

Personalized Osteopathic Care for Men with Chronic Primary Pelvic Pain Syndrome: A Case Series in Quebec

by
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Professional Program in Osteopathy

A thesis submitted to ENOSI Centre d'Ostéopathie de Montréal
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ABSTRACT

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INTRODUCTION: Chronic Primary Pelvic Pain Syndrome (CPPPS) is a disabling and underrecognized condition in men, characterized by persistent pelvic pain, urinary and sexual symptoms, and psychosocial distress. Conventional approaches often yield variable outcomes, highlighting the need for more integrative strategies. Osteopathy may represent a complementary approach within a biopsychosocial framework.

OBJECTIVES: To explore patterns of change temporally associated with individualized osteopathic care in men with CPPPS, and to examine how somatic dysfunction patterns and psychosocial vulnerability may relate to observed clinical trajectories.

METHODOLOGY: Prospective multiple-case series conducted in Quebec. Four adult men with physician-confirmed CPPPS received four sessions of individualized osteopathic care within a structured framework. Outcomes included VAS, NIH-CPSI, PDI, a Psychosocial Vulnerability Index (PSVI), clinical evaluation, and interviews.

RESULTS: Heterogeneous clinical trajectories were observed across cases. At the group level, reductions were noted in VAS (current pain), NIH-CPSI, and PDI scores over time, although the magnitude and pattern of change varied across participants. Three participants reached commonly cited thresholds for clinically meaningful improvement on selected measures. Participants with lower psychosocial vulnerability and more variable (transient) clinical findings tended to show more favorable trajectories, whereas more limited changes were observed in participants presenting with higher psychosocial burden and more persistent dysfunction patterns. A predominance of right-sided findings was also descriptively observed. Given the small sample size and exploratory design, these patterns should be interpreted cautiously and as hypothesis-generating.

CONCLUSION: This exploratory case series describes patterns of change observed during osteopathic care in CPPPS. Osteopathy may represent a component of multidimensional management, particularly in selected profiles; however, no conclusions regarding efficacy or causality can be drawn. Further controlled research is needed.

KEYWORDS: Chronic Primary Pelvic Pain Syndrome (CPPPS); Osteopathy; Biopsychosocial model; Pain Disability Index (PDI); NIH Chronic Prostatitis Symptom Index (NIH-CPSI); Visual Analog Scale (VAS); Psychosocial factors; Multidisciplinary care.

SOMMAIRE

Soins ostéopathiques personnalisés chez les hommes atteints du syndrome de douleur pelvienne chronique primaire (SDPCP) : une étude de cas multiples dans une perspective biopsychosociale au Québec

Par
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Mémoire présenté à ENOSI - Centre d'Ostéopathie de Montréal
en vue de l'obtention du Diplôme d'Études en Ostéopathie, grade de D.O.

INTRODUCTION : Le syndrome de douleur pelvienne chronique primaire (CPPPS) est une condition invalidante et sous-reconnue chez l'homme, caractérisée par des douleurs pelviennes persistantes, des symptômes urinaires et sexuels, ainsi qu'une détresse psychosociale. Les approches conventionnelles donnent souvent des résultats variables, soulignant la nécessité de stratégies plus intégratives. L'ostéopathie pourrait représenter une approche complémentaire dans un cadre biopsychosocial.
OBJECTIF: Explorer les profils d'évolution temporellement associés à une prise en charge ostéopathique individualisée chez des hommes atteints de CPPPS, et examiner les relations possibles entre les données cliniques, la vulnérabilité psychosociale et les trajectoires observées.
MÉTHODOLOGIE : Série de cas prospective réalisée au Québec. Quatre hommes adultes avec un diagnostic médical de CPPPS ont reçu quatre séances d'ostéopathie individualisée selon un cadre structuré. Les mesures incluaient le VAS, le NIH-CPSI, le PDI, un indice de vulnérabilité psychosociale (PSVI), une évaluation clinique standardisée et des entretiens.
RÉSULTATS : Des trajectoires hétérogènes ont été observées. Une diminution de la douleur, de la charge symptomatique et du handicap fonctionnel a été notée chez la majorité des participants, avec trois atteignant des seuils de changement cliniquement significatif. Des trajectoires plus favorables ont été observées chez les participants présentant une faible vulnérabilité psychosociale, tandis que des profils plus complexes ont montré des améliorations plus limitées. Une prédominance de dysfonctions du côté droit a également été observée de manière descriptive. Ces résultats doivent être interprétés avec prudence compte tenu du petit échantillon et du devis non contrôlé.
CONCLUSION : Cette série de cas exploratoire décrit des profils d'évolution observés lors d'une prise en charge ostéopathique du CPPPS. L'ostéopathie pourrait constituer une composante d'une approche multidimensionnelle, notamment dans certains profils cliniques. Aucune conclusion sur l'efficacité ou la causalité ne peut être établie. Des études contrôlées sont nécessaires.

MOTS-CLÉS : Syndrome de douleur pelvienne chronique primaire (SDPCP) ; Ostéopathie ; Modèle biopsychosocial ; Pain Disability Index (PDI) ; NIH Chronic Prostatitis Symptom Index (NIH-CPSI) ; Échelle visuelle analogique (EVA) ; Facteurs psychosociaux ; Soins multidisciplinaires.

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LIST OF ABBREVIATIONS

AMED - Allied and Complementary Medicine Database
BPS/IC - Bladder Pain Syndrome / Interstitial Cystitis
AMED - Allied and Complementary Medicine Database
BPS/IC - Bladder Pain Syndrome / Interstitial Cystitis
CBT - Cognitive Behavioral Therapy
CINAHL - Cumulative Index to Nursing and Allied Health Literature
CP/CPPS - Chronic Prostatitis / Chronic Pelvic Pain Syndrome
CPP - Chronic Pelvic Pain
CPPP - Chronic Pelvic-Perineal Pain
CPPS - Chronic Pelvic Pain Syndromes
CPPPS - Chronic Primary Pelvic Pain Syndrome
CSPP - Chronic Secondary Pelvic Pain
DO - Diploma in Osteopathy
EAU - European Association of Urology
EMG - Electromyography
EPT - Evolution Post-Treatment
HRV - Heart Rate Variability
HPAaxis - Hypothalamic-Pituitary-Adrenal axis
HVLA - High Velocity Low Amplitude
ICD-11 - International Classification of Diseases, 11th Revision
IASP - International Association for the Study of Pain
LUTS - Lower Urinary Tract Symptoms
MAPPNetwork - Multidisciplinary Approach to the Study of Chronic Pelvic Pain
MFR - Myofascial Release
MeSH - Medical Subject Headings
NIH-CPSI - National Institutes of Health Chronic Prostatitis Symptom Index
NSAIDs - Nonsteroidal Anti-Inflammatory Drugs
OMT - Osteopathic Manipulative Treatment
PBPS - Primary Bladder Pain Syndrome
PDI - Pain Disability Index
PICOTS - Population, Intervention, Comparator, Outcomes, Timing, Study design
PNE - Pudendal Nerve Entrapment
PRISMA - Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PSVI - Psychosocial Vulnerability Index
QoL - Quality of Life
ROM - Range of Motion
RCT - Randomized Controlled Trial
RSGVP fasciae - Recto-Sacro-Genito-Vesico-Pubic fasciae
SIJ - Sacroiliac Joint

SSRIs - Selective Serotonin Reuptake Inhibitors
TCAs - Tricyclic Antidepressants
TEM - Technique d'Équilibrage Musculaire
TENS - Transcutaneous Electrical Nerve Stimulation
UPOINT - Urinary, Psychosocial, Organ-specific, Infection, Neurological/Systemic, Tenderness, SexualDysfunction classification
VAS - Visual Analogue Scale
WHO - World Health Organization

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1. INTRODUCTION

1.1. Contextualization

To support a comprehensive understanding of this thesis, the following sections explore four core concepts: a general overview of the male pelvic anatomy, the physiological basis of pain, the clinical features of chronic pelvic pain (CPP) in men and osteopathy principles guiding its management. These components establish the anatomical, neurophysiological, clinical, and therapeutic context required to interpret the study's scope and relevance.

1.1.1 Conceptual Overview of the Male Pelvis and Perineum

The human body is a complex and integrated biological system composed of multiple interrelated structures and systems. It is organized into distinct anatomical regions and functional components, including the skeletal, muscular, nervous, circulatory, and visceral systems, all working in coordination to maintain homeostasis and support life. Structurally, the body can be divided into the head, neck, trunk, and limbs. The trunk, which houses vital thoracic, abdominal, and pelvic organs, serves as the central axis of the body and is essential to core physiological functions.

The male pelvis (plural: pelves or pelvises) constitutes the most caudal portion of the trunk, positioned between the abdominal cavity superiorly and the proximal lower limbs inferiorly. As shown in Figure 1, the male pelvis can be divided into the greater (false) and lesser (true) pelvis, each containing distinct osseous and visceral structures (*Gray's Anatomy for Students*, 4th Edition). It is a highly integrated region that combines osseous, articular, muscular, fascial, vascular, neural, and visceral components, which together form a functional unit essential for stability, locomotion, and the regulation of urinary, digestive, and reproductive processes (Standring, 2021; Drake et *al.*, 2019).

Figure 1: Divisions of the male pelvis.

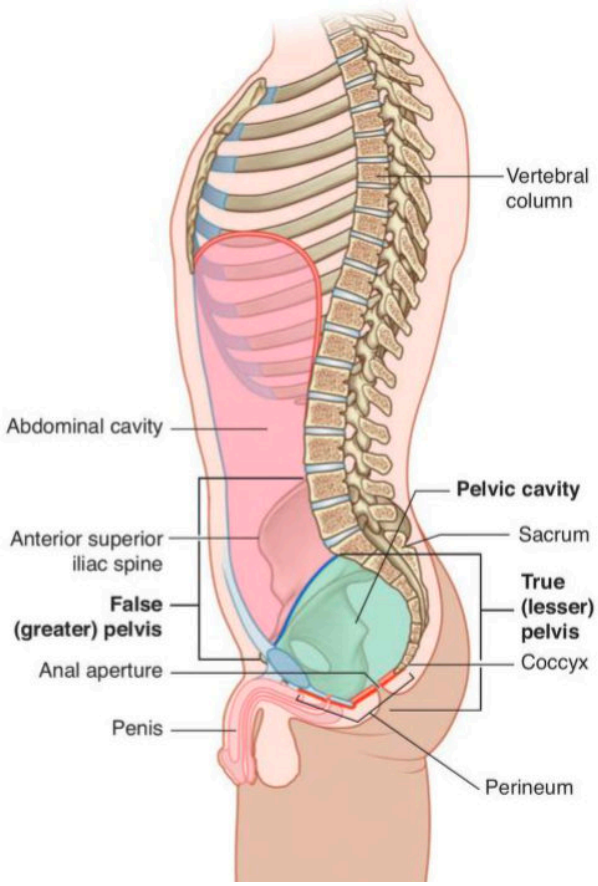
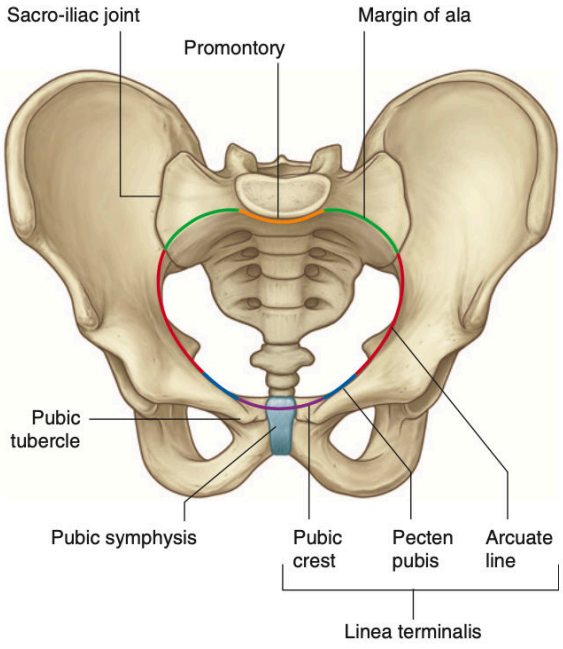


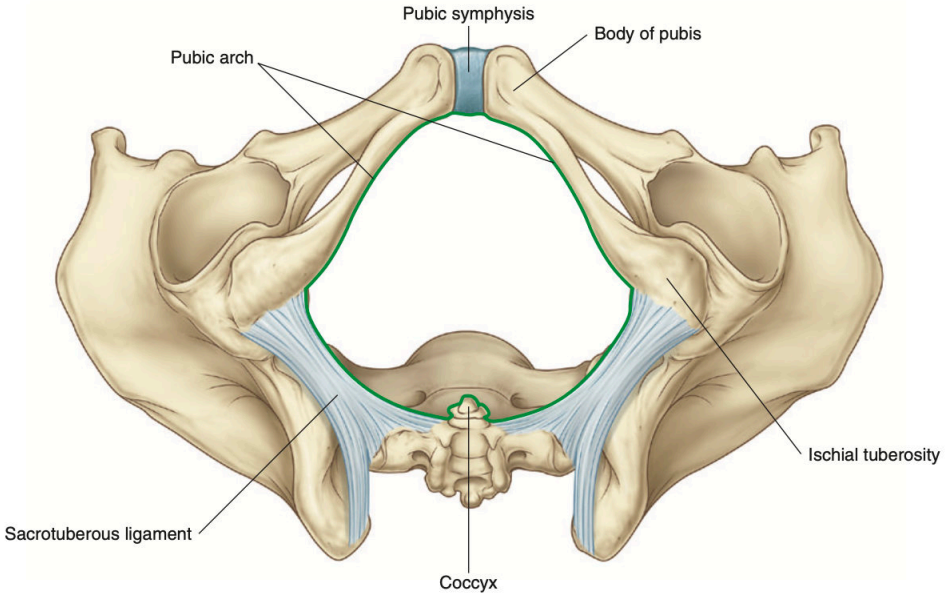
Figure taken from Gray's Anatomy for Students, Edition 4.

The greater pelvis, or *false pelvis*, lies superior to the pelvic brim and represents a continuation of the abdominal cavity. The *pelvic brim*, also known as the *pelvic inlet* (represented in Figure 2), marks the boundary between the greater and lesser pelvis. It is formed posteriorly by the sacral promontory and alae of the sacrum, laterally by the arcuate and pectineal lines, and anteriorly by the pubic crest and the superior margin of the pubic symphysis. The greater pelvis is bounded by the iliac fossae and the anterior abdominal wall anteriorly, and by the lumbar vertebrae and sacral base posteriorly. Because it lacks a superior limit, it remains open and continuous with the abdominal cavity. Functionally, it provides support for the lower abdominal viscera, including parts of the ileum, cecum, and sigmoid colon. Clinically, enlargement of abdominal organs, such as intestinal loops or masses, may extend into this region, reflecting its continuity with the abdominal compartment (Standring, 2021).

Figure 2: A. The Pelvic Inlet; B. The Pelvic Outlet



A



B

Figures taken from Gray's Anatomy for Students, Edition 4.

The lesser pelvis, or *true pelvis*, lies inferior to the pelvic inlet and is enclosed by the pubic bones, ischia, sacrum, and coccyx. This region forms a closed bony cavity with a pelvic inlet superiorly, muscular and ligamentous walls laterally, and the pelvic outlet inferiorly. The pelvic inlet is oriented obliquely, facilitating the descent of abdominal viscera into the pelvic cavity. The pelvic outlet forms the inferior boundary, delimited anteriorly by the pubic symphysis, posteriorly by the coccyx, and laterally by the ischial tuberosities and sacrotuberous ligaments.

The pelvic walls are formed by the sacrum, coccyx, and the inferior portions of the hip bones, and are reinforced by strong ligaments such as the sacrospinous and sacrotuberous. Muscular boundaries include the obturator internus along the anterolateral wall and the piriformis posterolaterally. Within these walls lie three key apertures, represented in Figure 3: the obturator canal, the greater sciatic foramen, and the lesser sciatic foramen, which transmit essential neurovascular structures such as the obturator, sciatic, and pudendal nerves, as well as the internal pudendal vessels.

Figure 3: Key apertures of the Pelvic Wall

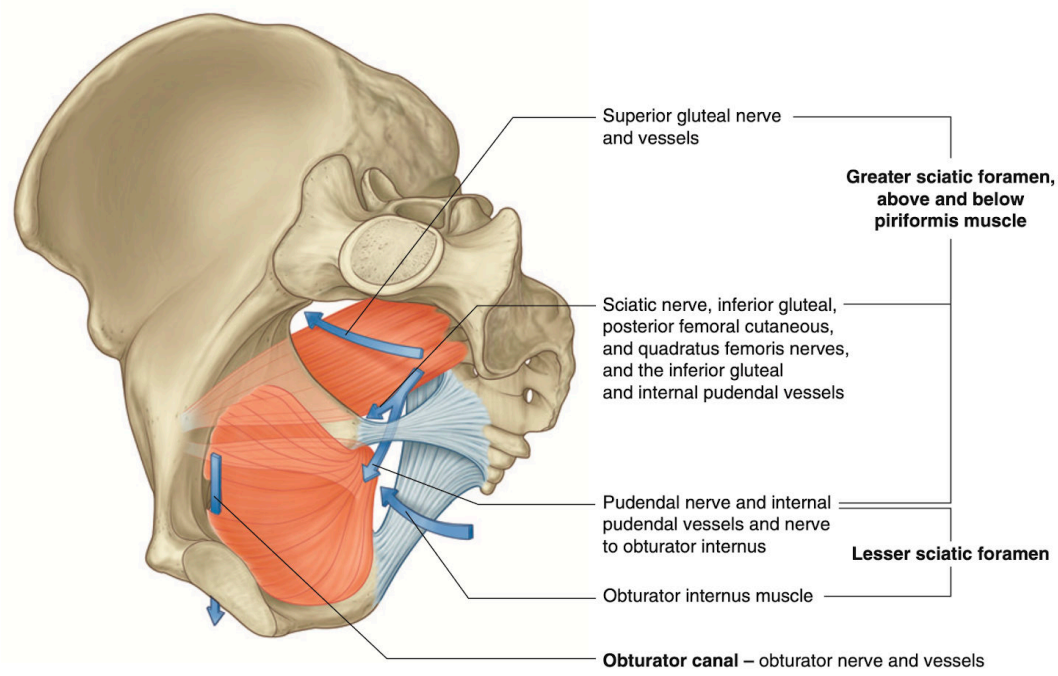


Figure taken from Gray's Anatomy for Students, Edition 4.

The pelvic cavity, defined as the space between the pelvic inlet and the pelvic floor, houses critical male pelvic organs including the bladder, prostate, seminal vesicles, and rectum. Its compact arrangement explains the functional interdependence of pelvic systems and the propensity for pathology in one organ to affect others through shared fascial and neurovascular connections (Drake et *al.*, 2019).

Inferior to the pelvic cavity lies the pelvic floor (Figure 4), or pelvic diaphragm, which forms the muscular and fascial support separating the pelvis from the perineum. It is primarily composed of the levator ani muscles (puborectalis, pubococcygeus, iliococcygeus) and the coccygeus, with additional reinforcement from the perineal membrane and the muscles of the deep perineal pouch. The pelvic floor plays a central role in visceral support, maintenance of continence, and regulation of intra-abdominal pressure. Dysfunction of this system, whether through trauma, neurological injury, or muscular weakness, may result in pelvic organ prolapse, urinary or fecal incontinence, or pelvic pain syndromes (Moore et *al.*, 2018).

Figure 4: Pelvic Floor

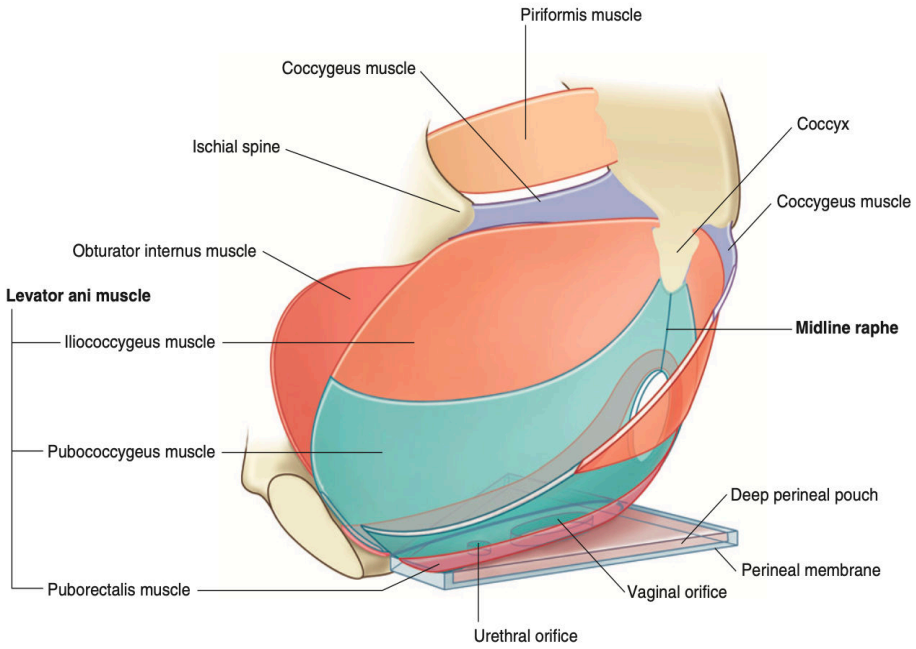


Figure taken from Gray's Anatomy for Students, Edition 4.

The perineum (Figure 5) lies inferior to the pelvic floor and represents the most external division of the pelvic region. It is a diamond-shaped anatomical area bounded anteriorly by the pubic symphysis, posteriorly by the coccyx, and laterally by the ischial tuberosities. A transverse line drawn between the ischial tuberosities divides it into two functional triangles: the urogenital triangle anteriorly, which contains the distal urethra, erectile tissues, and associated muscles, and the anal triangle posteriorly, which contains the anal canal and sphincter complex. The perineum also houses important neurovascular structures, including branches of the pudendal nerve and internal pudendal vessels, which are essential for excretory and sexual functions. This close relationship between the neurovascular supply and pelvic organs underlies many clinical syndromes, including erectile dysfunction and pudendal neuralgia (Drake et *al*., 2019).

Figure 5: Male Perineum

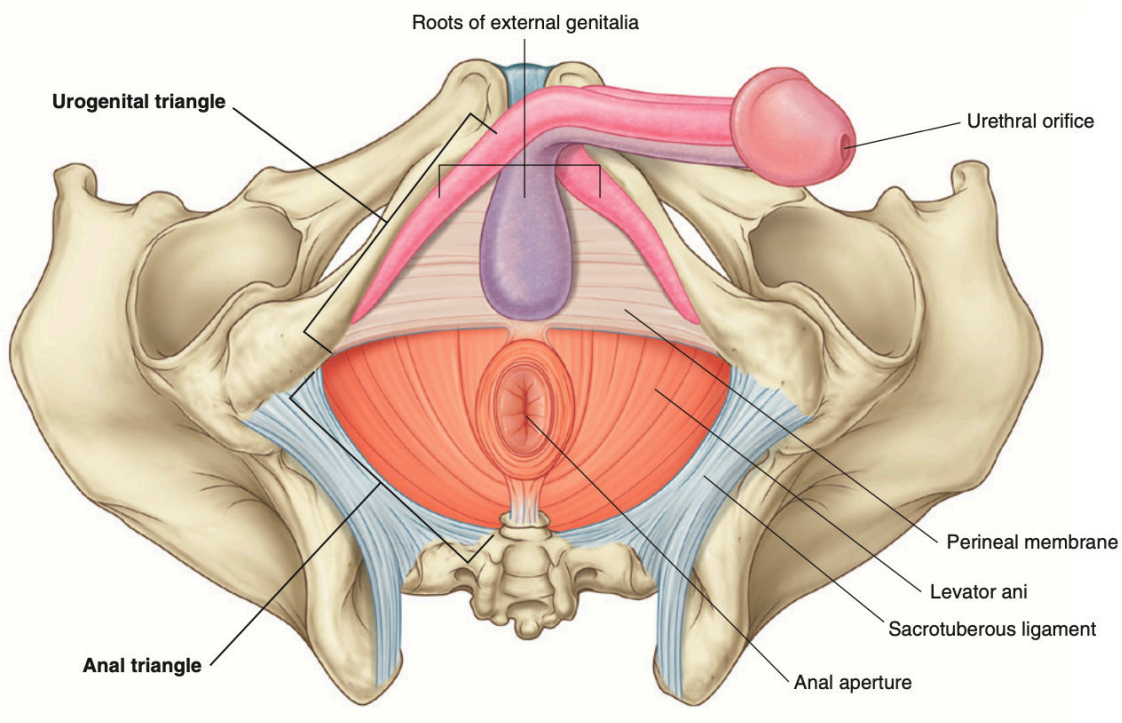


Figure taken from Gray's Anatomy for Students, Edition 4.

Importance of Neurovascular Structures

The vascular system of the pelvis provides arterial perfusion and venous drainage to the viscera and erectile tissues, while also contributing to thermoregulation, especially in the testes through the pampiniform venous plexuses. The nervous system supplies both somatic innervation(responsible for voluntary motor control and conscious sensory perception) and autonomic innervation, which regulates smooth muscle contraction, glandular secretion, and vascular tone. Autonomic fibers converge in plexuses, which are networks of intersecting nerves such as the inferior hypogastric plexus, where sympathetic and parasympathetic fibers intermingle before distributing to the pelvic organs (Standring, 2021). These neurovascular structures are critical for continence, sexual function, visceral motility, and pain perception. Their location within defined fascial planes provides protection and efficient distribution but also makes them susceptible to entrapment, compression, or injury, which can have significant clinical consequences. The anatomical continuity of these neurovascular pathways, and their communication with adjacent compartments such as the perineum and abdominal cavity, is illustrated in Figure 6.

Figure 6: Areas of communication between the perineum and other regions.

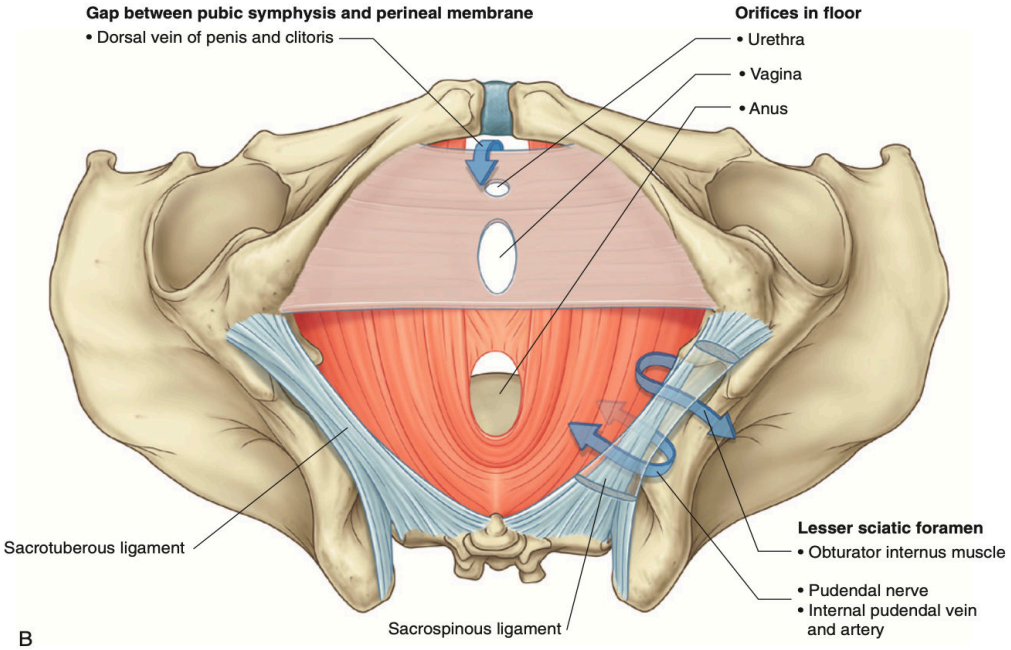


Figure taken from Gray's Anatomy for Students, Edition 4.

Integrative Role

The pelvis also plays a biomechanical role as the keystone of the axial skeleton. It transmits weight from the vertebral column to the lower limbs, absorbs mechanical stresses, and stabilizes posture. Its integration of musculoskeletal mechanics with visceral support and neurovascular regulation underscores the central role of the pelvis in both health and disease.

In summary, the male pelvis and perineum form a transitional and multifunctional anatomical region that unites skeletal support, muscular control, fascial continuity, visceral function, and neurovascular regulation. The male pelvis and perineum function as both a structural bridge between the trunk and lower limbs and a functional container for the pelvic viscera. They also serve as a dynamic support system, maintaining visceral stability through the pelvic floor while enabling locomotion and pressure regulation.

For clarity, this section provides only a conceptual overview. A detailed and systematic description of the male pelvic anatomy (including osteology, arthrology, myology, fasciae, viscera, innervation, vascularization, and biomechanics) is provided in Appendix 8, which establishes the anatomical foundation for the clinical and research discussions that follow.

1.1.2 Pain

A precise definition of pain is essential for understanding the effects of osteopathic manual therapy on chronic pelvic pain syndromes (CPPS) in men. Clear terminology ensures consistent diagnosis, classification, and outcome evaluation, strengthening the scientific validity of this study. The International Association for the Study of Pain (IASP, 2020) defines pain as *"an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage."*

Pain is first classified by duration. Acute pain is recent in onset, protective, and resolves with tissue healing. Chronic pain or persistent pain persists beyond the expected recovery period, typically defined as pain present almost daily for at least three months, with significant functional impact (Youngjoo and *al.*, 2023). Chronic pain may evolve from a nociceptive or neuropathic origin into nociplastic pain, driven by central sensitization mechanisms (Woolf, 2011). CPPS often involves overlapping mechanisms, requiring a multidimensional treatment approach.

From a neurobiological perspective, pain is categorized as nociceptive, neuropathic, or nociplastic.

1.1.2.1 Nociceptive Pain

Nociceptive pain arises from actual or potential damage to non-neural tissue and is mediated by nociceptors in the skin, muscles, joints, and viscera. As represented in Figure 7, these receptors detect noxious mechanical, thermal, or chemical stimuli and transmit signals via peripheral nerves to the spinal cord, where they are processed by the brain's pain matrix (Apkarian and *al*., 2009). Clinically, this pain is localized, aching, throbbing, or sharp, and worsens with movement or pressure. In CPPS, it may originate from musculoskeletal strain, ligamentous tension, or visceral inflammation.

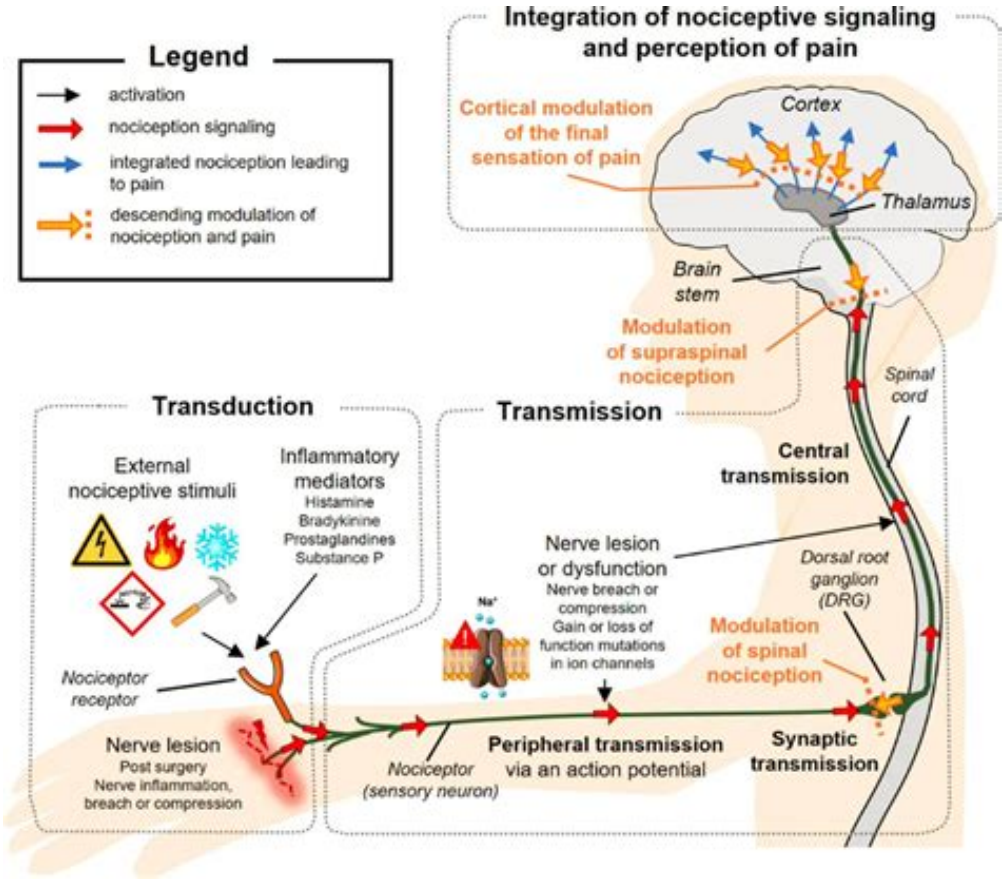
Peripheral sensitization sustains nociceptive pain when:

- nociceptors are directly activated by noxious stimuli,
- silent afferents become responsive after injury (Willis, 2006),

- pro-inflammatory mediators (e.g., prostaglandins, cytokines) heighten sensitivity (McMahon and *al*., 2005),
- receptor thresholds are lowered, increasing neuronal excitability.

These changes may persist beyond tissue healing, maintaining abnormal input and promoting central sensitization (Basbaum and *al*., 2009).

Figure 7: Schematic illustration of the nociceptive pathway

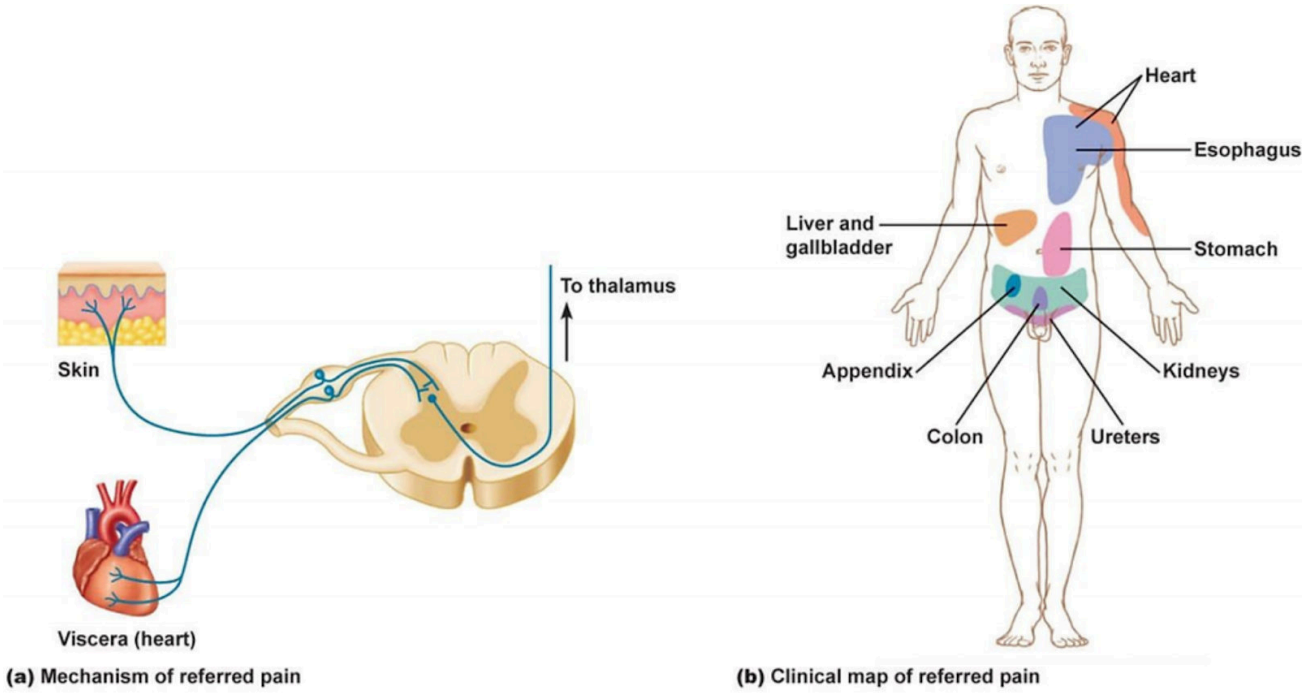


*From "Micro- and nanocarriers for pain alleviation," by A. da Silva, S. Lepetre-Mouelhi, & P. Couvreur, *Advanced Drug Delivery Reviews*, 187, 114359 (2022). https://doi.org/10.1016/j.addr.2022.114359. Copyright 2022 by Elsevier. Reproduced without modification.*

Referred pain is another important feature, especially in visceral and deep somatic sources. It occurs when afferent fibers from visceral and somatic structures converge on the same spinal neurons, leading the brain to misattribute visceral pain to somatic regions (Willis, 2006). Somatic pain is typically sharp and well localized, whereas visceral pain tends to be diffuse,

cramping, and often accompanied by autonomic responses such as nausea or sweating (Cervero & Laird, 1999; Millan, 1999). In CPP, nociceptive input from the prostate, bladder, uterus, or pelvic floor may be perceived in the abdomen, perineum, lumbar spine, or thighs (Sluka & Walsh, 2003; Cervero & Tattersall, 1986). This convergence mechanism and its resulting referral patterns are illustrated in Figure 8, which depicts the spinal organization and somatic projection zones of visceral afferents (*OpenStax*, 2013).

Figure 8: Referred Pain Mechanism and Map



*From *Clinical Map and Spinal Mechanism of Referred Pain* by OpenStax, 2013, OpenStax CNX. https://openstax.org/. Licensed under CC BY 4.0. Reproduced without modification.*

1.1.2.2 Neuropathic Pain

Neuropathic pain results from damage or dysfunction of the somatosensory system, affecting both peripheral and central pathways. Unlike nociceptive pain, it originates from maladaptive neural changes rather than ongoing tissue injury.

At the peripheral level, damaged nerves may fire spontaneously, generate ectopic discharges, or become hypersensitive due to altered ion channel expression (upregulated sodium,

downregulated potassium), increasing excitability (Jensen and *al*., 2011). Neuroma formation or demyelination may further disrupt conduction.

At the central level, persistent abnormal input leads to synaptic reorganization, loss of inhibitory control, and receptive field expansion. This creates allodynia (pain from normally non-painful stimuli) and hyperalgesia (exaggerated pain from painful stimuli). Pain perception may persist even after the initial lesion has resolved.

Figure 9: Neuropathic pain arises following nerve injury or dysfunction

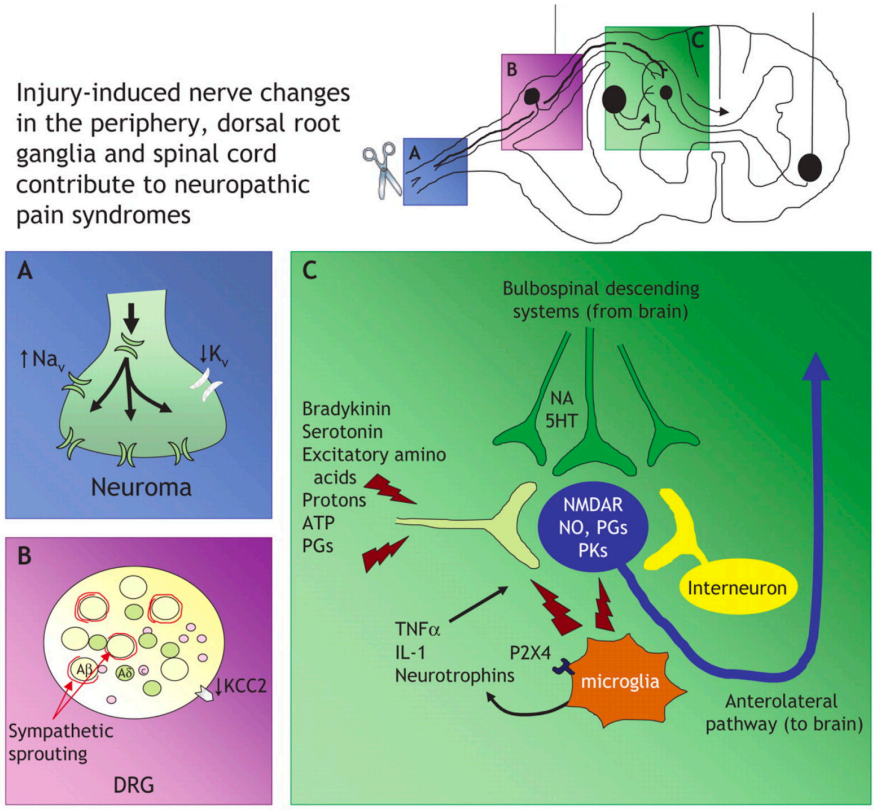


Figure taken from Neuropathic pain: A practical guide for the clinician by Gilron, I., Watson, C. P. N., Cahill, C. M., & Moulin, D. E. (2006), CMAJ, 175(3), 265-275. https://doi.org/10.1503/cmaj.060146

Together, these peripheral and central mechanisms form the basis of neuropathic pain, which is characterized not only by spontaneous discharges and heightened excitability but also by maladaptive plasticity within the somatosensory system.

1.1.2.3 Nociplastic Pain and Central Sensitization

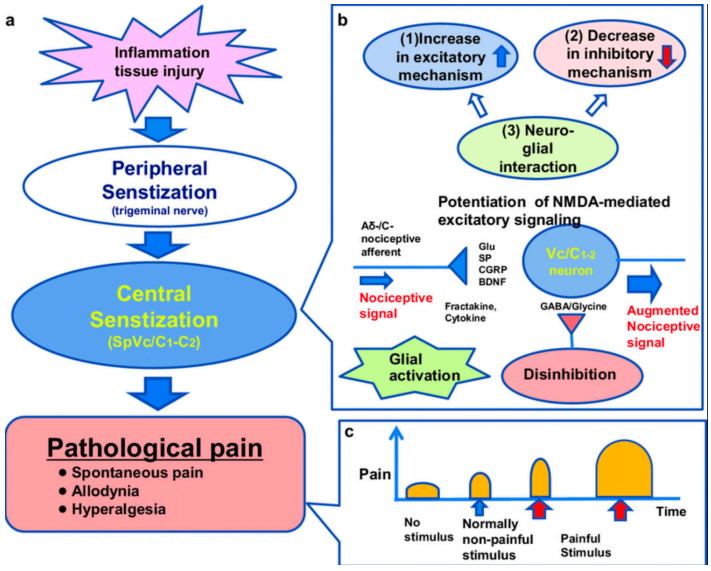
Nociplastic pain arises from altered nociceptive processing without clear evidence of tissue injury (nociceptive) or nerve lesion (neuropathic). It is driven by *central sensitization*, where the CNS becomes hypersensitive and amplifies both noxious and innocuous inputs (Clauw, 2015).

Key mechanisms include:

- Neuronal wind-up: repeated nociceptive input heightens dorsal horn responsiveness via glutamate, substance P, and N-methyl-D-aspartate (NMDA) receptor activation (Woolf, 2011).
- Deficient inhibition: impaired descending control from the PAG/RVM and local interneurons leads to disinhibition (Latremoliere & Woolf, 2009).
- Neuroinflammation: activated glial cells release cytokines and reactive species, perpetuating hyperexcitability (Ji et *al.*, 2013).
- Cortical reorganization: altered functional connectivity in the pain matrix affects cognition and emotion, further amplifying pain (Apkarian et *al*., 2009).

Clinically, nociplastic pain is disproportionate, diffuse, persistent, and often resistant to analgesics.

Figure 10: The mechanism underlying central sensitization and pathological pain.



Taken from Neurophysiology of Orofacial Pain by J. P. Okeson, in Contemporary Oral Medicine, 2017 (pp. 1-23). https://doi.org/10.1007/978-3-319-28100-1_8-2

In practice, many CPP cases involve mixed mechanisms, combining nociceptive, neuropathic, and nociplastic components. These overlaps complicate diagnosis and demand multimodal, individualized treatment approaches.

Table 1

Pain Classifications

Type of Pain	Duration	Neurobiological Basis	Characteristics	Examples
Nociceptive	Acute/Chronic	Activation of nociceptors from tissue damage/inflammation	Localized, aching, throbbing; acute resolves with healing, chronic persists with ongoing injury	Sprain (acute), osteoarthritis (chronic)
Neuropathic	Acute/Chronic	Lesion/dysfunction of somatosensory system	Burning, shooting, tingling; spontaneous or evoked	Postoperative neuropathy, diabetic neuropathy
Nociplastic	Acute/Chronic	Central sensitization, altered processing	Diffuse, widespread, inconsistent; often resistant to treatment	Fibromyalgia, post-surgical persistent pain
Mixed	Acute/Chronic	Combination of above mechanisms	Overlapping, complex presentation	Complex regional pain syndrome, CPPS

Adapted from the International Association for the Study of Pain (IASP, 2021); Kosek et al. (2021); and Scholz et al. (2019).

1.1.3 CPPS in Males

1.1.3.1 Definition of CPP

According to the European Association of Urology (EAU), CPP is defined as persistent or recurrent pain perceived in pelvic structures lasting at least three months, often accompanied by urinary, sexual, bowel, or pelvic floor symptoms. The condition is strongly associated with negative cognitive, emotional, behavioral, and sexual consequences.

The wording "*perceived*" highlights that diagnosis relies on clinical consensus between patient and practitioner, based on history, examination, and appropriate investigations, rather than on definitive biomarkers (Engeler et *al*., 2013).

1.1.3.2 Classification of CPP

The EAU and the International Association for the Study of Pain (IASP, ICD-11) classify CPP into two main categories: Chronic Secondary Pelvic Pain (CSPP) and Chronic Primary Pelvic Pain Syndromes (CPPPS). CSPP refers to pain associated with a well-defined pathology such as infection, inflammation, malignancy, or neuropathy, sometimes called *well-defined diseases* or *confusable conditions*. In contrast, CPPPS is a diagnosis of exclusion, defined as persistent pain without identifiable pathology and increasingly understood as a primary pain disorder, reflecting maladaptive central pain processing rather than localized tissue damage (Treede et *al*., 2019; IASP, 2021).

This thesis focuses exclusively on CPPPS, also termed *CPPS* by the IASP.

Multi-System Involvement and Classification Debate

Within CPPPS, pain may be localized to a specific organ (such as in *Primary Bladder Pain Syndrome* or *Primary Rectal Pain Syndrome*) or distributed across multiple sites, in which case the umbrella term CPPPS is preferred. Importantly, these organ-based labels do not imply local organ pathology, but rather indicate the predominant symptom site. Because many patients present with overlapping urinary, bowel, sexual, and musculoskeletal complaints, organ-specific classifications often fail to capture the true complexity of the disorder.

Table 2

Overview of the CPPS by region

Chronic pelvic pain syndromes (CPPS) in Men	
Urological pain syndromes	
Bladder pain syndrome (BPS)*	pain in the urinary bladder region, accompanied by at least one other symptom: pain worsening with bladder filling day-time and/or night-time urinary frequency
Urethral pain syndrome	pain perceived in the urethra
Penile pain syndrome	pain within the penis that is not primarily in the urethra
Prostate pain syndrome	pain which is convincingly reproduced by prostate palpation
Scrotal pain syndrome	pain localized within the organs of the scrotum; generic term when the site of the pain is not clearly testicular or epididymal
Testicular pain syndrome	pain perceived in the testes
Post-vasectomy pain syndrome	scrotal pain syndrome that follows vasectomy
Epididymal pain syndrome	pain perceived in the epididymis
Musculoskeletal system	
Pelvic floor muscle pain syndrome	pelvic floor pain that may be associated with overactivity of or trigger points within the pelvic floor muscles or trigger points found in muscles, such as the abdominal, thigh and paraspinal muscles and even those not directly related to the pelvis
Coccyx pain syndrome	pain perceived in the region of the coccyx
Gastrointestinal pelvic pain syndromes	
Irritable bowel syndrome (IBS)	pain perceived in the bowel, according to the Rome III criteria
Chronic anal pain syndrome	pain perceived in the anus
Intermittent chronic anal pain syndrome	pain unrelated to the need to or the process of defecation, that seems to arise in the rectum or anal canal
Pudendal pain syndrome	
*** ESSIC proposal (adapted from [2])**	

Table reproduced from EAU (2023).

Recent research emphasizes the systemic and multidimensional nature of CPPPS, which is frequently associated with comorbid conditions such as fibromyalgia, chronic fatigue syndrome, irritable bowel syndrome, and autoimmune disorders. Programs like the MAPP Network (Multidisciplinary Approach to the Study of CPP) argue for moving away from rigid organ-based classifications toward symptom- and mechanism-based frameworks that better reflect central sensitization, systemic disturbances, and psychosocial factors.

Figure 11: EAU Classification of CPPS

Axis I Region		Axis II System	Axis III End-organ as pain syndrome as identified from Hx, Ex and Ix	Axis IV Referral characteristics	Axis V Temporal characteristics	Axis VI Character	Axis VII Associated symptoms	Axis VIII Psychological symptoms
Chronic pelvic pain	Chronic secondary pelvic pain syndrome, formally known as specific disease associated pelvic pain OR Chronic primary pelvic pain syndrome, formally known as pelvic pain syndrome	Urological	Prostate	Suprapubic Inguinal Urethral Penile/clitoral Perineal Rectal Back Buttocks Thighs	ONSET Acute Chronic ONGOING Sporadic Cyclical Continuous TIME Filling Emptying Immediate post Late post TRIGGER Provoked Spontaneous	Aching Burning Stabbing Electric	UROLOGICAL Frequency Nocturia Hesitancy Dysfunctional flow Urgency Incontinence GYNAECOLOGICAL Menstrual Menopause GASTROINTESTINAL Constipation Diarrhoea Bloatedness Urgency Incontinence NEUROLOGICAL Dysaesthesia Hyperaesthesia Allodynia Hyperalgesia SEXUOLOGICAL Satisfaction Female dyspareunia Sexual avoidance Erectile dysfunction Medication MUSCLE Function impairment Fasciculation CUTANEOUS Trophic changes Sensory changes	ANXIETY About pain or putative cause of pain Catastrophic thinking about Pain DEPRESSION Attributed to pain or impact of pain Attributed to other causes Unattributed PTSD SYMPTOMS Re-experiencing Avoidance
			Bladder					
			Scrotal Testicular Epididymal					
			Penile Urethral					
			Post-vasectomy					
		Gynaecological	Vulvar Vestibular Clitoral					
			Endometriosis associated					
			CPPPS with cyclical exacerbations					
			Dysmenorrhoea					
		Gastrointestinal	Irritable bowel					
			Chronic anal					
			Intermittent chronic anal					
		Peripheral nerves	Pudendal pain syndrome					
		Sexological	Dyspareunia					
			Pelvic pain with sexual dysfunction					
		Psychological	Any pelvic organ					
		Musculo-skeletal	Pelvic floor muscle Abdominal muscle Spinal					
			Coccyx Hip muscle					

Figure taken from EAU (2023).

A widely used clinical tool in this regard is the UPOINT system (Nickel et *al*., 2009), which classifies patients into phenotypic domains (Urinary, Psychosocial, Organ-specific, Infection, Neurological/systemic, Tenderness (musculoskeletal), and Sexual dysfunction). This multidomain approach recognizes the heterogeneity of CPPPS and provides a practical basis for individualized, multimodal management. Figure 12 summarizes the recommended phenotyping domains and associated clinical assessments as outlined by the EAU, providing a structured approach to guide multidisciplinary evaluation and targeted management planning.

One example of a CPPPS subtype is Primary Perineal Pain Syndrome, characterized by neuropathic-type pain in the pudendal nerve distribution without identifiable pathology. It frequently coexists with urinary, sexual, or rectal symptoms and illustrates the overlap of peripheral, central, and psychosocial factors that define CPPPS.

Figure 12: Phenotyping of pelvic pain - UPOINT classification

Phenotyping	Assessment
Urology	Urinary flow, micturition diary, cystoscopy, ultrasound, uroflowmetry.
Psychology	Anxiety about pain, depression and loss of function, history of negative sexual experiences.
Organ specific	Ask for gynaecological, gastro-intestinal, ano-rectal, sexological complaints. Gynaecological examination, rectal examination.
Infection	Semen culture and urine culture, vaginal swab, stool culture.
Neurological	Ask for neurological complaints (sensory loss, dysaesthesia). Neurological testing during physical examination: sensory problems, sacral reflexes and muscular function.
Tender muscle	Palpation of the pelvic floor muscles, the abdominal muscles and the gluteal muscles.
Sexological	Erectile function, ejaculatory function, post-orgasmic pain.

Figure taken from EAU (2023).

1.1.3.3 Epidemiology

Epidemiology examines the distribution, patterns, and determinants of health conditions in specific populations. In the case of CPPS , epidemiological data provide important insights into incidence, prevalence, and population burden. However, estimates remain limited, particularly for male populations and for subtypes of CPPPS (Collins et *al*., 1998; Krieger et *al*., 2002).

Incidence refers to the number of new cases arising in a population during a given period. For CPPPS, reliable incidence data are scarce, and subtype-specific estimates are lacking, making it difficult to assess trends or population-level risk with precision.

Prevalence, which measures the proportion of affected individuals at a given time, is better studied. Overall prevalence of CPPPS in men ranges between 2% and 16%, depending on methodology and population studied (Collins et *al*., 1998; Krieger et *al*., 2002). The condition most often affects men aged 20-50 years, with significantly lower rates in adolescents and older men.

The most prevalent male subtype is Chronic Prostatitis/Chronic Pelvic Pain Syndrome (CP/CPPS), which accounts for 90-95% of all prostatitis cases. Prevalence estimates range from 2% to 10%, and men aged 50-59 years have a threefold higher risk compared with those aged 20-39 (Clemens et *al*., 2007).

Other subtypes show more variable prevalence. Primary Bladder Pain Syndrome (PBPS) affects both sexes, but with a strong female predominance (female-to-male ratio ~10:1). Reported prevalence ranges widely, from 0.06% to 20%, reflecting differences in diagnostic criteria (Nickel et *al*., 2012). Within PBPS, Hunner's lesion subtype represents approximately 5-50% of cases. Though predominantly seen in adults, PBPS has also been described in children (Sant et *al*., 2007).

Chronic scrotal pain syndromes, such as testicular pain syndrome and epididymal pain syndrome, are less well quantified. Estimates suggest up to 4% of men in urological practice present with chronic scrotal pain, highlighting its clinical significance (Potts et *al*., 2000).

Neuropathic pelvic pain syndromes, though less common, represent important diagnostic categories. Pudendal neuralgia, for example, is a rare but increasingly recognized cause of chronic perineal pain in men. It is frequently associated with activities such as cycling or prolonged sitting (Labat et *al*., 2008). Other neuropathic forms include ilioinguinal and genitofemoral neuralgia, which can mimic or coexist with other pelvic pain conditions.

In summary, epidemiological evidence confirms that CPPPS is a common but heterogeneous condition in men, with prevalence estimates varying by subtype and diagnostic framework. The high burden of CP/CPPS, the under-recognition of neuropathic forms, and the variability in PBPS data underscore the need for more standardized epidemiological studies. While epidemiological data highlight the widespread and variable nature of CPPPS, these figures gain greater meaning when examined through its clinical expression. Understanding how the condition presents across multiple interrelated systems is crucial to grasping its diagnostic and therapeutic challenges.

1.1.3.4 Clinical Presentation

The clinical presentation of chronic primary pelvic pain syndromes (CPPP) in men is heterogeneous, spanning physical, urological, sexual, neurological, musculoskeletal, and psychological domains that frequently overlap and interact.

1. **Pelvic Pain**

Persistent or recurrent pelvic pain is the hallmark symptom. It may localize to the perineum, lower abdomen, penis, scrotum, anus, or inner thighs, and is often described as dull, burning, stabbing, or throbbing. Pain may be unilateral or bilateral, fluctuate in intensity, and radiate to the lower back or thighs, complicating diagnosis. Common aggravating factors include prolonged sitting, walking, urination, ejaculation, and bowel movements (Anderson et *al*., 2007).

2. **Lower Urinary Tract Symptoms (LUTS)**

Urinary frequency, urgency, hesitancy, dysuria, and incomplete bladder emptying are frequently reported. While these mimic urinary tract infection or benign prostatic hyperplasia, diagnostic testing usually reveals no such pathology (Shoskes & Nickel, 2012). Instead, symptoms are often linked to pelvic floor muscle dysfunction, autonomic dysregulation, or afferent nerve sensitization.

3. **Sexual Dysfunction**

Sexual health is commonly affected. Patients may report pain during or after ejaculation, reduced libido, erectile dysfunction, or dissatisfaction with sexual activity. Symptoms stem from both physical contributors (pelvic floor hypertonicity, neuromuscular tension, or vascular compromise) and psychological distress associated with chronic, unpredictable pain. Anticipatory anxiety around intercourse can further perpetuate dysfunction (Clemens et *al*., 2007; Tripp et *al*., 2006).

4. **Anorectal Symptoms**

Anal and rectal pain often presents as burning, numbness, or pressure, sometimes worsening with defecation. Chronic constipation may occur, frequently due to pelvic floor

dyssynergia or anorectal hypersensitivity. These symptoms are particularly distressing and contribute to avoidance behaviors and social withdrawal (Zermann et *al*., 2003).

5. **Musculoskeletal and Neurological Manifestations**

Musculoskeletal dysfunction is integral to CPPP. Many patients exhibit chronic low back pain, pelvic girdle instability, and myofascial pain syndromes, often accompanied by hypertonicity and trigger points in the pelvic floor, abdominal wall, or lumbar spine (Anderson et *al*., 2005). Neural involvement, particularly pudendal nerve entrapment, may produce neuropathic features such as sharp, shooting pain, paresthesia, or allodynia. Patients also report abdominal or gluteal spasms, highlighting the interaction between musculoskeletal dysfunction and neuropathic mechanisms (FitzGerald & Kotarinos, 2003; Anderson et *al*., 2007).

6. **Systemic and Psychological Symptoms**

Chronic pain frequently extends beyond the pelvis, producing fatigue, sleep disturbance, and cognitive difficulties ("brain fog"). Mental health comorbidities- including anxiety, depression, and somatization- are disproportionately prevalent. Psychological distress correlates strongly with pain severity, diminished quality of life, and increased healthcare use (Tripp et *al*., 2006). Maladaptive coping strategies such as catastrophizing amplify pain via central sensitization. These psychosocial factors may both precede and result from pain, creating a self-reinforcing cycle of symptom persistence and treatment resistance (Tripp et al., 2009; Mehik et *al*., 2000).

Conclusion

CPPPS rarely presents in isolation; instead, it encompasses a constellation of urological, gastrointestinal, sexual, musculoskeletal, neurological, and psychological symptoms. This complexity complicates diagnosis, management, and prognosis, and underscores the necessity of interdisciplinary and biopsychosocial treatment approaches.

1.1.3.5 Etiology, Pathophysiology, and Risk Factors of CPPPS in Men

CPPPS in men is a complex condition without a singular cause, characterized by interacting biological, psychological, lifestyle, genetic, and sociocultural factors. These elements intertwine to

perpetuate self-sustaining, individualized pain cycles influenced by patient-specific vulnerabilities (Nickel & Tripp, 2019; Shoskes et *al*., 2017).

1. Peripheral Mechanisms

1.1 Persistent Nociceptive Input

Persistent nociceptive input occurs due to ongoing activation of peripheral pain receptors (nociceptors) triggered by inflammation, tissue damage, mechanical stress, or chemical irritation, often persisting beyond the resolution of the initial injury or infection. Common initiating factors include infections, surgeries, and trauma.

1.1.1 Infection

Infections, such as sexually transmitted infections (e.g., Chlamydia, Gonorrhea), prostatitis, and recurrent urinary tract infections (UTIs), provoke immune responses that sensitize nociceptors through pro-inflammatory mediators (cytokines, chemokines), causing ongoing pain even after the infection resolves. Repeated inflammatory insults may cause nerve hypersensitivity, fibrosis, and persistent nociceptive activation, particularly affecting pelvic nerves (Nickel & Tripp, 2008; Pontari, 2008; Hanno et *al*., 2011).

1.1.2 Urogenital and Abdominal Surgeries

Surgeries like prostatectomy, vasectomy, and hernia repair may lead to scar tissue formation, fibrosis, and fascial adhesions, mechanically compressing or irritating local nerves. This structural disruption results in persistent peripheral nerve sensitization and continuous pain signals (Antolak et *al*., 2002; Anloague & Huijbregts, 2009).

1.1.3 Pelvic or Perineal Trauma

Trauma can cause muscular and fascial injuries, trigger points, and neuropathies from mechanical strain. Post-injury fibrosis and nerve entrapment further perpetuate pain independently of ongoing tissue injury (Anderson et *al*., 2006).

1.2 Neuropathic Input

Neuropathic pain originates from nerve lesions or dysfunction, manifesting as burning,

shock-like sensations, or heightened pain sensitivity (allodynia). In CPPPS, nerves such as the pudendal and lumbar plexus branches (ilioinguinal, genitofemoral, obturator, femoral) can become entrapped within tight anatomical spaces, inducing neuropathic pain. Pudendal nerve entrapment (PNE) is particularly significant, characterized by perineal pain intensified by sitting and alleviated by standing. Lumbar plexus nerves may be entrapped due to muscular imbalance, anatomical variations, or dynamic compression (Antolak et *al*., 2002; Labat et *al*., 2008; Robert et *al*., 2022).

1.3 Peripheral Contributors

Peripheral contributors to CPPPS involve structural and functional disturbances that maintain and intensify ongoing nociceptive input. These factors, including myofascial dysfunction, joint dysregulation, fascial restriction, and visceral-somatic interactions, closely interact, reinforcing cycles of peripheral sensitization (Woolf, 2011; Qin et *al*., 2014).

1.3.1 Myofascial Contributors

Musculoskeletal dysfunction significantly contributes to CPPPS by facilitating interactions among neuromuscular, fascial, and visceral systems. Pelvic floor muscle hypertonicity is central, often manifesting as protective guarding and the formation of myofascial trigger points. Sustained muscular tension restricts local blood flow, causing ischemia and the buildup of inflammatory metabolites, intensifying nociceptive signaling and perpetuating pain (Fitzgerald et al., 2017; Anderson et al., 2006). This creates a self-reinforcing spasm-pain cycle.

Trigger points, hyperirritable muscle nodules, commonly form in muscles such as levator ani, obturator internus, iliopsoas, quadratus lumborum, gluteals, and hip adductors. Active trigger points refer pain to areas like the perineum, genitals, abdomen, and thighs, complicating diagnosis and treatment (Anderson et *al*., 2005; Weiss, 2001). They also impair neuromuscular coordination and pelvic biomechanics. For instance, iliopsoas tightness may increase anterior pelvic tilt and compress lumbar nerves, leading to abdominal or groin pain. Quadratus lumborum dysfunction can provoke lateral trunk shifts and irritate abdominal nerves, while hyperactive hip adductors can strain the pelvic floor and pubic region, causing urogenital discomfort (Travell & Simons, 1999).

1.3.2 Joint and Fascial Contributors

Joint dysfunction exacerbates muscular imbalances, especially at key pelvic junctions such as the sacroiliac joints, lumbosacral junction, and thoracolumbar spine. Abnormal joint mechanics can induce compensatory muscle tension and irritate spinal nerve roots, reinforcing pain cycles. Dysfunction of the pubic symphysis can alter pelvic ring dynamics, restricting neurovascular mobility and intensifying CPP (Loubser et *al*., 2020).

Fascial restrictions within the endopelvic, iliac, and transversalis fascia impair pelvic organ support and nerve mobility. Postsurgical adhesions from prostatectomy, hernia repairs, or other pelvic surgeries create mechanical constraints that irritate nerves and sustain peripheral nociceptive stimulation (Qin et *al*., 2014; Antolak et *al*., 2002).

1.3.3 Visceral-Somatic Contributors

Visceral dysfunctions, including chronic prostatitis, interstitial cystitis, irritable bowel syndrome (IBS), and chronic constipation, interact reciprocally with somatic dysfunctions. For example, gastrointestinal disturbances elevate intra-abdominal pressure, stimulating reflexive pelvic muscle guarding and spinal root irritation. Cross-sensitization between visceral afferents and spinal neurons further amplifies pain perception, contributing to CPPPS's complex and diffuse symptomatology (Mayer & Bushnell, 2009; Crouch et *al*., 2017).

Collectively, these peripheral mechanisms sustain a continuous nociceptive drive underlying peripheral sensitization. If unresolved, this persistent peripheral stimulation can progress to central sensitization, characterized by maladaptive changes in pain processing within spinal and supraspinal centers, marking the evolution from acute to CPP.

2. Central Sensitization

Central sensitization refers to the heightened responsiveness of the central nervous system (CNS) to sensory stimuli, leading to amplified pain perception. It can develop and persist due to continuous nociceptive (pain receptors) or neuropathic (nerve-related) input.

In persistent nociceptive stimulation, prolonged activation from inflammation, mechanical stress, or tissue injury induces neuroplastic changes in the spinal cord, particularly at the dorsal horn. Continuous release of glutamate activates NMDA receptors, strengthening synaptic

transmission and increasing the excitability of spinal neurons. Concurrently, reductions in inhibitory neurotransmitters (such as GABA and glycine) and activation of glial cells (microglia and astrocytes) further amplify sensitization by releasing inflammatory cytokines and excitatory mediators. Clinically, these neuroplastic adaptations manifest as increased sensitivity to pain (hyperalgesia), pain from typically non-painful stimuli (allodynia), and prolonged after-sensations following stimulus removal (Latremoliere & Woolf, 2009; Woolf, 2011).

Persistent neuropathic input (nerve injury, entrapment, or dysfunction) also promotes central sensitization. Injured nerves exhibit abnormal electrical activity, including spontaneous firing and ectopic discharges, driven by altered ion channel expression (increased sodium channels and reduced potassium channels). These abnormal signals consistently bombard the CNS, leading to enhanced spinal pain pathway potentiation and glial cell activation. Importantly, neuropathic mechanisms can maintain sensitization independently of ongoing peripheral damage, contributing to widespread and chronic pain patterns. Neuroimaging studies have demonstrated increased brain activation in regions responsible for cognitive-affective pain processing (insula, thalamus, anterior cingulate cortex) among men with CPPPS, further validating central involvement (Kutch et al., 2017).

Together, nociceptive and neuropathic inputs trigger maladaptive spinal and supraspinal processing changes, resulting in chronic pain states characterized by disproportionate pain relative to observable tissue damage.

3. Psychosocial Modulation

Psychosocial factors significantly influence the onset, perpetuation, and exacerbation of CPPPS through behavioral, cognitive, emotional, neuroendocrine, and autonomic mechanisms (Tripp et *al*., 2006; Tripp et *al*., 2009; Anderson et *al*., 2005). Emotional trauma, chronic stress, adverse early-life experiences, and maladaptive thought patterns shape how the CNS perceives and regulates pain. These influences are mediated via cortical-limbic pathways, the hypothalamic-pituitary-adrenal (HPA) axis, and autonomic nervous system circuits, collectively termed the "emotional pelvis" concept. This model describes how unresolved psychological distress manifests physically as pelvic muscle tension, autonomic dysregulation, and enhanced pain perception (Apkarian et *al*., 2009; Lowen, 1994).

Psychological comorbidities, including anxiety, depression, PTSD, and somatization, frequently co-occur in CPPPS patients and strongly contribute to chronicity. Such conditions alter stress responses and impair descending pain inhibitory mechanisms. Maladaptive cognitive patterns, notably catastrophizing, hypervigilance, and fear-avoidance behaviors, exacerbate these disruptions. Neuroimaging demonstrates increased activation in pain-processing brain regions (e.g., anterior cingulate cortex, insula) among individuals who catastrophize, underscoring their role in amplifying central sensitization (Bushnell et *al*., 2013).

Early-life trauma, particularly sexual, physical, or emotional abuse, is associated with sustained alterations in limbic and HPA-axis function, heightening lifelong vulnerability to pelvic pain. Men with these experiences or persistent psychosocial stress often exhibit increased pelvic floor muscle tension, hypervigilance, sexual dysfunction, and emotional dysregulation, perpetuating pain patterns (van der Kolk, 2014).

Chronic stress-induced neuroendocrine disruptions further amplify pain chronification. Persistent HPA-axis activation elevates corticotropin-releasing hormone (CRH), adrenocorticotropic hormone (ACTH), and cortisol levels, impairing immune regulation and sensitizing pain pathways. Concurrent sympathetic nervous system hyperactivity promotes vasoconstriction, ischemia, and sustained pelvic floor muscle tension. Reduced parasympathetic activity impairs anti-inflammatory vagal influences, further contributing to CPP (Heim et *al*., 2000).

Collectively, psychosocial influences create self-perpetuating pain cycles independent of tissue injury. Thus, comprehensive CPPPS assessments must integrate psychological evaluations and psychosocial management strategies. As shown in Table 3, psychosocial factors contribute to symptom persistence through neuroendocrine and autonomic pathways (Tripp et al., 2006; Tripp et al., 2009).

Table 3

Break down of Psychosocial Factors influencing CPPPS

Psychosocial Factor	Underlying Mechanisms	Systems Involved	Clinical Manifestations
Emotional Trauma & Early Adversity	Long-term changes in stress and pain processing; increased emotional reactivity	Limbic system, HPA axis	Heightened pain sensitivity, emotional dysregulation, increased vulnerability to CPPPS

Chronic Stress	Persistent activation of stress axis; sensitization of pain pathways; increased pelvic muscle tone	HPA axis, autonomic nervous system	Muscle tension, sleep disruption, amplified pain, fatigue
Maladaptive Cognitions	Catastrophizing, fear-avoidance, and hypervigilance intensify pain perception and reduce coping capacity	Prefrontal cortex, insula, anterior cingulate	Reduced function, activity avoidance, greater disability, poor treatment response
Autonomic Dysregulation	Sympathetic overactivity increases muscle tone and vasoconstriction; reduced parasympathetic inhibition	Sympathetic/parasympathetic branches of ANS	Pelvic floor hypertonicity, dyspareunia, urinary urgency, poor stress recovery
Neuroendocrine Dysfunction	Elevated CRH, ACTH, and cortisol affect immune and nociceptive systems	HPA axis, immune pathways	Immune suppression, neuroinflammation, prolonged pain responses
Somatization & Insecure Attachment	Emotional conflict expressed through the body; increased body vigilance and pain-related behaviors	Cortico-limbic circuits	Guarding, pelvic pain triggered by emotional distress, persistent somatic symptoms

Table adapted from Tripp et al. (2006), Tripp et al. (2009), Anderson et al. (2005), and Mehik et al. (2000).

4. Risk Factors

CPPPS results from a dynamic interplay of biological, psychological, lifestyle, genetic, and sociocultural influences. These factors increase vulnerability, initiate pelvic dysfunction, or facilitate pain chronification, emphasizing the necessity for comprehensive risk assessment and multidisciplinary treatment approaches.

4.1 Lifestyle and Occupational Contributors

Sedentary lifestyles and occupational factors (prolonged sitting, repetitive high-impact activities) contribute significantly to pelvic dysfunctions. These stressors induce pelvic floor hypertonicity, myofascial trigger points, and mechanical nerve compression (Anderson et *al*., 2005). Additionally, sexual behaviors (frequent or delayed ejaculation, prolonged abstinence) may disrupt autonomic regulation, aggravating symptoms. Tobacco use exacerbates symptoms by impairing vascular function, increasing fibrosis, and delaying tissue healing (Robert et *al*., 2022; Fitzgerald et *al*., 2017).

4.2 Gastrointestinal and Dietary Influences

Gastrointestinal dysfunctions (chronic constipation, bloating, IBS) and dietary irritants (caffeine, alcohol, spicy foods, artificial sweeteners) trigger visceral hypersensitivity, elevating

pelvic floor muscle tone and increasing intra-abdominal pressure. Cross-organ sensitization, defined as the process by which irritation or inflammation in one visceral organ increases the excitability of shared spinal neurons receiving input from adjacent organs, thereby spreading pain sensitivity across multiple pelvic structures, amplifies pelvic pain through spinal neuronal convergence and reinforces chronic symptomatology (Grundy et *al*., 2018; Mayer & Bushnell, 2009).

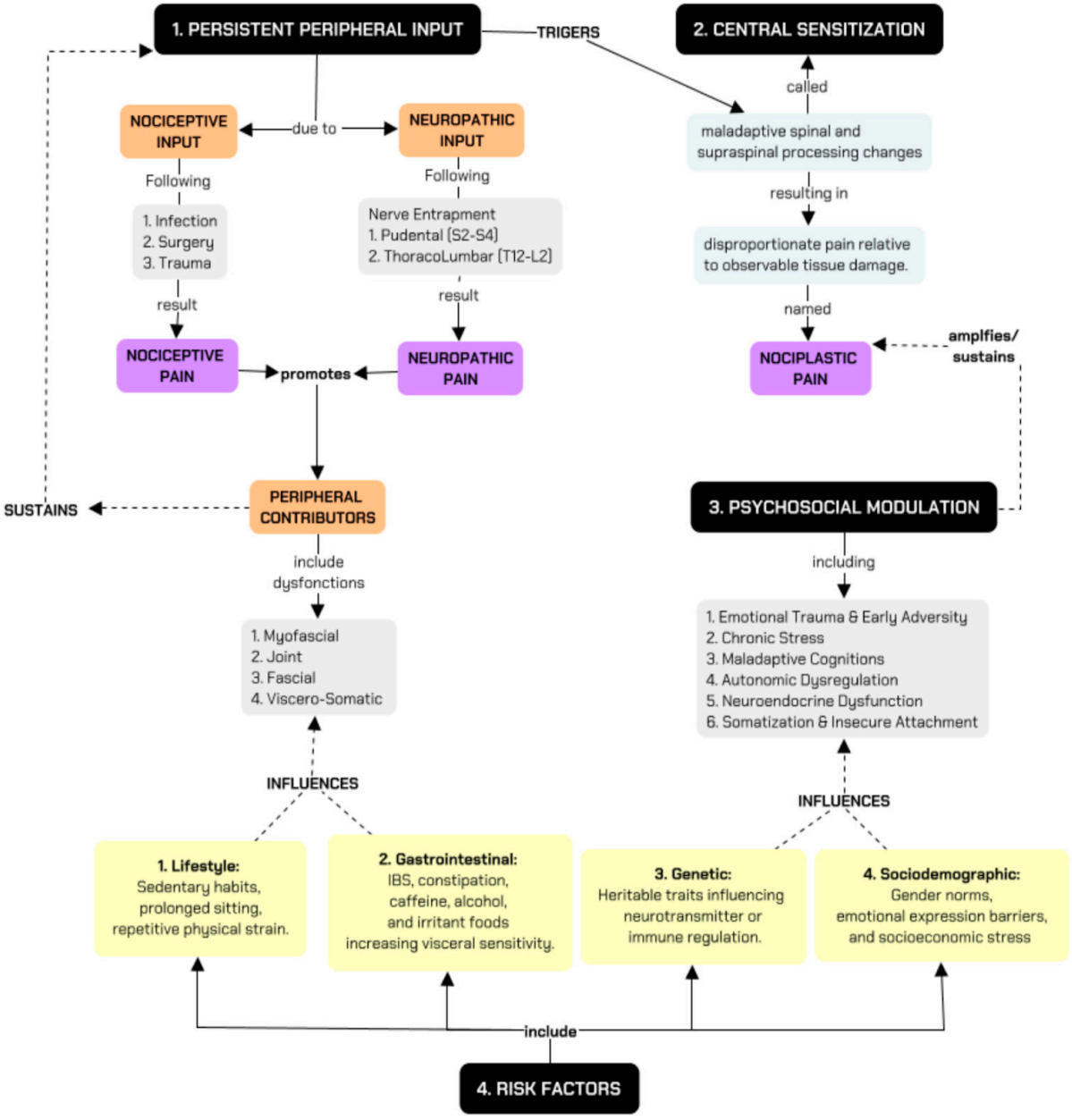
4.3 Genetic and Familial Susceptibility

Emerging evidence indicates genetic predisposition in CPPPS, highlighted by familial clustering and overlap with other chronic pain conditions (e.g.: fibromyalgia, IBS). Potential genetic involvement includes neurotransmitter regulation (serotonergic, dopaminergic pathways) and immune modulation, influencing individual susceptibility and pain progression (Clemens et *al*., 2015).

4.4 Sociodemographic and Cultural Factors

Sociodemographic contexts, such as age-related hormonal changes (e.g.: testosterone decline), lower socioeconomic status, occupational stress exposure, and cultural perceptions regarding masculinity and emotional expression, significantly impact CPPPS vulnerability and symptom chronicity. Cultural attitudes may discourage timely healthcare access, thereby prolonging symptom recognition and management (Engeler et *al*., 2020).

Figure 13: Interactions Between Peripheral, Central, and Psychosocial Mechanisms in CPPPS.



Summary

In summary, CPPPS emerges from a multifaceted interplay among peripheral, central, and psychosocial mechanisms, each mutually reinforcing pain chronification. Peripheral nociceptive and neuropathic mechanisms initiate and maintain persistent pain signals, while central sensitization amplifies pain processing independently of ongoing peripheral stimuli. Psychosocial factors (stress, emotional trauma, cognitive distortions, and neuroendocrine dysregulation) further entrench these chronic pain cycles by influencing central and autonomic nervous system regulation. Figure 13 illustrates how peripheral nociceptive and neuropathic inputs, central sensitization, and psychosocial modulation interact dynamically to sustain CPPPS.

Risk factors spanning lifestyle habits, occupational stresses, dietary influences, gastrointestinal dysfunctions, genetic predisposition, and sociodemographic contexts interact dynamically with these pathophysiological processes. Together, these factors shape the clinical presentation, course, and prognosis of CPPPS, necessitating a multidimensional approach to assessment, treatment, and prevention.

1.1.3.6 Diagnosis

CPPPS in men presents significant diagnostic challenges because of its multifactorial and heterogeneous etiology. Pain mechanisms may be nociceptive, neuropathic, or nociplastic, and often overlap with urological, gastrointestinal, musculoskeletal, and psychosocial conditions. This complexity contributes to diagnostic delays of up to 87 months and imposes a burden comparable to chronic diseases such as coronary heart disease or Crohn's disease (Nickel et *al*., 2007).

One of the greatest barriers to effective diagnosis is the lack of reliable biomarkers. As a result, diagnosis is primarily clinical and based on the exclusion of specific conditions such as infections, structural abnormalities, malignancy, or bacterial prostatitis (Clemens et *al*., 2016). The process is further complicated by low awareness among clinicians, stigma surrounding pelvic and sexual health, and the absence of standardized diagnostic protocols, all of which contribute to mismanagement and underdiagnosis (Engeler et *al*., 2020).

Clinical Criteria and Assessment

CPPPS is generally defined as non-cyclical pelvic pain persisting for at least three of the past six months, without an identifiable underlying cause. A detailed history is the cornerstone of assessment, documenting pain characteristics (onset, location, quality, intensity, and aggravating or relieving factors) alongside urinary, bowel, and sexual symptoms. Psychosocial factors, including anxiety, depression, catastrophizing, and quality-of-life impacts, should be systematically explored.

Physical examination remains critical. Local assessment includes digital rectal examination, prostate palpation, and evaluation of pelvic floor tone. Musculoskeletal screening of the lumbopelvic region, hip mobility, posture, and myofascial trigger points helps identify somatic contributors. Neurological evaluation allows detection of sensory changes, radiculopathy, or nerve entrapment. Together, these steps establish a multidimensional diagnostic profile that can guide individualized management.

Diagnostic Frameworks

The diagnostic pathway is often guided by a process of exclusion. If symptoms are attributable to a specific disease, the condition is classified as chronic secondary pelvic pain and treated according to disease-specific guidelines. If no underlying pathology is found, the patient is classified as having CPPPS. Figure 14 illustrates the stepwise distinction between chronic secondary and primary pelvic pain, based on clinical history and examination. When organ-specific symptoms are present, referral to appropriate specialties such as urology, gastroenterology, neurology, sexology, or pelvic floor rehabilitation is recommended.

When organ-specific symptoms are present, referral to appropriate specialties such as urology, gastroenterology, neurology, sexology, or pelvic floor rehabilitation is recommended. Figure 15 emphasizes the need for multidisciplinary collaboration, showing how organ-specific symptoms direct referral to specialty care, while non-organ-specific pain requires an integrative, musculoskeletal and biopsychosocial approach.

Figure 14: Diagnostic pathway for CPP distinguishing secondary and primary forms

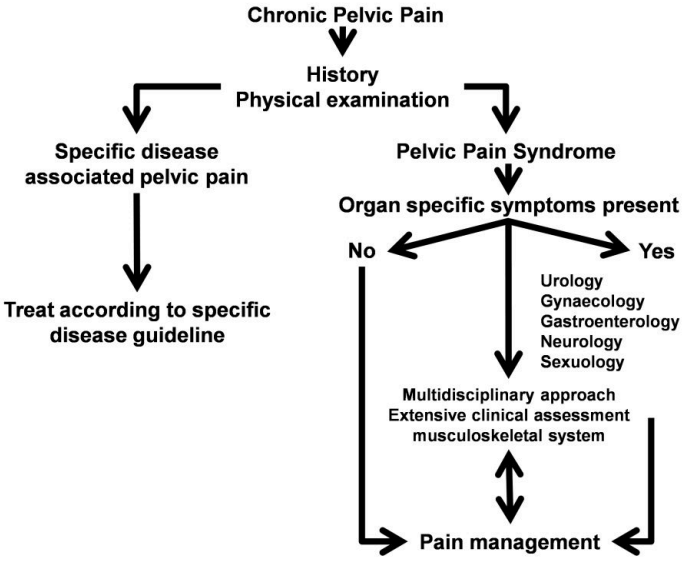


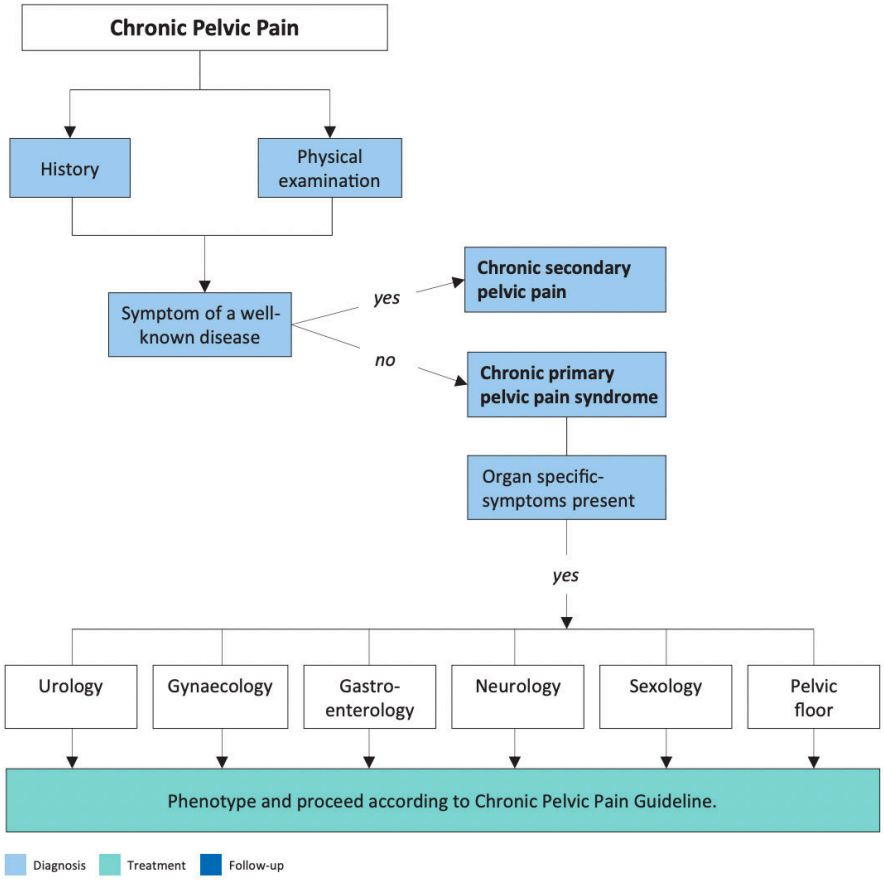
Figure taken from Engeler et al., 2020.

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Biopsychosocial Diagnostic Model

Because CPP rarely has a single cause, diagnostic reasoning should follow a biopsychosocial model. Biological assessment identifies or excludes infections, inflammation, and somatic dysfunctions. Psychological screening evaluates mood disorders, coping strategies, trauma history, and maladaptive cognitions, while the social dimension examines occupational strain, relational stressors, and lifestyle habits such as cycling or prolonged sitting. This multidimensional assessment is crucial for distinguishing between transient dysfunctions and entrenched pain syndromes, and for guiding treatment beyond symptomatic relief to address mechanisms sustaining pain cycles (Nickel & Tripp, 2019).

Figure 15: Multidisciplinary diagnostic framework for CPP



Common Contributing Factors

Several contributors should be considered in clinical reasoning. These include non-bacterial inflammation and neuroimmune activation, pelvic floor hypertonicity and myofascial trigger points, and repetitive mechanical loading from activities such as cycling. Comorbid conditions (irritable bowel syndrome, fibromyalgia, anxiety, and depression) are also common, linking CPP with broader central sensitization syndromes (Nickel et *al*., 2007).

Future Directions

To improve early detection, epidemiological research and refined phenotyping are needed to better classify male CPP subtypes, stratify risk factors, and develop standardized diagnostic pathways. Such efforts would help reduce diagnostic delays and improve outcomes by ensuring timely referral and integrated, multidisciplinary care.

1.1.3.7 CPPS Treatment Options

Managing CPPPS remains challenging because of its heterogeneous and multifactorial origins. Single-modality strategies, such as isolated pharmacological or procedural interventions, have produced limited and inconsistent outcomes, often leaving patients dissatisfied (Nickel & Tripp, 2019). Increasingly, clinicians advocate for a comprehensive, patient-centered model that integrates medical, rehabilitative, psychological, and manual approaches to address the interplay between somatic, neurological, urological, and psychosocial mechanisms.

Within this integrative perspective, the UPOINT clinical phenotyping system (Nickel et *al*., 2009) provides a structured and pragmatic framework for guiding both diagnosis and individualized treatment in patients with CP/CPPS. Developed to address the limitations of single-modality management, UPOINT categorizes patients into six clinical domains (Urinary, Psychosocial, Organ-specific, Infection, Neurological/Systemic, and Tenderness) each representing a distinct etiological and therapeutic dimension.

This multidimensional approach facilitates personalized, multimodal management, allowing clinicians to target the specific mechanisms contributing to each patient's presentation. Table 4 summarizes the diagnostic criteria and corresponding treatment options for each UPOINT domain, illustrating how the model operationalizes a biopsychosocial strategy for CPPPS care.

Although the UPOINT system continues to evolve and the validation of certain domains remains incomplete (Shoskes & Nickel, 2013; Magri et *al*., 2021), it remains a valuable and widely adopted algorithm for organizing both clinical assessment and interdisciplinary treatment planning. Its alignment with the biopsychosocial model also supports integration of osteopathic, medical, and psychological approaches within a unified therapeutic framework.

Table 4

Diagnostic Criteria and Treatments for UPOINT Phenotypes

Domain	Diagnostic Criteria	Possible Treatment
Urinary	Bothersome irritative or obstructive urinary symptoms; high postvoid residual	Alpha-blockers;Antimuscarinics;5-alpha-reductase inhibitors (5-ARI)
Psychosocial	Clinical depression; Catastrophizing (verbalized helplessness and hopelessness)	Psychological or psychiatric counseling; Cognitive-behavioral therapy
Organ-specific	Prostate tenderness; Symptom relief with voiding	Quercetin; Pollen extract
Infection	Positive cultures of prostatic fluid in the absence of Urinary Tract Infection (UTI); Urethritis	Antibiotics
Neurological/Systemic	Pain outside the pelvis; Neuropathic pain	Neuromodulating medications; Acupuncture
Tenderness	Pelvic floor dysfunction or spasm; Muscle trigger points in pelvis or abdomen	Pelvic physical therapy; Myofascial release; Injection therapy

*Adapted from "UPOINT system: A diagnostic/therapeutic algorithm for chronic prostatitis/chronic pelvic pain syndrome," by P. H. Song, 2020, *Urogenital Tract Infection, 15*(2), 27-32. https://doi.org/10.14777/uti.2020.15.2.27*

The UPOINT system thus provides a clinically relevant foundation for integrating the following therapeutic modalities according to each patient's predominant phenotypic domains.

1. Medical Treatments

1.1 Pharmacological Interventions

Pharmacologic management is usually adapted from general chronic pain protocols, given the lack of CPPPS-specific evidence. The main categories of pharmacological interventions used are:

- **Simple analgesics and NSAIDs:** Paracetamol can be used alone or with NSAIDs. NSAID efficacy is mainly extrapolated from dysmenorrhea studies, where they outperformed placebo and were potentially more effective than paracetamol (Engeler et *al*., 2022).
- **Neuropathic pain agents:** Tricyclic antidepressants (TCAs) have demonstrated moderate benefit in neuropathic and centrally sensitized pain, while SSRIs and other antidepressants

have weaker evidence (Moisset et *al*., 2020). Anticonvulsants such as gabapentin are also considered, though CPPPS-specific data are sparse (Wiffen et *al*., 2017).

- **Opioids:** Generally avoided due to risks of dependence and side effects, but may be used selectively in refractory cases for short-term relief (Finnerup et *al*., 2015).

1.2 Interventional Therapies

Interventional techniques are typically reserved for patients with persistent or refractory symptoms.

- **Nerve blocks**, particularly image-guided blocks, can serve both diagnostic and therapeutic purposes. They are commonly used in suspected cases of pudendal neuralgia or entrapment of other pelvic nerves.
- **Local anesthetic and corticosteroid injections** into the pudendal nerve or surrounding neural structures can help confirm a neuropathic component and provide temporary pain relief. However, repeated use carries risks such as tissue damage and steroid-related complications, and their effects are generally short-lived. Therefore, nerve blocks are best utilized as part of a comprehensive treatment strategy or as a transitional measure before implementing long-term therapies (Shoskes et *al*., 2017).
- **Suprapubic transcutaneous electrical nerve stimulation (TENS)** has shown partial effectiveness in bladder pain syndrome/interstitial cystitis (BPS/IC), particularly in ulcerative subtypes. Though data are limited and outcomes inconsistent, TENS remains a non-invasive option for select cases (van Balken et *al*., 2003).
- **Sacral neuromodulation** has demonstrated benefit in treating pelvic pain and dysfunction through modulation of sacral nerve pathways. It is typically reserved for patients who have failed conventional therapies and demonstrate neurogenic features or complex regional pain syndromes (Peters et *al*., 2007).
- **Botulinum toxin injections** have emerged as a promising treatment for pelvic floor hypertonicity and bladder hypersensitivity. These injections may reduce detrusor overactivity and sensory input, especially in patients with refractory BPS/IC (Ghei et *al*., 2005; Kuo, 2005).

1.3 Surgical Management

Surgical interventions are generally considered a last resort in CPPPS and are reserved for patients with clearly defined structural or neuropathic abnormalities. Surgical options include decompression of the pudendal nerve, resection of pelvic varicosities, and prostate interventions such as transurethral resection of the prostate (TURP). While some patients may benefit, surgical outcomes are variable and can worsen symptoms if the underlying pain mechanism is misidentified. Thus, surgical intervention should only be pursued after thorough diagnostic workup and multidisciplinary evaluation (Rees et *al*., 2015).

2. Other Treatments

2.1 Physiotherapy

Pelvic floor physical therapy has emerged as a cornerstone intervention, especially in patients presenting with pelvic floor hypertonicity or myofascial trigger points. Interventions may include manual myofascial release, trigger point therapy, biofeedback, diaphragmatic breathing, and pelvic floor muscle re-education. These techniques aim to restore normal muscle tone, improve neuromuscular coordination, and reduce pelvic tension (FitzGerald et *al*., 2013). A skilled physiotherapist can also assess and correct postural dysfunctions and movement patterns that place undue stress on pelvic structures. While many patients report meaningful improvement, the long-term success of pelvic floor rehabilitation often hinges on patient adherence and ongoing self-management practices.

2.1 Psychotherapy

Psychological interventions, particularly cognitive-behavioral therapy (CBT), are essential when anxiety, depression, catastrophizing, or trauma history are present. Psychological distress is a well-documented risk factor for symptom persistence in CPPPS. CBT can help reframe maladaptive thoughts and behaviors, reduce pain-related fear, and enhance coping strategies (Nickel & Tripp, 2019). When integrated into a broader biopsychosocial treatment plan, psychological support has been shown to improve clinical outcomes and reduce the risk of chronicity.

2.3 Manual Therapy

Manual therapy (including osteopathic, chiropractic, and soft tissue techniques) addresses musculoskeletal and fascial dysfunctions that contribute to pelvic pain. Interventions may include:

- **Joint mobilization/manipulation** of the lumbar spine, pelvis, and sacroiliac joints to improve mobility and reduce nociceptive drive.
- **Fascial and visceral mobilization** to release tension in pelvic fasciae, restore organ mobility, and optimize circulation.
- **Myofascial and soft tissue techniques** to reduce hypertonicity, deactivate trigger points, and improve tissue compliance.

Preliminary evidence suggests manual therapy may reduce pain intensity, improve function, and modulate autonomic regulation in pelvic pain syndromes (Anderson et *al*., 2015; Licciardone et *al*., 2010). Although studies remain limited, manual therapy is typically well tolerated and complements physiotherapy and psychological care by targeting somatic contributors to pain.

Complementary approaches such as acupuncture and biofeedback also offer potential benefits. Acupuncture is believed to modulate both autonomic and nociceptive pathways, reduce muscle hypertonicity, and improve central pain processing. Biofeedback techniques allow patients to gain voluntary control over pelvic floor muscle activity and can be particularly useful in addressing hypertonic pelvic patterns. The effectiveness of these interventions often depends on practitioner experience, treatment consistency, and patient commitment (Anderson et *al*., 2015).

In summary, effective management of CPPPS requires a tiered and integrative strategy. First-line medical treatments may be complemented by physiotherapy and psychotherapy, with manual therapy offering an additional avenue for addressing somatic and fascial dysfunctions. Interventional and surgical options should be reserved for refractory cases with clear diagnostic justification. Success depends on patient education, strong therapeutic alliance, and sustained self-management.

1.1.3.7 Summary

CPPPS in men represents a complex clinical challenge, characterized by multifactorial interactions between anatomy, physiology, psychology, and sociocultural dynamics. It remains one of the least understood chronic pain conditions, often invisible due to the absence of clear biomarkers or structural abnormalities. As a result, patients commonly undergo repeated investigations, experience fragmented care, and report limited relief.

From a scientific perspective, CPPPS raises critical questions about the interaction between peripheral nociception, central sensitization, and psychosocial modulation. From an educational perspective, it illustrates the need for integrative clinical reasoning that bridges anatomical knowledge with biopsychosocial awareness.

These considerations underscore the importance of investigating osteopathy's role in CPPPS, not only as a potential therapeutic option, but also as a way of advancing evidence-based, interdisciplinary, and patient-centered care for men living with CPP.

1.1.4 Osteopathy

Osteopathy is a patient-centered form of manual therapy founded in the late 19th century by Dr. Andrew Taylor Still. It is grounded in the principle that the body functions as an integrated unit, in which structure and function are interdependent, and health is maintained through inherent self-regulatory and self-healing mechanisms (D'Alessandro et *al*., 2020). Clinical practice aims to identify and alleviate barriers to physiological balance (such as mobility restrictions, circulatory impairments, or autonomic dysfunctions) in order to optimize recovery, homeostasis, and function.

At the core of osteopathic reasoning lies the concept of somatic dysfunction, defined as impaired or altered mobility, tone, or circulation within tissues. Osteopathic assessment integrates anatomical, biomechanical, neurological, and physiological perspectives to detect dysfunctions across musculoskeletal, visceral, fascial, and neural systems. Clinically, these dysfunctions are identified through the TART diagnostic framework - which evaluates Tissue texture changes, Asymmetry, Restriction of motion, and Tenderness. As summarized in Table 5, this model guides the palpatory and functional examination that distinguishes physiologic motion from pathologic restriction.

Table 5

Diagnostic Criteria for Somatic Dysfunction (TART)

Criterion	Description
Tissue Texture Changes (T)	Surrounding tissue may be edematous, tender, fibrotic, atrophied, or hypertonic. These changes reflect local alterations in circulation, lymphatic drainage, or muscle tone.
Asymmetry (A)	Bones, muscles, or joints may feel asymmetric compared with contralateral or adjacent structures (e.g., a more posterior spinous process or a more superior ischial tuberosity).
Restriction of Motion (R)	Joints affected by somatic dysfunction demonstrate restricted movement. Under normal physiologic conditions, a joint moves between two barriers: the physiologic barrier (maximum active range of motion) and the anatomic barrier (maximum passive range of motion). In somatic dysfunction, a restrictive barrier develops before the physiologic barrier, limiting motion and producing a pathologic restriction.
Tenderness (T)	A painful or uncomfortable sensation reproducible during palpation of tissues, often indicating hyperalgesia or local inflammatory change.

Adapted from foundational osteopathic diagnostic frameworks describing the four diagnostic criteria of somatic dysfunction (TART): Tissue texture changes, Asymmetry, Restriction of motion, and Tenderness (American Association of Colleges of Osteopathic Medicine [AACOM], 2017; Chila, 2011).

A key component of this framework is the concept of interregional dependence, which posits that dysfunctions in one region of the body can influence or perpetuate dysfunctions in another through shared biomechanical chains, neural networks, and fascial continuities (Sueki, Cleland, & Wainner, 2013). This principle reinforces that no body region operates in isolation: restricted diaphragmatic motion may alter pelvic floor tension, sacroiliac joint hypomobility may disturb lumbar mechanics, and thoracolumbar fascial stiffness may compromise venous and lymphatic drainage. Recognizing these relationships is crucial in conditions such as CPPPS, where multiple interdependent systems (musculoskeletal, visceral, neurological, and psychosocial) contribute to the persistence of pain.

Within this context, Osteopathic Manipulative Treatment (OMT) applies a range of hands-on techniques (including myofascial release, joint articulation, visceral mobilization, strain-counterstrain, and craniosacral therapy) to restore mobility, improve physiological balance, and modulate autonomic tone. By addressing structural dysfunctions in interconnected regions such as the sacroiliac joints, lumbar spine, diaphragm, pelvic floor, and abdominal viscera, OMT can enhance load transfer, neurovascular mobility, and diaphragmatic-pelvic coordination. These effects may reduce nociceptive input, alleviate myofascial hypertonicity, and diminish neural entrapments such as pudendal or obturator neuropathies (Hains et *al*., 2009). Through this integrative lens, osteopathy seeks not merely to treat localized symptoms but to restore systemic harmony, potentially mitigating the peripheral and central sensitization processes that sustain CPPPS (Nickel & Tripp, 2017; Woolf, 2011).

Beyond biomechanics, osteopathy aligns closely with the biopsychosocial model of care. Manual treatment is complemented by empathetic listening, reassurance, patient education, and empowerment, all of which can reduce maladaptive pain beliefs, improve coping strategies, and enhance therapeutic engagement (Apkarian et *al*., 2009). The therapeutic relationship itself is considered an active component of treatment, fostering emotional regulation, safety, and self-efficacy (D'Alessandro & Furze, 2004). This multidimensional perspective is illustrated in Figure 16, which integrates biological, psychological, and social processes in the experience of chronic pain. Such a model underpins osteopathic reasoning in CPPPS, emphasizing how neurophysiological, mechanical, and emotional domains interact in perpetuating or resolving symptoms.

Figure 16: Psychosocial and biological factors in somatic pain and aims of OMT

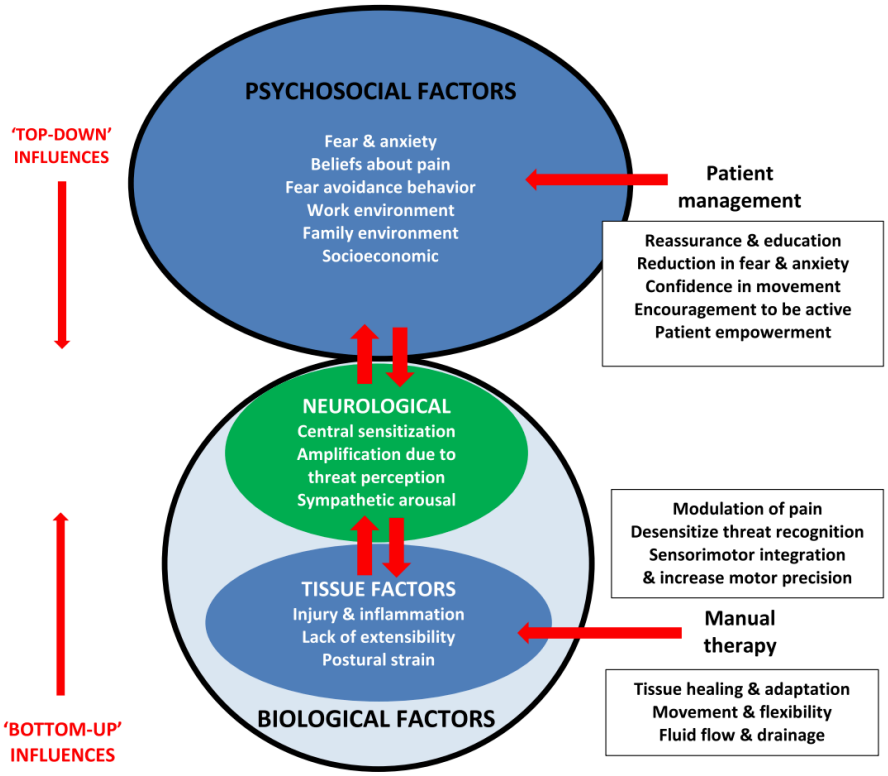


Figure taken from: Fryer, G. (2017). *Integrating osteopathic approaches based on biopsychosocial therapeutic mechanisms. Part 1: The mechanisms. International Journal of Osteopathic Medicine, 25*, 30-41. https://doi.org/10.1016/j.ijosm.2017.05.002

Despite its clinical relevance and expanding evidence base, the integration of osteopathy into healthcare systems remains highly variable worldwide. In several European countries, osteopathy is a regulated and recognized profession integrated into public health structures, whereas in Quebec it remains unregulated and lacks formal recognition. This uneven professional status shapes public perception, physician trust, and opportunities for interdisciplinary collaboration - factors directly relevant to the present study, which explores osteopathy's potential contribution within medically collaborative frameworks for CPPPS.

1.2. Problem Statement

Chronic pelvic pain (CPP) is defined by the European Association of Urology as persistent or recurrent pain perceived in structures related to the pelvis, lasting at least three months, and often accompanied by urinary, sexual, bowel, or psychosocial disturbances (Engeler et *al*., 2020). The International Association for the Study of Pain further classifies chronic primary pelvic pain syndrome (CPPPS) as a primary pain condition within the ICD-11, describing cases in which no identifiable pathology-such as infection, inflammation, malignancy, or structural abnormality-can fully explain the symptoms (IASP, 2021; Treede et *al*., 2019). CPPPS is therefore increasingly understood as a multidimensional condition involving altered pain processing, rather than solely localized tissue damage.

Epidemiological data highlight the significant burden of this condition. CPPPS affects approximately 2% to 16% of men, most commonly between 20 and 50 years of age (Collins et *al*., 1998; Krieger et al., 2002). The most prevalent subtype, CP/CPPS, accounts for 90-95% of prostatitis diagnoses (Clemens et *al*., 2007). Its impact on quality of life is substantial, with reported burden comparable to conditions such as Crohn's disease or myocardial infarction (Nickel et al., 2007). Despite this, diagnosis is often delayed-sometimes by several years-and treatment responses remain variable, with many patients continuing to experience persistent symptoms despite multiple interventions (Nickel & Tripp, 2017).

The pathophysiology of CPPPS is complex and multifactorial. Peripheral mechanisms-including prior infection, trauma, post-surgical changes, and myofascial dysfunction-may contribute to nociceptive input and nerve sensitization, potentially involving structures such as the pudendal, ilioinguinal, or genitofemoral nerves (Robert et *al*., 2022). Central sensitization may further amplify pain perception through altered spinal and supraspinal processing, sometimes independent of ongoing peripheral pathology (Woolf, 2011). Psychosocial factors-including stress, maladaptive coping strategies, trauma history, and sociocultural influences-also play a significant role in shaping symptom expression and prognosis (Tripp et al., 2009).

In line with contemporary clinical guidelines from the American Urological Association and the European Association of Urology, CPPPS is increasingly approached as a multifactorial

condition requiring multimodal and interdisciplinary management, rather than a purely urological disorder. Phenotyping approaches such as the UPOINT system have been proposed to guide individualized care by identifying contributing domains (urinary, psychosocial, organ-specific, infectious, neurologic/systemic, and musculoskeletal), supporting a more targeted and integrative treatment strategy.

Despite this evolving understanding, care pathways often remain predominantly biomedical, with emphasis on pharmacological or procedural interventions, while integrative and non-pharmacological approaches remain variably utilized.

In Quebec, systemic factors further complicate management. While universal healthcare provides access to physicians and diagnostic investigations, access to non-pharmacological interventions-such as pelvic floor physiotherapy, psychotherapy, chronic pain services, or osteopathy-remains uneven, particularly in rural and semi-remote regions (Bergeron et *al*., 2021). Insurance coverage is often partial, contributing to socioeconomic disparities in access to complementary care. In practice, patients may experience fragmented care pathways, with limited coordination between disciplines.

The professional status of osteopathy represents an additional contextual factor. Unlike in countries such as the United Kingdom, France, or Switzerland-where osteopathy is regulated and integrated to varying degrees within healthcare systems (WHO, 2010; Fawkes et *al*., 2020)-Quebec lacks standardized regulation and university-based training frameworks. This contributes to variability in professional recognition and may influence referral patterns and interprofessional collaboration (Sirois, 2019; INCAM, 2019).

Cultural factors may also influence care-seeking behaviors. Men experiencing pelvic or urogenital symptoms may delay consultation due to stigma, discomfort discussing sexual health, or sociocultural norms related to masculinity (Broom et *al*., 2015). These dynamics may contribute to underreporting, delayed diagnosis, and increased psychosocial burden.

Taken together, these systemic, professional, and cultural factors contribute to a context in which CPPPS remains challenging to manage within existing care structures. This highlights the

importance of exploring integrative and interdisciplinary approaches that may better address the multifactorial nature of the condition.

Within this context, clinical observations from referring physicians in this project suggest that some patients with persistent symptoms, despite conventional care, reported perceived improvements when osteopathic care was introduced as part of a broader management strategy. While such observations remain anecdotal and cannot establish causality, they support the clinical plausibility of further exploratory investigation.

However, the current evidence base remains limited. Beyond one randomized controlled trial (Marx, 2006), available research consists primarily of case reports, with no studies conducted in Quebec or within French-speaking populations. This highlights both a scientific gap-in terms of structured and contextualized data-and a sociocultural gap, related to the absence of region-specific research.

This study addresses these gaps by asking: What changes in pain, function, and quality of life are observed in men with chronic primary pelvic pain syndrome in Quebec, temporally associated with osteopathic care?

In doing so, it also explores how osteopathic care may be integrated within a multimodal framework, using validated outcome measures, structured clinical assessment, and psychosocial profiling to contribute to reproducible, hypothesis-generating insights for clinical practice and osteopathic education.

1.3 Objectives and Hypotheses

1.3.1 Main Objective

Objective 1 (O1): To describe changes in pain, function, and quality of life observed in men aged 18-70 diagnosed with CPPPS in Quebec, temporally associated with a short course of personalized osteopathic care, within a biopsychosocial and regionally contextualized framework.

Hypothesis 1 (H1): Participants will demonstrate clinically meaningful improvements in pain, functional status, and quality of life over the course of care, representing an exploratory signal supporting the potential relevance of osteopathic care in this population.

1.3.2 Secondary Objectives

Research Objectives

Objective 2 (O2): To explore changes in symptom severity, pelvic symptom burden, and disability over time, using validated outcome measures (VAS, NIH-CPSI, PDI), in association with osteopathic care.

Hypothesis 2 (H2): Participants will show reductions in pain intensity, symptom burden, and disability scores across the intervention period, consistent with changes temporally associated with care.

Objective 3 (O3): To document the evolution of somatic and visceral mobility findings, based on a structured osteopathic assessment protocol targeting recurrent dysfunctions (pelvic floor, sacroiliac joints, sacrum, coccyx, lumbo-thoracic junction, abdominal wall, pelvic viscera).

Hypothesis 3 (H3): Osteopathic assessment will reveal changes in lumbopelvic and visceral mobility patterns over time, providing descriptive clinical insights into potential mechanisms involved in patient evolution.

Clinical Objectives

Objective 4 (O4): To explore the potential role of osteopathic care within a multimodal and multidisciplinary management framework for CPPPS in Quebec, particularly in relation to musculoskeletal and functional domains.

Hypothesis 4 (H4): Findings from this case series will provide preliminary, hypothesis-generating insights suggesting that osteopathic care may represent a complementary component within multidisciplinary CPPPS management.

1.4 Relevance of the Project

1.4.1 Clinical Relevance

All participants were referred by physicians (primarily a collaborating surgeon-urologist and, in one case, a general practitioner at Rockland MD) after experiencing limited or no improvement with conventional treatment. This highlights a clinical gap, where patients continue to experience persistent and often debilitating symptoms despite standard care.

Within this context, the project explores the role of osteopathic care as a complementary approach within a biopsychosocial framework, particularly in cases where conventional management alone appears insufficient. The use of validated outcome measures and structured clinical assessment contributes to a more reproducible and clinically interpretable description of patient trajectories, offering relevant insights for clinicians navigating complex CPPPS presentations within Quebec's healthcare system.

1.4.2 Scientific Relevance

This project addresses two key scientific gaps: the limited availability of structured data regarding osteopathic care in CPPPS, and the lack of Quebec-specific research contextualized to local healthcare realities.

By combining validated quantitative tools (VAS, NIH-CPSI, PDI), psychosocial profiling, and systematic osteopathic assessment, the study provides preliminary, hypothesis-generating data that may help inform the design of future controlled studies. Rather than establishing effectiveness, this work contributes to the early empirical exploration of osteopathy's potential role within the broader field of chronic pelvic pain research.

1.4.3 Educational Relevance

The project led to the development of a Clinical Learning Framework integrating multimodal assessment, dysfunction prioritization, and psychosocial profiling. This framework supports osteopaths and trainees in approaching complex pain presentations through a structured, evidence-informed, and patient-centered lens.

By emphasizing validated outcome measures, clinical reasoning, and interprofessional awareness, it aligns osteopathic training with contemporary biopsychosocial and multidisciplinary models of care.

1.4.4 Community and Public Health Relevance

From a public health perspective, this project highlights systemic and cultural barriers contributing to the under-recognition of male pelvic pain in Quebec. Limited access to non-pharmacological interventions, fragmented referral pathways, and social stigma surrounding urogenital symptoms may contribute to delays in care and increased patient isolation.

By documenting patient experiences and clinical trajectories, this study contributes to greater awareness of CPPPS as a complex and multifactorial condition, and supports the need for earlier, more integrated, and multidisciplinary approaches to care.

1.4.5 Professional Relevance

This study also reflects evolving dynamics in the integration of osteopathy within healthcare systems. Physician referrals observed in this project suggest a growing openness toward collaborative approaches in the management of complex pain conditions.

By using standardized outcome measures and situating osteopathic care within a multimodal and interdisciplinary framework, this project contributes to a more structured and transparent representation of osteopathic practice, which may support future dialogue around integration, collaboration, and recognition within healthcare systems.

1.4.6 Overall Relevance

Collectively, these dimensions highlight the value of conducting a structured exploratory study on osteopathic care for men with CPPPS in Quebec. Clinically, it addresses unmet patient needs; scientifically, it contributes preliminary data; educationally, it offers a structured clinical framework; socially, it raises awareness of an under-recognized condition; and professionally, it supports ongoing efforts toward collaborative care models.

As such, this project contributes to a more comprehensive and integrative understanding of CPPPS management, while generating insights that may inform future research and clinical practice.

2. LITERATURE REVIEW

2.1 Purpose

The purpose of this literature review was to assess the relevance and rationale for conducting a structured exploratory case study on osteopathic manual therapy (OMT) in men with chronic primary pelvic pain syndrome (CPPPS), with particular attention to the Quebec sociocultural context. Although osteopathy is widely practiced in North America and Europe, its role within the management of CPPPS remains insufficiently documented.

This review therefore pursued several objectives. It aimed to examine the existing evidence regarding changes in pain, urinary and genital symptoms, and functional outcomes associated with OMT in men with CPPPS, while recognizing the exploratory nature and methodological limitations of the available literature. It also sought to deepen understanding of the multifactorial pathophysiological mechanisms underlying CPPPS, including peripheral nociception, central sensitization, and psychosocial influences, and to consider how osteopathic approaches may interact with these processes within a biopsychosocial and multimodal framework.

In addition, the review critically appraised the methodological strengths and limitations of existing studies in order to inform the development of a scientifically coherent yet clinically feasible research design. Finally, it situates these findings within the Quebec healthcare landscape, where osteopathy remains variably integrated into conventional care, highlighting the need for context-specific and hypothesis-generating research.

In this way, the literature review addresses not only clinical and mechanistic considerations, but also the broader contextual, methodological, and interdisciplinary dimensions relevant to the study of osteopathy in CPPPS.

2.2 Methodology

2.2.1 Research question

The review was guided by the following question:

“What is the impact of osteopathic manual therapy on non-specific CPP in adult males.

This question reflects both the need for a broad evidence base (capturing adult male populations with CPPPS across different clinical presentations) and the specific interest in osteopathy as an intervention. It was designed to balance clinical inclusivity with methodological focus.

2.2.2 Context and screening

The question was developed using the PICOTS framework (Population, Intervention, Comparator, Outcomes, Timing, Study design), a widely used tool in evidence-based medicine that helps structure systematic analysis. The framework clarified the scope of this review by specifying that the population would be adult males with CPP of non-infectious, non-structural, and non-malignant origin. The intervention was restricted to osteopathic manual therapy, defined broadly to include structural, myofascial, visceral, craniosacral, and functional techniques. Comparisons were drawn between conventional treatment alone and conventional treatment supplemented with OMT, although many case reports included no comparator. Outcomes included pain intensity, urinary and sexual function, quality of life, psychosocial functioning, and long-term sustainability of effects. The review considered chronic symptoms lasting at least three months and included studies of any follow-up duration. In terms of study design, randomized controlled trials, observational studies, and single-case reports were eligible, with preference given to designs offering structured documentation of interventions and outcomes.

2.2.3 Eligibility criterias

Eligibility criteria were applied to ensure rigor and clinical relevance. Studies had to be published between 2000 and 2024 to reflect contemporary clinical practice and allow for peer evaluation. The intervention needed to be explicitly identified as osteopathic manual therapy. Studies focusing on physiotherapy, chiropractic, or other manual therapies were excluded, as they did not address the specific research question. Only male populations were considered, and studies involving women or mixed-gender groups were excluded. To be included, studies also had to report at least one outcome measure related to pain, function, or quality of life, whether narrative or standardized. Finally, studies were required to be available in English or French and accessible in full text.

2.2.4 Databases and Methodology

The databases used to review the attached results are MEDLINE Full text (EBSCO), CINAHL plus with full text and AMED via the libraries and archives of the University of Sherbrooke. Keywords were structured under three domains:

Osteopathy*:*

osteopathy OR "osteopathic manual therapy" OR "omt" OR "manual therapy" OR "osteopathic treatment" OR manipulation, osteopathic*

AND Pelvic Pain:

Pelvic Pain OR "Chronic Pelvic Pain" OR "Genital Pain"OR "Chronic Prostatitis/Chronic Pelvic Pain Syndrome" OR "chronic pelvic pain syndrome" OR "CPPS" OR "Pelvic Floor Disorders"OR "Pudendal Neuralgia"OR "Pudendal Nerve Entrapment"

AND Male:

male or men or man or males

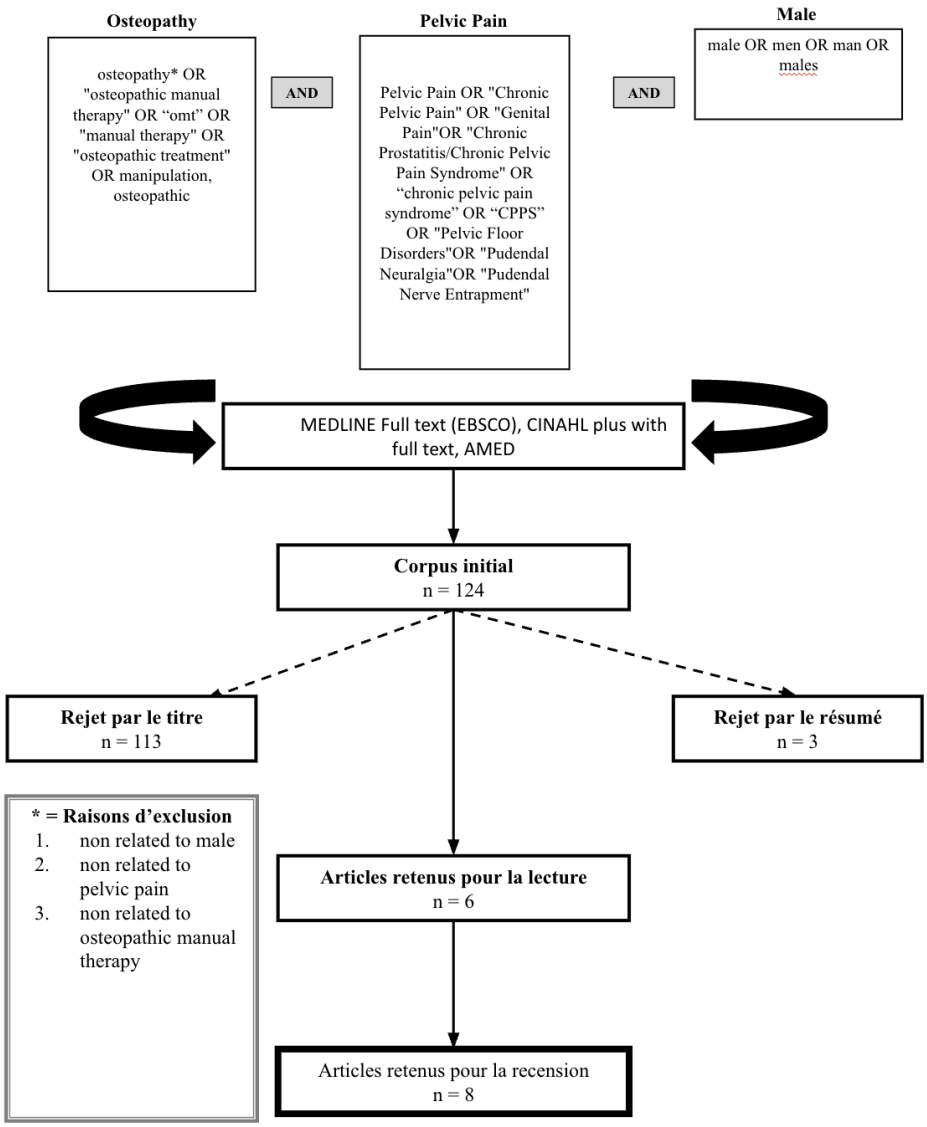
The Medical Subject Headings (MeSH) promoted the use of keywords favouring the results in the database and allowed the addition of the terms "manipulation, osteopathic" to the list of keywords. The boolean operator OR was used between the different keywords to offer more combination possibilities. The boolean operator AND was used between the two concepts in order to ensure a correlation between the subjects.

2.2.5 Selection

The initial search generated 124 results, which were imported into Zotero for organization. Title and abstract screening eliminated 114 articles that were clearly irrelevant, primarily because they did not address osteopathy, pelvic pain, or male populations. A further four were excluded after abstract review because they focused on physiotherapy or chiropractic interventions rather than osteopathy. Six studies remained for full-text evaluation. During this process, two additional studies were identified through reference lists and parallel searches. These supplementary articles met all inclusion criteria and were added to the corpus. The final selection therefore comprised

eight studies: one randomized controlled trial and seven single-case reports. This process is summarized in the PRISMA diagram (Figure 17).

Figure 17: PRISMA diagram



2.3 Results of the Literature Review

This literature review identified eight relevant publications on osteopathic or manual therapy interventions for CPP in men between 2006 and 2023. The body of work consists of one RCT (Marx, 2006) and seven case reports. While small in number, these studies provide valuable insights into how osteopathy and related manual therapies have been applied to diverse clinical presentations of CPPPS.

2.3.1 Summary Table

Table 6

Characteristics and Outcomes of Included Studies

Author(s)	Year	Study Title	Design	Key Findings
Marx	2006	Does osteopathic treatment influence symptoms of CP/CPPS?	Randomized Controlled Trial	~50% improvement in QoL, pain, and function with OMT vs. no change in control group
Switters	2023	Biopsychosocial osteopathic intervention for CP/CPPS	Case Report	Significant improvement in pain, function, and quality of life
Davia & Welty	2014	Manual Therapy and Education for CPPPS	Case Report	Significant reduction in pain and postural improvement
Lafave & Sutter	2012	Pudendal nerve entrapment in a rodeo athlete	Case Report	Complete resolution of neuralgia; symptom-free at 5-year follow-up
Durante et al.	2010	Pudendal nerve entrapment in an Ironman athlete	Case Report	Pain-free at 8 and 12 weeks; resolution of neuralgia symptoms
Gray	2019	OMT for post-vasectomy pain syndrome	Case Report	Full pain resolution and improved quality of life
Newman et al.	2021	Resolution of chronic testicular pain with impairment-based therapy	Case Report	Symptom-free at one-year follow-up
Li et al.	2022	Manual therapy for penile pain with six-month follow-up	Case Report	Pain resolution and restored function; sustained improvement at six months

Table 6 above summarizes the key characteristics and findings of each included study. Notably, seven of the eight identified publications were single case studies, while only one was a randomized controlled trial. This predominance of case-based designs likely reflects both the exploratory stage of research on osteopathic management of chronic pelvic pain and the

methodological challenges of standardizing individualized interventions for a heterogeneous condition. These limitations and their implications for future evidence development will be further discussed in the discussion section.

2.3.2 Study Designs and Populations

As stated in section 2.3.1, The only RCT available, conducted by Marx (2006), evaluated the effects of OMT in men with CP/CPPS. Participants were randomized to receive either osteopathic treatment or no manual therapy. This study remains the highest-quality evidence available, providing comparative data and using validated outcome measures.

The remaining studies were single-patient case reports, each illustrating a unique presentation of male pelvic pain. For example, Durante et *al*. (2010) and Lafave & Sutter (2012) described pudendal neuralgia in athletes (an Ironman competitor and a rodeo rider, respectively). Gray (2019) reported on post-vasectomy pain syndrome, while Li et *al*. (2022) documented penile pain with a six-month follow-up. Newman et *al*. (2021) described chronic testicular pain, and Switters (2023) as well as Davia & Welty (2014) presented broader CPPPS cases. Collectively, these reports reflect the heterogeneity of CPPPS and the wide spectrum of symptom presentations encountered in clinical practice.

2.3.3 Interventions and Treatment Protocols

Treatment protocols were heterogeneous, reflecting osteopathy's emphasis on individualized care.

- **Duration and frequency.** Interventions ranged from four sessions delivered over six weeks (Li et *al*., 2022) to extended follow-ups over several years, as in Lafave & Sutter (2012), which reported sustained remission five years after treatment.
- **Techniques.** Across studies, the most common techniques included myofascial release, visceral mobilization, neural mobilization, and postural correction. These were generally

selected based on each patient's unique biomechanical findings, rather than applied through a standardized protocol.

- **Focus of treatment.** Some cases prioritized neural decompression (e.g., pudendal nerve entrapment), while others addressed visceral restrictions, postural adaptations, or global musculoskeletal dysfunctions. This variation underscores both the adaptability of OMT and the difficulty of synthesizing results across highly individualized interventions.

2.3.4 Outcomes and Measures

Outcomes varied considerably in both measurement and reporting.

- **Validated tools:** The RCT by Marx (2006) was the only study to systematically use validated instruments, including the NIH Chronic Prostatitis Symptom Index (NIH-CPSI) and quality-of-life scales. Results showed approximately 50% improvement in pain, urinary symptoms, and quality of life in the treatment group compared to no significant change in controls.
- **Narrative reporting:** Most case reports relied on patient self-reports of symptom resolution or improvement, with limited use of structured tools. For example, Lafave & Sutter (2012) reported complete resolution of pudendal neuralgia in a rodeo athlete, sustained at five years, while Durante et al. (2010) described pain-free outcomes at 8 and 12 weeks in an Ironman athlete.
- **Functional outcomes:** A few studies noted improvements in biomechanics and posture (e.g., Davia & Welty, 2014), which are clinically relevant given the mechanical loading of the pelvic floor. However, these changes were generally documented descriptively rather than measured with standardized functional tests.
- **Psychosocial outcomes:** None of the studies systematically assessed psychosocial variables, despite their recognized role in CPPPS pathophysiology. This omission limits the ability to evaluate how OMT may influence emotional, behavioral, or social dimensions of chronic pain.

- **Durability:** Follow-up periods ranged from weeks (Li et *al*., 2022) to years (Lafave & Sutter, 2012). While some cases reported long-term resolution, most studies offered only short-term results, leaving uncertainty about sustained effectiveness.

2.3.4 Context and Transferability

All of the included studies were conducted outside Quebec and none within francophone populations. Most came from Europe or North America, where healthcare systems, professional regulations, and cultural perceptions of osteopathy differ significantly from those in Quebec. This geographic and linguistic gap is critical: in Quebec, osteopathy remains unregulated, stigmatized within parts of the medical community, and variably accessible due to socioeconomic and systemic barriers. Consequently, findings from international contexts may have limited transferability to Quebec's healthcare environment.

2.4 Critical Analysis

2.4.1 Current State of Knowledge

The collective body of literature, although limited, suggests that OMT may provide clinically meaningful improvements for men suffering from CPPPS. The randomized controlled trial by Marx (2006) remains the most rigorous contribution to date, demonstrating that participants who received OMT reported an approximate 50% improvement in pain, urinary symptoms, and quality of life compared to controls who received no manual intervention. This result provides preliminary evidence that osteopathy can influence not only symptom perception but also functional outcomes relevant to daily living.

The seven case reports, while methodologically weaker, reinforce these findings by consistently documenting reductions in pain and improvements in function or well-being following osteopathic or manual therapy interventions. These reports describe diverse clinical presentations, including pudendal neuralgia, post-vasectomy pain, penile pain, and chronic testicular pain,

suggesting that OMT may be adaptable across phenotypic subtypes of CPPPS. Importantly, several studies also observed postural or biomechanical improvements, highlighting the potential value of addressing systemic musculoskeletal contributors rather than focusing solely on localized pelvic symptoms.

Taken together, the literature supports the plausibility of OMT as a therapeutic option for CPPPS. The convergence of positive outcomes across heterogeneous cases indicates that osteopathy may have a role as a flexible, individualized intervention, especially in patients who do not respond to conventional biomedical treatments.

2.4.2 Methodological Characteristics and Limitations

Despite encouraging signals, the current evidence base is methodologically fragile. Several limitations warrant emphasis:

- **Study design limitations.** With the exception of Marx (2006), all publications are single case reports. While such studies provide valuable clinical detail, they lack external validity and do not permit causal inference. The predominance of anecdotal evidence prevents strong conclusions about efficacy.
- **Heterogeneity of interventions.** Treatment schedules varied considerably, from a handful of sessions over weeks to multi-year follow-ups. Techniques were highly individualized, often tailored to the specific patient rather than following standardized protocols. While this reflects osteopathy's patient-centered ethos, it limits reproducibility and makes cross-study comparison impossible.
- **Outcome measures.** Only Marx (2006) employed validated tools such as the NIH-CPSI and quality-of-life indices. Most other reports relied primarily on narrative descriptions of symptom resolution, with limited functional or quality-of-life data and no standardized pain or disability scales. While this reliance on subjective outcomes may limit the comparability and quantification of results, it does not necessarily undermine the scientific

validity of the studies. In the context of a multifactorial and highly individualized condition such as chronic pelvic pain, clinical reasoning remains a central component of osteopathic practice and research interpretation. The use of validated scales would, however, provide a complementary means of quantifying improvement and facilitating comparison across studies, without replacing the essential role of individualized clinical judgment.

- **Psychosocial assessment.** Despite consensus that CPPPS is influenced by psychosocial and emotional factors, none of the reviewed studies systematically evaluated these dimensions. This omission represents a major weakness, as it overlooks variables that strongly influence prognosis and therapeutic response.
- **Follow-up duration.** Durations varied widely, from short-term evaluations of a few weeks to long-term follow-ups extending several years. The absence of consistent medium- or long-term follow-up limits understanding of the durability of osteopathic benefits and the risk of relapse.
- **Interdisciplinary context.** None of the studies situated osteopathy within a broader multidisciplinary pathway involving urology, psychology, or physiotherapy. Instead, osteopathy was examined in isolation, ignoring the reality that chronic pain care is most effective when delivered through integrative models.
- **Geographic and cultural relevance.** All studies were conducted outside Quebec and outside francophone populations. As such, none considered the systemic, linguistic, and cultural barriers specific to Quebec's healthcare environment, where access to osteopathy is limited and stigmatized by the public health system.

In summary, while the literature suggests that OMT may hold therapeutic promise for CPPPS, methodological weaknesses, including design, reproducibility, outcome measurement, and contextual relevance, substantially limit the robustness of current knowledge.

2.5 Knowledge Gaps

From this critical appraisal, four principal knowledge gaps can be identified:

1. **Regional and cultural gap.** No studies to date have examined osteopathic treatment for CPPPS in Quebec or among French-speaking populations. This limits the applicability of existing findings to local healthcare systems, which are shaped by unique regulatory, linguistic, and sociocultural dynamics (OQLF, 2019; INSPQ, 2018). Patients in Quebec face distinct barriers (including stigma surrounding male pelvic pain, inequitable access to non-pharmacological therapies, and persistent skepticism toward osteopathy within parts of the medical system) that are not addressed in the international literature (Association professionnelle des ostéopathes du Québec, 2021)
2. **Methodological gap.** The absence of standardized protocols, validated outcome measures, and consistent follow-up weakens the credibility and comparability of existing studies. Without validated tools such as the NIH-CPSI, VAS, or PDI, outcomes cannot be benchmarked against broader clinical research, and replication is nearly impossible.
3. **Pathophysiological gap.** Existing studies tend to focus narrowly on one dimension of CPPPS (peripheral myofascial dysfunction, visceral mobility, or neuropathic mechanisms) rather than integrating these findings into a comprehensive biopsychosocial framework. This fragmented approach limits understanding of how osteopathy may modulate complex interactions between peripheral, central, and psychosocial processes.
4. **Interdisciplinary gap.** Current studies present osteopathy as a stand-alone intervention, rather than exploring its role within multidisciplinary models of care. This does not reflect real-world clinical practice in Quebec, where collaboration between urologists, physiotherapists, psychologists, and manual therapists is essential for managing CPP.

Together, these gaps underscore the urgent need for structured, context-specific, and interdisciplinary research.

2.6 Conclusion

The literature reviewed suggests that osteopathic manual therapy (OMT) has been associated with improvements in pain, function, and quality of life in men with CPPPS across a

limited number of studies. Findings from the randomized controlled trial by Marx (2006), as well as several case reports, describe positive clinical trajectories across heterogeneous presentations, supporting the clinical plausibility of osteopathy as a complementary approach. However, the current evidence base remains limited by the predominance of case reports, lack of methodological standardization, minimal integration of psychosocial assessment, and absence of region-specific data. These limitations constrain both the scientific robustness and the broader applicability of existing findings.

In response to these gaps, the present study adopts an exploratory, descriptive, and pedagogically oriented design, rather than aiming to establish causal effectiveness or statistical generalizability. The objective is to apply a structured and transparent clinical research approach to osteopathic care as delivered by a student-researcher within a supervised academic setting. Particular emphasis is placed on clinical reasoning, methodological coherence, and critical reflection, while situating the study within Quebec's specific sociocultural and regulatory context.

Conducted without external funding and within a healthcare context where osteopathy is not formally regulated, this project does not follow the structure of large-scale controlled trials. Instead, it seeks to contribute by systematically documenting clinical trajectories, integrating validated outcome measures, psychosocial profiling, and structured osteopathic assessment. In doing so, the study aims to generate clinically relevant and hypothesis-generating insights, while providing a foundation for future, more rigorous investigations.

3. METHODOLOGY

3.1. Study Design

This project adopts a prospective, descriptive multiple-case study design involving four adult male participants diagnosed with CPPPS. It includes both interventional and observational components, documenting clinical outcomes, patient-reported experiences, and elements of the therapeutic process within a real-world osteopathic care setting. This design allows for the in-depth documentation of individual clinical trajectories across heterogeneous presentations, while also enabling descriptive comparisons across cases. Given the small sample size and absence of a control group, the study is not intended to support inferential analysis or establish causal relationships, but rather to describe changes observed in these cases over time, temporally associated with care.

The project is exploratory in nature and emphasizes systematic data collection, transparency, and critical reflection over statistical generalizability. Conducted under academic supervision within the specific regulatory and healthcare context of Quebec, it aims to generate clinically relevant and hypothesis-generating insights, while also contributing to educational development in osteopathic practice.

3.2. Population and Sampling

3.2.1 Target Population

This exploratory case series included adult men living in Quebec who were experiencing persistent pelvic, perineal, genital, or anal pain without identifiable infectious, neoplastic, or structural causes. Eligible participants met the clinical definition of CPPPS, characterized by non-organic, non-infectious pain persisting for at least three months and significantly affecting quality of life. Each diagnosis was confirmed by a medical specialist, such as a urologist, prior to enrollment.

Diagnosis confirmation was based on prior medical evaluation, including the exclusion of red flags (e.g., infection, malignancy, structural pathology), in accordance with standard urological practice for CP/CPPS.

Participants were recruited through medical referral pathways, reflecting a clinical convenience sample of patients already engaged in care, many of whom had experienced persistent symptoms despite prior treatment. While this approach enhances clinical relevance, it may also introduce selection bias and limit representativeness of the broader CPPPS population.

The small sample size (n = 4) and non-probabilistic sampling strategy further limit external validity and preclude generalization beyond exploratory observations. However, detailed clinical and contextual descriptions were provided to support transferability, allowing readers to assess applicability to similar patient populations.

3.2.2 Inclusion Criteria

Eligibility was restricted to men aged 18 years or older presenting with pain localized to the pelvic, perineal, genital, or anal regions persisting for at least three months. A formal diagnosis of CPPPS confirmed by a physician was required, with prior exclusion of organic, structural, or infectious causes.

Participants were required to attend weekly osteopathic sessions over four to six weeks and to sign an informed consent form authorizing the release of medical information for research purposes.

Eligibility required all the following criteria to be met at the time of evaluation (May 2025):

- Male, aged 18 years or older
- Pain localized to pelvic, perineal, genital, or anal regions, persisting ≥ 3 months
- Diagnosis of CPPPS confirmed by a specialist physician (e.g., urologist)

- No identifiable organic, structural, or infectious etiology (red flags ruled out)
- Willingness to attend weekly osteopathic treatment sessions over 4-6 weeks
- Agreement to sign consent authorizing medical information sharing

3.2.3 Exclusion Criteria

Participants were excluded if they presented with:

- Active urogenital infection or known systemic inflammatory disease
- Neurological or psychiatric disorder impairing evaluation or consent capacity
- Pelvic or abdominal surgery performed within the past 6 months
- Concurrent participation in another manual therapy or rehabilitation program during the study

3.2.4 Recruitment Strategy and Sampling Process

Participants were recruited in Montreal through medical referral pathways, primarily via a collaborating urologist-surgeon and, in one case, a general practitioner affiliated with the Rockland MD private medical clinic. No public advertisements were used. Recruitment therefore reflects a clinical convenience sample of patients already engaged in medical care for CPPPS, most of whom had experienced limited or no improvement with conventional treatments.

Recruitment took place between May 1 and May 30, 2025. A recruitment document (Appendix 1) was provided to referring physicians to standardize patient information.

The recruitment process followed these steps:

1. **Initial Medical Screening:** The referring physician conducted a comprehensive medical evaluation to confirm the diagnosis of CPPPS and exclude identifiable pathological causes (infection, malignancy, structural abnormalities). This step ensured that all participants met established clinical criteria and that red flags had been ruled out prior to inclusion.

2. **Study Presentation:** Eligible patients were informed about the study by their physician, via a recruitment publication (Appendix 1.1) and invited to contact the researcher via a dedicated email address if interested in participating.
3. **Screening and Inclusion:** A total of 4 patients were informed of the study, of whom 4 expressed interest and were screened by the researcher. Following eligibility verification, the four participants met all inclusion criteria and no exclusion criteria and were enrolled.
4. **Consent and Initial Contact:** Participants received an informed consent form (Appendix 3.1), pre-approved by the medical board, authorizing the use of their medical information for research purposes.
5. **Phone Interview (Pre-inclusion assessment)**

   A structured phone interview was conducted to:

   - Explain the study's purpose, duration, and procedures
   - Describe the osteopathic intervention
   - Confirm availability and logistical feasibility
   - Collect preliminary qualitative data (pain history, lifestyle, expectations)

3.4.5 Sampling Considerations and Potential Bias

This study used a non-probabilistic convenience sampling strategy, which may introduce selection bias, as participants were recruited through medical referral and may not be representative of the broader CPPPS population. In particular, included participants were already engaged in healthcare pathways and may have been more motivated to seek alternative or complementary care.

However, detailed clinical and contextual descriptions of each case were provided to support transferability, allowing readers to assess the applicability of findings to similar patient populations.

3.3 Data Collection Tools

To address the multidimensional nature of Chronic Primary Pelvic Pain Syndrome (CPPPS), a multimodal data collection strategy was implemented, integrating quantitative, qualitative, medical, and clinical assessment tools.

Each instrument was selected to capture a distinct dimension of the condition (pain intensity, symptom burden, functional impact, clinical findings, and psychosocial context) allowing triangulation of data within a biopsychosocial (BPS) framework.

All tools were applied using a standardized protocol across participants and timepoints (T0-T5) to ensure consistency and reproducibility.

3.3.1 Quantitative Tools

Three validated instruments were used to assess pain, symptom severity, and functional impact: the VAS, NIH-CPSI, and PDI. These measures were selected for their demonstrated validity and reliability in chronic pain populations, their specific relevance to CPPPS, and their sensitivity to change in repeated-measures designs. Together, they enabled both intra-individual trajectory tracking over time and meaningful comparisons across cases.

1. **Visual Analogue Scale (VAS)** (Appendix 5.1)

The Visual Analog Scale (VAS) is a widely used tool for assessing pain intensity in clinical and research settings. It consists of a 0-10 scale anchored by “no pain” and “worst imaginable pain” (Hawker et *al*., 2011).

In this study, the VAS was administered at five time points (T1-T5) to capture two dimensions of pain: “At the moment” pain (current intensity at each session) and “Worst pain in the past week” (retrospective peak pain).

A ≥30% reduction from baseline was used as a reference threshold for clinically meaningful change, based on prior literature (Farrar et *al*., 2001).

The VAS demonstrates high test-retest reliability (r = 0.94) and strong construct validity across chronic pain conditions (Bijur et *al*., 2001). Its sensitivity to short-term change makes it appropriate for repeated assessments in case series designs.

2. **NIH Chronic Prostatitis Symptom Index (NIH-CPSI**) (Appendix 5.2)

Symptom burden was assessed using the NIH Chronic Prostatitis Symptom Index (NIH-CPSI), a validated instrument commonly used in men with CP/CPPS (Litwin et *al*., 1999).

The NIH-CPSI evaluates three domains: Pain (location, frequency, intensity), Urinary symptoms and Quality of life impact. Total scores range from 0 to 43, with higher scores indicating greater symptom burden. A reduction of ≥6 points was used as a commonly cited reference threshold for clinically meaningful change (Nickel et *al*., 2001).

The instrument demonstrates good internal consistency (α = 0.86) and test-retest reliability (r = 0.84) (Litwin et *al*., 1999).

3. **Pain Disability Index (PDI)** (Appendix 5.3)

Functional disability was assessed using the Pain Disability Index (PDI), a validated self-report measure evaluating the extent to which pain interferes with daily functioning across seven domains (Pollard, 1984; Tait et *al*., 1990). The PDI assesses the following domains:

- Family and home responsibilities
- Recreation
- Social activity
- Occupation
- Sexual behavior

- Self-care
- Life-support activities

Each domain is scored from 0 to 10, yielding a total score ranging from 0 to 70, with higher scores indicating greater disability. Although no universal classification exists, scores are commonly interpreted descriptively as:

- Mild: <15
- Moderate: 15-39
- Severe: ≥40

A ≥30% reduction from baseline was used as a commonly cited reference threshold for clinically meaningful change.

The PDI demonstrates high internal consistency (α = 0.86-0.91) and test-retest reliability (r = 0.91) (Tait et *al*., 1990).

3.3.2 Qualitative Tools

Qualitative data were collected using semi-structured interviews to capture subjective and contextual aspects of CPPPS not addressed by quantitative measures.

Interviews followed a standardized guide to ensure consistency across participants, while allowing open-ended responses. Data was recorded through detailed written notes.

Two semi-structured interview formats were used:

1. **Initial Phone Interview**

The baseline interview collected:

- demographic and clinical history
- symptom characteristics

- lifestyle factors
- psychosocial context (stress, emotional state, beliefs)

This information contextualized quantitative measures and informed individualized clinical reasoning. Table 7 summarizes the key domains and topics explored during the initial phone interview.

Table 7

Initial Phone Interview Domains and Topics

Domain	Topics Explored
1. Demographics	• Age, height, weight, recent weight changes • Occupation and type of work (sedentary/manual/mixed) • Family context (e.g., caregiving role, relationship status)
2. Pain Profile	• Onset and history of symptoms • Pain location and descriptors (burning, stabbing, dull, etc.) • Pain intensity (current, average, worst) • Aggravating and relieving factors • Rhythm or pattern (e.g., intermittent, constant, cyclical)
3. Associated Symptoms	• Urinary symptoms (urgency, frequency, painful voiding, incomplete emptying) • Digestive symptoms (bloating, bowel dysfunction, GI discomfort) • Neurological symptoms (numbness, hypersensitivity, paresthesia) • Sexual symptoms (erectile/ejaculatory difficulties, genital pain, libido changes)
4. Lifestyle Factors	• Physical activity: frequency, type, duration, intensity • Sedentary time (hours/day), postural habits, ergonomic challenges • Work-related stress and psychosocial load
5. Sleep and Diet	• Average sleep duration and subjective quality • Sleep disturbances linked to pain or emotional state • General dietary habits, food intolerances • Hydration and fluid intake
6. Substance Use	• Tobacco use (smoking, vaping) • Alcohol use (frequency and quantity) • Recreational drug use (type, frequency)
7. Psychosocial Dimensions	• Initial pain beliefs and expectations • Emotional distress (anxiety, shame, depressive symptoms) • Coping strategies already in use (adaptive or maladaptive) • Motivation for treatment and readiness to engage in change

2. Evolution Post-Treatment (EPT) Interviews

At each session, participants completed a structured follow-up interview exploring:

- symptom evolution
- functional changes
- perceived treatment effects
- psychosocial factors (e.g., stress, coping, fear-avoidance)

These interviews supported longitudinal tracking of patient experience and contributed to interpretation of clinical trajectories. Table 8 summarizes the key domains and topics explored:

Table 8

Evolution Post Treatment Interview Domains and Topics

Domain	Topics Explored
1. Symptom Evolution	• Subjective progression since the previous session (improvement, stagnation, or worsening) • Frequency and duration of pain-free periods • Average and peak pain intensity (VAS, 0-10 scale) • Changes in pain location, distribution, or type (e.g., localized vs. radiating, burning vs. dull) • Post-treatment effects (immediate or delayed relief, aggravation, emotional response) • Presence of any side effects, new symptoms, or functional changes since the last treatment
2. Pain Profile	• Primary pain location(s) (e.g., perineum, penis, testicles, sacrum, pubis) • Onset and chronological history (precipitating events, progression, chronicity) • Pain characteristics (burning, stabbing, cramping, pressure-like) • Current, average, and worst pain intensity • Aggravating and relieving factors (posture, stress, physical activity, sexual activity, urination, defecation) • Pattern/rhythm (constant, intermittent, situational) • Coexisting symptoms (numbness, urinary or bowel dysfunction, sexual impairment) • Past diagnostic and treatment history (tests, physician impressions, misdiagnoses)
3. Systems Screening	• **Gastrointestinal (GI):** Bowel function, GI pain, bloating, gas, food intolerances, bowel habit changes • **Urinary**: Voiding symptoms (urgency, frequency, hesitancy), painful voiding, incomplete emptying, incontinence, bladder-related pain • **Genital/Sexual:** Pain triggers (e.g., mechanical, positional, sexual), erectile and ejaculatory function, genital sensory changes, libido and sexual impact, frequency and quality of sexual activity

4. Lifestyle & Habits	• **Physical Activity and Function**: Frequency, intensity, and duration of exercise, changes in activity level, sedentary behavior, physical hobbies • **Occupational Context**: Job type (manual/sedentary/mixed), work posture, ergonomic strain, work-related stress • **Sleep**: Duration, quality, pain-related disturbances, sleep aids • **Diet and Substance Use**: Dietary patterns, hydration, caffeine/alcohol/sugar consumption • **Substance Use:** Tobacco (smoking/vaping), alcohol, recreational drug use
5. Psychosocial Assessment	• **Pain Beliefs:** Understanding of pain origin, perceived meaning, expectations of recovery • **Fear/Avoidance:** Activity avoidance due to fear of symptom exacerbation or reinjury • **Coping Strategies:** Adaptive vs. maladaptive (e.g., pacing, problem-solving vs. rumination, withdrawal) • **Emotional State:** Anxiety, depressive symptoms, emotional regulation, frustration, shame • **Stressful Events:** Recent or ongoing psychosocial stressors (e.g., work pressure, trauma, family dynamics) • **Self-Esteem / Body Image:** Changes in self-perception, impact on masculinity, confidence, or sexual identity • **Perceived Control:** Sense of agency vs. helplessness in managing pain and daily life • **Motivation for Change:** Willingness to engage in self-care, openness to therapeutic input, behavioral readiness • **Health Behavior:** Implementation of lifestyle changes, self-monitoring, consistency with therapeutic activities • **Social Impact:** Impact on relationships, intimacy, communication difficulties, support system strength or isolation

3.3.3 Medical History Report

A structured review of medical records was conducted for each participant using documentation provided by referring physicians. Sources included urology consultations, imaging reports (MRI and ultrasound), laboratory results, and prior treatment records. A standardized extraction grid (Appendix 2) was used to ensure consistency across cases. This review aimed to confirm the absence of identifiable pathology, document prior diagnostic and therapeutic history, and identify relevant comorbidities. Overall, this information supported clinical reasoning and helped contextualize findings within each participant's broader healthcare trajectory.

3.3.4 Clinical Osteopathic Evaluation Protocole

A standardized clinical evaluation protocol was applied at each treatment session to assess musculoskeletal, fascial, and functional findings. The protocol followed a consistent sequence,

including observation, dynamic testing, mobility assessment, pain provocation tests, and palpatory evaluation. All findings were documented using a standardized form (Appendix 6.1).

1. Observation and Dynamic Assessment

Postural and movement assessment included:

- spinal alignment
- pelvic positioning
- load distribution patterns

Dynamic tests (e.g., Gillet test) were used to assess lumbopelvic movement patterns. Reliability of individual tests varies, but improves when interpreted in combination (Laslett et *al*., 2005).

2. Mobility Testing

Lumbar and hip mobility were assessed through active and passive movements. These tests aimed to identify movement restrictions and asymmetries relevant to lumbopelvic function. Reliability is moderate to high depending on the measure (MacDonald et *al*., 2006; Reiman et *al*., 2012).

3. Pain Provocation Tests

Standardized orthopedic tests included:

- Thomas test
- FABER
- FADIR

These tests were used to explore potential contributions from hip, sacroiliac, and surrounding structures. Their diagnostic value increases when interpreted in combination (Laslett et *al*., 2005; Martin et *al*., 2008).

4. Palpatory Evaluation

Palpation targeted:

- articular mobility
- myofascial tone
- selected visceral regions

While palpatory findings are inherently subjective, moderate reliability has been reported for specific domains such as trigger point assessment (Gerwin et *al*., 2004). These findings were interpreted as clinician-reported observations, not objective measures.

Longitudinal Application

All tools were applied repeatedly across sessions (T1-T5), allowing:

- tracking of clinical trajectories
- comparison between subjective and objective measures
- integration of findings across domains

This approach supported a multidimensional and longitudinal analysis of CPPPS, consistent with the study's exploratory design.

3.4 Procedure

The intervention was conducted over approximately 8 to 10 weeks per participant and comprised six structured timepoints (T0-T5). A repeated-measures design was used to allow intra-individual tracking of clinical trajectories across time.

A standardized core protocol was applied across all participants to ensure reproducibility, while allowing individualized clinical decision-making within predefined parameters.

Standardized components included:

- timing and sequence of sessions (T0-T5)
- use of validated outcome measures (VAS, NIH-CPSI, PDI)
- structured interviews (EPT format)
- a predefined clinical testing sequence

Treatment techniques were individualized based on clinical findings, within this structured framework.

3.4.1 Setting and Duration

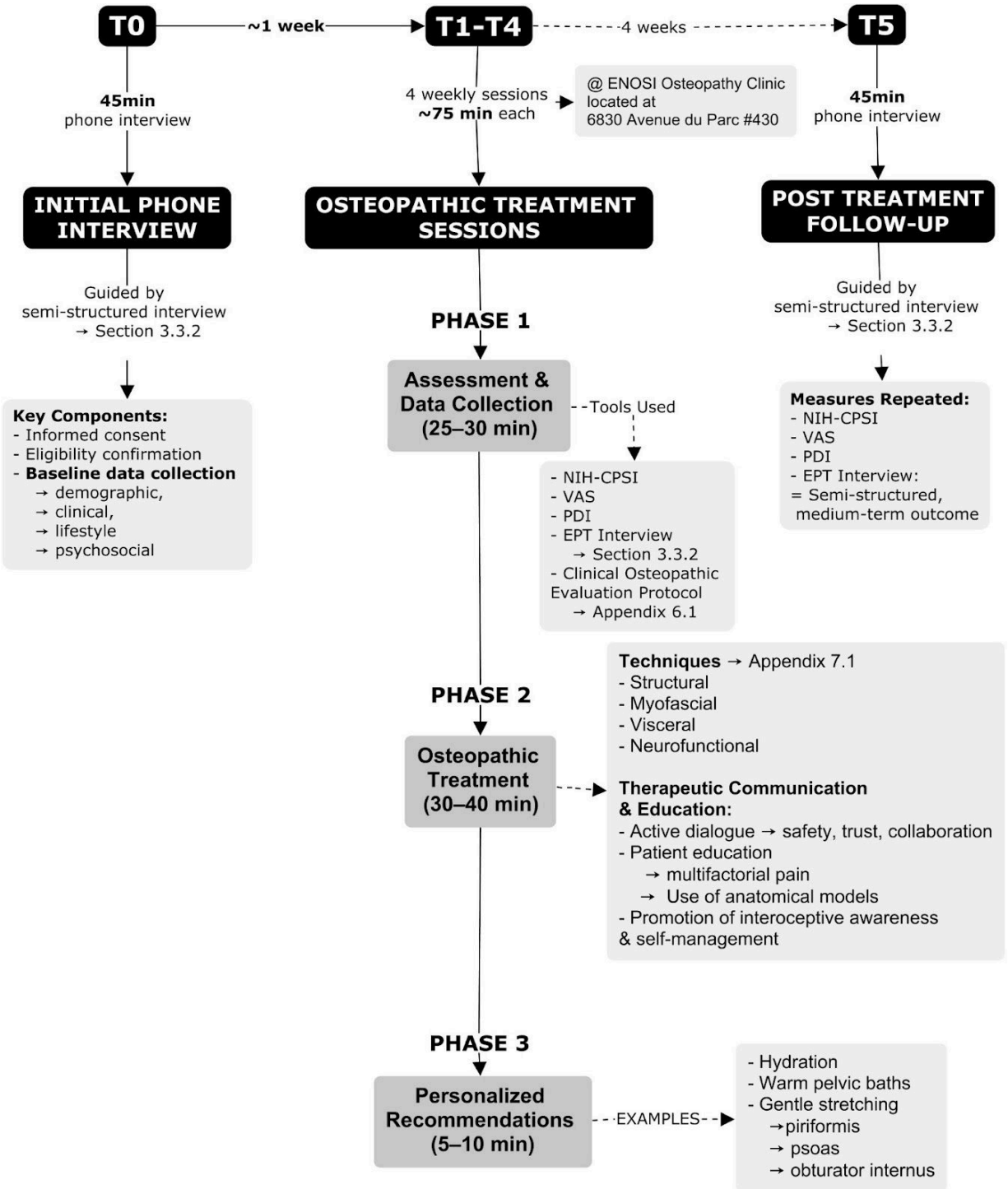
Each participant followed a standardized timeline over approximately two months, allowing consistent short-term and follow-up assessment across cases.

The protocol included:

- **T0 (Intake):** one phone interview (~60 minutes), conducted prior to treatment
- **T1-T4 (Treatment):** four in-person sessions (~75 minutes each), delivered weekly
- **T5 (Follow-up):** one phone interview (~30-60 minutes), conducted four weeks after the final session

All in-person sessions were conducted at the ENOSI Osteopathy Clinic (Montréal, QC). Remote interviews (T0 and T5) were conducted in a confidential setting. This standardized timeline was selected to allow comparison of short-term changes and early follow-up across participants. Please refer to Figure 17 for a detailed timeline of the intervention.

Figure 18: Osteopathic Intervention Protocol for CPPPS



3.4.2 Sequence of Interventions

The intervention sequence was standardized across participants and consisted of three phases at each session: **(1) assessment, (2) treatment, and (3) recommendations.**

T0 - Initial Intake

The intake interview (T0) followed a structured, semi-structured format (Section 3.3.2) and included: eligibility confirmation, informed consent and collection of baseline demographic, clinical, and psychosocial data. This phase informed individualized care planning within the standardized protocol.

T1-T4 - Treatment Sessions

Each session followed a consistent structure.

1. Assessment Phase (25-30 minutes)

The assessment phase included:

- administration of VAS, NIH-CPSI, and PDI (Section 3.3.1)
- structured EPT interview (Section 3.3.2)
- clinical testing using the Clinical Osteopathic Evaluation Protocol (Section 3.3.4)

Clinical testing followed a standardized sequence: observation → dynamic testing → mobility assessment → provocation tests → palpatory evaluation.

This structure ensured consistency across sessions and participants, and allowed repeated documentation of clinical findings over time.

2. Treatment Phase (30-40 minutes)

Treatment consisted of individualized osteopathic interventions selected from a predefined pool of approaches (structural, myofascial, visceral, neurofunctional; Appendix 7.1). Treatment selection followed a structured decision process, based on:

1. findings identified during assessment
2. presence of recurrent versus variable dysfunction patterns
3. patient tolerance and response to prior sessions

Interventions targeted areas of reduced mobility or increased tissue tone, within a biopsychosocial framework.

3. Education and Communication (Integrated)

Patient education and therapeutic communication were integrated throughout sessions. Information was provided regarding the multidimensional nature of CPPPS, including physical and psychosocial factors, to support patient understanding and engagement.

4. Recommendations Phase (5-10 minutes)

Each session concluded with brief, individualized recommendations aimed at supporting self-management. These included general guidance such as:

- hydration
- heat application
- targeted stretching (e.g., psoas, piriformis, obturator region)

Recommendations were adapted to individual tolerance and clinical presentation.

T5 - Follow-Up

A follow-up interview (T5) was conducted four weeks after the final session. This included: re-administration of VAS, NIH-CPSI, and PDI along with structured EPT interviews. This timepoint allowed comparison with baseline and assessment of short-term trajectory and maintenance of changes.

3.5 Data Analysis

Data were analyzed using a descriptive, case-oriented approach, with the aim of documenting individual and case series-level changes across the intervention period. Given the exploratory design, very small sample size (n = 4), and absence of a control group, no inferential statistics were applied, and the study was not designed to establish causal relationships. Results are therefore presented as changes observed over time, temporally associated with care, and should be interpreted with caution.

Outcomes are reported session by session to highlight intra-individual trajectories and are summarized in tables and figures to facilitate comparison across participants. Case series-level means are presented for descriptive purposes only and should be interpreted cautiously given the limited sample size.

Given the mixed-methods nature of this study, quantitative and qualitative data were integrated using a convergent parallel design, in which both data types were collected concurrently, analyzed separately, and merged at the interpretation stage. Quantitative measures (VAS, NIH-CPSI, PDI) were used to document symptom evolution and functional impact, while qualitative data (anamnesis, follow-up interviews, medical record information, and logbook entries) provided contextual insight into patients' lived experiences, coping processes, and psychosocial dynamics.

The two components did not hold equal analytical status. The study followed a QUAN → qual priority model, in which the quantitative component served as the primary descriptive framework to structure the observation of symptom progression over time, while the qualitative component played a complementary role, enriching the interpretation of individual trajectories and helping to contextualize variability across cases.

The merging of data sources was conducted through case-level triangulation and joint interpretation, whereby quantitative outcomes for each participant were systematically examined alongside qualitative narratives and osteopathic clinical findings. This integration was performed both at the level of individual case analysis and across-case comparison, allowing patterns of convergence, complementarity, or divergence to be identified.

This approach supports a more comprehensive, yet exploratory, understanding of each participant's evolution within a biopsychosocial framework, without implying causal relationships.

3.5.1 Baseline Clinical Profiles

Baseline demographic, clinical, and psychosocial characteristics were summarized descriptively for each participant to contextualize symptom evolution. Key domains included age and BMI, diagnostic category and symptom duration, medical and surgical history, pain characteristics and distribution, urinary and sexual symptoms, psychosocial and relational impact, and prior treatment history.

Data were presented through narrative case descriptions and summary tables. No inferential analysis was performed; these profiles served solely to characterize the sample and support contextual interpretation.

3.5.2 Quantitative Results

Quantitative outcomes were assessed using three validated instruments: the Visual Analog Scale (VAS), the National Institutes of Health Chronic Prostatitis Symptom Index (NIH-CPSI), and

the Pain Disability Index (PDI). Raw scores were collected at five time points (T1-T5) and analyzed descriptively for each participant and across the case series.

For all measures, results are presented as absolute values, absolute changes, and percentage changes over time, alongside individual trajectories. Given the exploratory design and small sample size, findings should be interpreted descriptively and without inference of causality.

VAS

Participants rated current pain intensity and worst pain experienced in the past week (0-10 scale). A reduction of ≥30% from baseline was used as a reference threshold for clinically meaningful change, based on prior literature (Farrar et *al*., 2001). This threshold is provided as a contextual indicator and not as an absolute criterion.

NIH-CPSI

Total scores (range 0-43) were tracked longitudinally. A reduction of ≥6 points was used as a commonly cited threshold for clinically meaningful improvement, while acknowledging variability in thresholds depending on methodology and context (Litwin et *al*., 1999; Nickel et *al*., 2001).

PDI

Total scores (range 0-70) were analyzed descriptively. A reduction of ≥30% from baseline was used as an indicator of clinically meaningful change (Tait et *al*., 1990; Pollard, 1984), again interpreted as a reference rather than a definitive threshold.

3.5.3 Clinical Osteopathic Evaluation

Osteopathic findings were documented at each session using the standardized protocol described in Section 3.3.4. For analysis, findings were compiled and summarized descriptively. Recurrent dysfunctions were aggregated using frequency counts across sessions and participants and presented in tabular format to illustrate recurring patterns.

Given the exploratory design and reliance on clinical assessment, these findings are not considered objective measures and should not be interpreted as causal indicators, but rather as part of the overall clinical context.

3.5.3 Qualitative and Psychosocial Analysis

Qualitative data were obtained from multiple sources, including semi-structured clinical anamnesis (T0), Evolution Post-Treatment (EPT) interviews at each session, T5 follow-up, medical record review, and systematic researcher logbook entries. These data captured participants' subjective experiences related to pain perception, emotional regulation, coping strategies, lifestyle impact, and psychosocial dynamics.

Analytical Approach

The qualitative component was informed by a descriptive qualitative approach, aiming to provide a comprehensive summary of participants' experiences in everyday terms without extensive theoretical interpretation (Sandelowski, 2000). As interviews were not audio-recorded and no formal thematic analysis was conducted, qualitative data were analyzed using a structured content organization approach inspired by qualitative content analysis (Elo & Kyngäs, 2008). Findings are therefore presented as contextual support rather than as independent analytic conclusions.

Mixed-Methods Integration

Quantitative and qualitative data were integrated using a convergent parallel approach. Quantitative data served as the primary descriptive framework to track symptom evolution, while qualitative data provided complementary insight into patient experience and variability in trajectories. Integration was conducted through case-level triangulation and joint interpretation, allowing identification of convergence, complementarity, or divergence across data sources.

Psychosocial Profiling (PSVI)

Psychosocial vulnerability was assessed using the Psychosocial Vulnerability Index (PSVI), a

study-specific 10-domain tool designed to capture psychosocial factors relevant to pain experience and clinical evolution. Each domain was scored from 0 to 2, yielding a total score from 0 to 20, categorized descriptively as low, moderate, or high vulnerability.

Scores were established progressively across early sessions (T0-T2) based on clinical anamnesis, follow-up discussions, medical record review, and researcher field notes. As a non-validated, study-specific instrument, PSVI scores were used for descriptive and contextual purposes only and should be interpreted with caution. They were not used for inferential or comparative analysis but served to support interpretation of individual trajectories within a biopsychosocial framework.

3.6 Ethical Considerations

This study involved the collection of health-related data from human participants and was conducted in accordance with established ethical principles, including respect for autonomy, confidentiality, non-maleficence, and responsible data governance.

Participation was voluntary and based on informed consent. Participants received comprehensive verbal and written explanations of the study's objectives, procedures, duration, potential risks, and expected benefits. All questions were addressed prior to inclusion, and written informed consent was obtained before participation (Appendix 3.1). Participants were informed of their right to withdraw from the study at any time, without justification and without any impact on their access to care.

Confidentiality was strictly maintained throughout the study. All data were anonymized using alphanumeric codes, and identifying information was stored separately from clinical and research data. Access to identifiable data was restricted to the principal investigator. Any data presented in this thesis were de-identified to prevent participant recognition.

All data (clinical notes, questionnaires, qualitative records, and logbook entries) were securely stored on password-protected devices, while physical documents were kept in a locked and secure location. Access was restricted exclusively to the principal investigator, and no data were stored on public or shared platforms. Data will be retained for a period of two years following study completion (until 2027), in accordance with institutional and professional guidelines, after which they will be securely destroyed.

In accordance with institutional requirements for exploratory clinical case series conducted within a supervised educational setting at ENOSI - Centre d'Ostéopathie de Montréal, formal research ethics board approval was not required. However, all procedures were conducted in accordance with recognized ethical standards for human research and clinical practice.

Participant selection followed clearly defined, non-discriminatory inclusion and exclusion criteria, ensuring equitable distribution of research risks and benefits. Particular attention was paid to minimizing potential bias related to the clinician-researcher role and the small sample size, while maintaining rigorous ethical standards throughout the study.

Respect for autonomy, dignity, and privacy was maintained at all times. Given the sensitive nature of pelvic and sexual health, particular care was taken to provide a safe, respectful, and non-judgmental clinical environment.

Osteopathic interventions were selected to minimize risk, and contraindications were systematically assessed prior to treatment. The anticipated therapeutic benefits were considered to outweigh potential risks. The treatments were administered by a fifth-year osteopathy student with appropriate clinical training and supervision, and techniques were adapted to each participant's presentation and tolerance.

Participants were monitored for one month following the intervention period to identify any delayed adverse effects and to provide additional support if required.

All findings, including negative or inconclusive results, were reported transparently and without modification. This research addresses a prevalent yet under-recognized condition and aims to contribute to the development of more comprehensive, patient-centered, and ethically responsible care strategies for men with CPPPS.

4. RESULTS

This section presents the clinical trajectories observed across four adult male participants diagnosed with CPPPS over the course of osteopathic care. Findings are reported descriptively and reflect changes observed over time, temporally associated with care, without implying causal relationships. Given the small sample size (n = 4) and exploratory design, results should be interpreted with caution and are not intended to support generalizable conclusions.

Results are structured in alignment with the study objectives and aim to capture multidimensional patient evolution across domains including pain intensity, functional impact, osteopathic clinical findings, and psychosocial context.

The following subsections present:

- Clinical baseline profiles and individual trajectories
- Changes in pain intensity (VAS)
- Changes in symptom burden (NIH-CPSI)
- Changes in pain-related disability (PDI)
- Recurrent osteopathic clinical findings
- Psychosocial vulnerability profiles (PSVI)

4.1 Clinical Baseline Portraits and Individual Trajectories

4.1.1 Participant Overview and Inclusion Rationale

This study included four adult male participants aged 27 to 59 years, all of whom had received a prior medical diagnosis consistent with CPPPS. Participants were recruited through physician referral and represent a clinical convenience sample of individuals engaged in healthcare pathways, most of whom reported limited or no sustained improvement with conventional management.

All participants met the following criteria: persistent pelvic, perineal, genital, or related pain for ≥6 months; negative urological and infectious investigations with red flags ruled out; clinically significant impact on functional, psychological, or social domains; and willingness to engage in osteopathic care within a broader care context.

This small but heterogeneous sample was selected to allow for in-depth, case-level description of clinical trajectories across varied presentations. The diversity of clinical profiles reflects the multifactorial nature of CPPPS, particularly in individuals presenting with persistent symptoms despite prior medical management.

As such, this sample may reflect a subgroup of patients with more complex or treatment-resistant presentations, which should be considered when interpreting the findings. Given the sampling strategy and small sample size (n = 4), results should be interpreted as exploratory and hypothesis-generating, and not as representative of the broader CPPPS population.

4.1.2 Baseline Clinical Portraits

This section presents the baseline clinical profiles of the four participants prior to the initiation of osteopathic care. These profiles integrate demographic, symptomatic, medical, and psychosocial variables to provide a contextualized understanding of each individual's presentation and the rationale for inclusion. A comparative summary of key clinical domains is presented in Table 9.

The following narrative portraits expand on this baseline overview by describing each participant's clinical presentation in detail. They illustrate the heterogeneity of CPPPS presentations, as well as variability in psychosocial context and prior treatment history, which may influence individual clinical trajectories.

Table 9

Summary of Included Patients at Baseline

Domain	Patient 1	Patient 2	Patient 3	Patient 4
1. DEMOGRAPHIC AND BIOMETRIC PROFILE				
Age (years)	37	44	59	49
BMI	26.1	26.6	28.7	23.6
Primary Diagnosis	CP/CPPS (NIH Category IIIb)	Post-vasectomy chronic testicular pain syndrome	Mixed CPP syndrome	CP/CPPS with central sensitization signs
Symptom Duration	~4 years	~6 months	~1 year	~3 years
2. Contributing Medical History				
History of Trauma	None	Hamstring strain 6 months ago	None	None
History of Surgery	None	Vasectomy, thymectomy	None	Appendectomy, bunion surgery
History of Infection	Gonorrhea (4 years ago)	None known	Recurrent gonorrhea/chlamydia (10 years)	None confirmed
3. Pain Characteristics and Symptom Distribution				
Pain Location	Perineum, penis, pelvic floor	Right testicle, inguinal region	Urethra, distal penis, occasionally testicles	Perineum, pelvic floor, anus, urethra
Onset & History	Gradual onset post-gonorrhea infection (4-5 years ago); worsened with increased sexual activity	Intermittent since vasectomy 15 yrs ago; flare-up ongoing for 3 weeks	Post-retirement lifestyle change, increased sedentary behavior	Pain began in penis/testicles and migrated to anal region
Pain Characteristics	Urethral burning, diffuse perineal/genital pain, post-ejaculatory pain up to 24h, penile sensitivity	Dull internal testicular pain (1/10), 3 shock-like episodes/week	Fluctuating episodes 1-3 days, worse in evening; may disturb sleep	Tightness, pulling, 'spoon-in-anus' sensation; chronic levator ani contraction
Aggravating Factors	Prolonged sitting/lying, masturbation/ejaculation, anal penetration, full bladder	Running, swinging, trunk flexion	Prolonged sitting, sedentary winter lifestyle	Stress, bowel movements, sitting/standing, squats
Relieving Factors	Urination, rest, partial relief from NSAIDs, Xatral improves urinary stream	Maximal hip flexion (e.g., toilet position)	Stretching, breathing exercises, standing with legs extended	Ice (5 min), distraction (phone), meds ineffective
Urinary Symptoms	Burning at stream start, weak/interrupted flow, incomplete voiding	Sensation of incomplete voiding before bed	No urinary symptoms	Occasional burning with urination
Sexual Symptoms	Painful erections, reduced libido, intimacy avoidance	No ejaculatory pain; reduced libido due to discomfort	Maintains sexual activity; penile pain post-coitus during flares	Occasional ejaculatory pain; sexually inactive
Neurological Symptoms	None reported beyond pelvic area	None	None	None outside pelvic region
Pain Irradiation	Sometimes radiates to right testicle	Confined to testicle/inguinal	Localized to urethra/testicle; false urge to urinate	Postural adaptation causes rib pain; scoliosis; neck pain

		region; no mass or sensitivity change		
4. Psychosocial and Functional Impact				
Psychological Impact	Low self-esteem, mild depression, shame	Irritability by midday; pain fatigue affects mood	No psychological/mood disorders reported	Chronic distress, shame, anxiety, loss of role
Relational Impact	Breakup linked to pain; avoids intimacy	Strain with partner and teen son	Maintains intimacy	Lost custody of daughter; conflict with identity; isolation
Quality of Life Impact	Morning pain, sleep difficulty, gym as distraction	Not sleep-disruptive but impacts energy and mood	Sleep disturbed during flares; prefers standing	Progressive daytime worsening; evening peak; sleep preserved
5. Treatment Histories and Therapeutic Gaps				
Current Treatment	None currently	Amitriptyline (partial), PT (effective)	Amitriptyline, PT, psychological support	Psychological care, Trintellix, Ativan, Zopiclone
Past Treatment (Effective)	None	Pelvic PT (~90% improvement)	PT, psychological follow-up	Breathing/PT support (some benefit)
6. Osteopathic Relevance and Clinical Implications				
Justification for Inclusion	Chronic nonbacterial pelvic pain; meets CPP criteria; consented to care	Chronic neuropathic-like pelvic pain; ruled out infection/tumor	Persistent pelvic pain; negative STI/urinary workup; high functional impact	Chronic, fluctuating pain; complex psychosocial overlay; consented to follow-up

Clinical Case Descriptions

The following case descriptions are presented descriptively and aim to contextualize individual clinical trajectories within their respective biopsychosocial profiles, without implying causal relationships.

Patient 1 - Post-Infectious CPP with Psychosocial Vulnerability

This participant was a 37-year-old male (BMI 26.1) presenting with a four-year history of persistent perineal and urethral pain following a prior gonorrheal infection. Pain was described as burning and diffuse, and was aggravated by ejaculation, masturbation, prolonged sitting, and bladder distension. He also reported pelvic floor tension and a weak urinary stream, suggesting a possible contribution of neuromyofascial and urological factors. Psychosocially, the participant reported low self-esteem, moderate depressive symptoms, disrupted sleep, and avoidance of sexual intimacy, contributing to reduced quality of life and social withdrawal. His medical history was otherwise unremarkable. Previous interventions included antibiotics, NSAIDs, and

physiotherapy, with no sustained improvement. This profile is suggestive of a post-infectious presentation associated with elevated psychosocial vulnerability.

Patient 2 - Post-Vasectomy Pain Syndrome with Neuropathic Features

The second participant was a 44-year-old male (BMI 26.6) presenting with intermittent right testicular pain beginning after a vasectomy performed 15 years earlier. In the three weeks prior to baseline, symptoms had become constant and were aggravated by trunk flexion, running, and prolonged sitting. Despite persistent pain and associated fatigue, the participant maintained stable psychological functioning and supportive family relationships, suggesting relative resilience. Medical history included vasectomy and thymectomy. Previous treatments included amitriptyline (partial relief), alpha-blockers, and pelvic physiotherapy, the latter previously associated with substantial symptom improvement. This presentation appears consistent with chronic post-vasectomy pain with mechanical and possible neuropathic features, without marked psychosocial burden.

Patient 3 - Chronic Penile and Testicular Pain with Neuromyofascial Components

The third participant was a 59-year-old male with a normal BMI, presenting with a one-year history of episodic penile and urethral pain, occasionally radiating to the testicles. Episodes lasted one to three days and were aggravated by prolonged sitting and physical inactivity. He reported urinary symptoms, including urgency and a sensation of incomplete voiding, in the absence of identified urological pathology. Psychosocially, he described mild health-related anxiety but no significant mood disturbance or functional impairment. He remained physically active and socially supported. Medical history included prior sexually transmitted infections approximately ten years earlier. Previous treatments included antibiotics, amitriptyline, psychotherapy (minimal benefit), and pelvic physiotherapy, with partial symptom relief. This profile may reflect a neuromyofascial-dominant presentation with relatively low psychosocial burden.

Patient 4 - Complex CPP with High Psychosocial Burden

The fourth participant was a 49-year-old male (BMI 23.6) on medical leave due to symptom severity. He presented with a three-year history of progressive pelvic, perineal, anal, and urethral pain, initially localized to the genitals and later extending to the anorectal region. Pain was described as a sensation of tightness and pulling, consistent with chronic pelvic floor hypertonicity and rectal pressure. Psychosocially, the participant reported significant distress, including anxiety, shame, and unresolved trauma following a post-divorce identity crisis. Loss of paternal custody and relational isolation contributed to marked social withdrawal. Medical history included appendectomy and bunion surgery. Previous treatments included anxiolytics, antidepressants, sleep medication, and physiotherapy, with limited reported benefit. This case reflects a complex presentation involving both physical and psychosocial contributors, with substantial impact on quality of life.

Together, these clinical portraits illustrate the heterogeneity of CPPPS presentations, ranging from profiles with predominantly localized or physical features to more complex cases involving significant psychosocial and functional dimensions. This variability supports the relevance of multidimensional, individualized approaches to care and highlights the importance of interpreting clinical trajectories within each participant's unique biopsychosocial context.

4.2 Quantitative Outcome Results

4.2.1 VAS Results

4.2.1.1 VAS - "At the Moment" Pain

Current pain intensity was assessed using the Visual Analog Scale (VAS) (see Methods). “At the moment” pain scores were recorded at five time points (T1-T5). Figure 18 illustrates individual trajectories and the mean case series trend, while Table 10 summarizes descriptive statistics. Given the small sample size (n = 4), results are presented descriptively and should be interpreted with caution.

Figure 19. Individual trajectories and mean case series trend for VAS “at the moment” pain scores across intervention

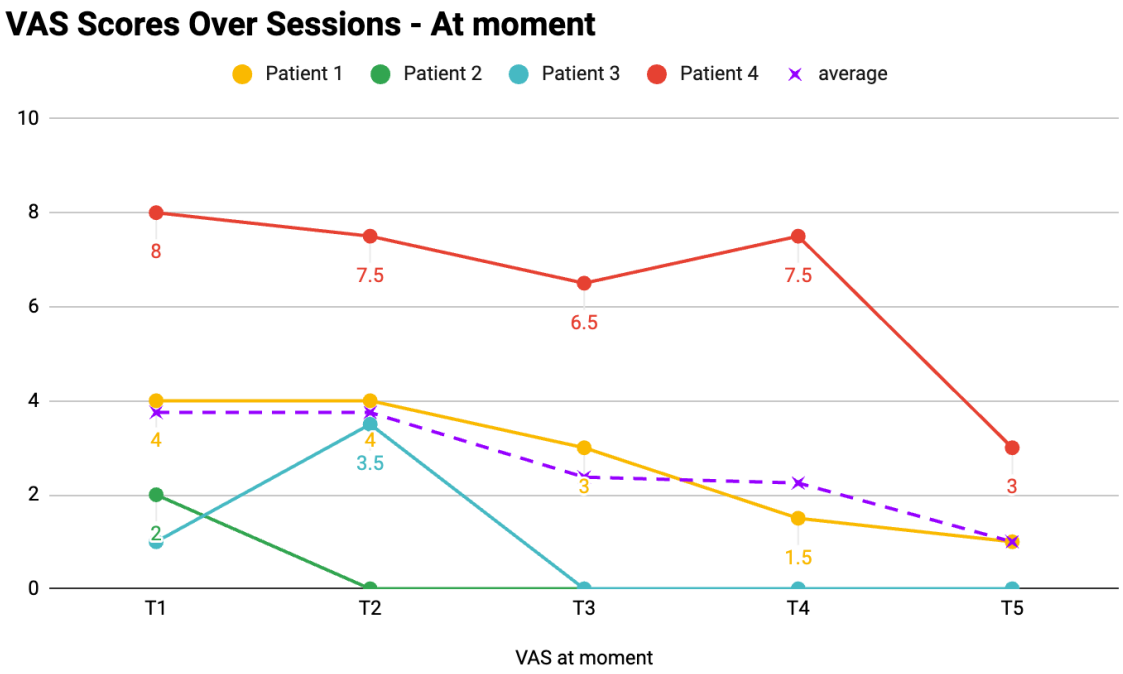


Table 10

Descriptive Statistics - VAS "At the Moment" Scores (T1-T5)

Patient	T1	T5	Range	% Improvement
Patient 1	4	1	3	75%
Patient 2	2	0	2	100%
Patient 3	1	0	3.5	100%
Patient 4	8	3	5	63%
Average	**3.75**	**1**	**3.375**	**84%**

Baseline Values (T1)

At baseline (T1), “at the moment” pain scores ranged from 1 to 8 across participants. Individual values were as follows: Patient 1: 4; Patient 2: 2; Patient 3: 1; Patient 4: 8. The mean score was 3.75, reflecting an overall mild-to-moderate level of current pain, with marked inter-individual variability.

Observed Trajectories (T1-T5)

By T5, individual scores were as follows: Patient 1: 1 (Δ = -3); Patient 2: 0 (Δ = -2); Patient 3: 0 (Δ = -1, with a transient increase at T2); Patient 4: 3 (Δ = -5). The mean score decreased from 3.75 at baseline to 1 at T5 (Δ = -2.75).

Three participants (Patients 1-3) reported minimal or no current pain at T5, while one participant (Patient 4) remained symptomatic, with a reduction from severe to moderate levels.

Group level patterns

All participants showed a reduction in current pain intensity over the observation period, with absolute decreases ranging from 1 to 5 points. Variability across participants decreased over time, with scores narrowing from a range of 1-8 at baseline to 0-3 at T5.

4.2.1.2 VAS - "Worst Pain"

Peak pain intensity was assessed using the Visual Analog Scale (VAS) (see Methods). “Worst pain in the past week” scores were recorded at five time points (T1-T5). Figure 19 illustrates the individual trajectories and case series mean, while Table 11 summarizes the descriptive statistics.

Figure 20: Individual trajectories and mean case series trend for VAS “worst pain” scores across intervention

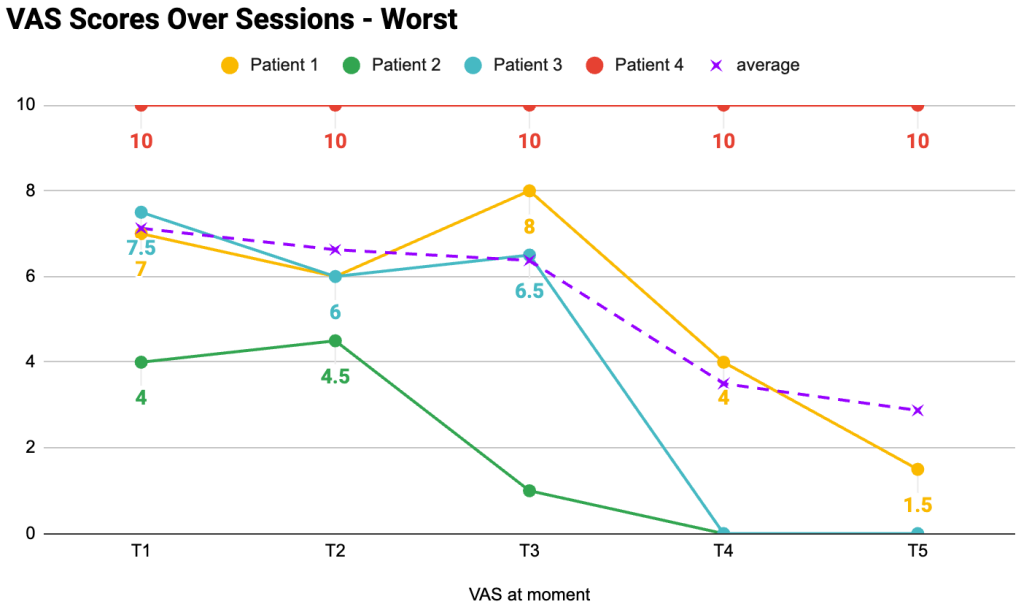


Table 11

Descriptive Statistics - VAS "Worst Pain" Scores (T1-T5)

Patient	T1	T5	Range	% Improvement
Patient 1	7	1.5	6.5	79%
Patient 2	4	0	4.5	100%
Patient 3	7.5	0	7.5	100%
Patient 4	10	10	0	0%
Average	**7.125**	**2.875**	**4.625**	**70%**

Baseline Values (T1)

At baseline (T1), worst pain scores ranged from 4 to 10 across participants. Individual values were as follows: Patient 1: 7; Patient 2: 4; Patient 3: 7.5; Patient 4: 10. The mean score was 7.1, indicating an overall high level of peak pain intensity at baseline, with notable inter-individual variability.

Observed Trajectories (T1-T5)

By T5, individual scores were as follows: Patient 1: 1.5 (Δ = -5.5); Patient 2: 0 (Δ = -4); Patient 3: 0 (Δ = -7.5); Patient 4: 10 (Δ = 0). The mean score decreased from 7.1 at baseline to 2.9 at T5 (Δ = -4.2).

Three participants showed substantial reductions in worst pain intensity, including two participants (Patients 2 and 3) who reported no peak pain at T5. One participant (Patient 1) demonstrated a fluctuating trajectory with an overall decrease, while one participant (Patient 4) reported persistently high pain without observable change over the intervention period.

Group-Level Patterns

Absolute changes ranged from 0 to 7.5 points across participants. At T5, three participants reported scores within the low-to-absent pain range, while one participant remained at a high level of symptom intensity. Overall, trajectories varied across individuals, reflecting heterogeneous patterns of change within this small case series.

4.2.2 NIH-CPSI Results

The National Institutes of Health Chronic Prostatitis Symptom Index (NIH-CPSI) is a validated instrument used to assess symptom burden in men with CP/CPPS (Litwin et al., 1999) (see Methods). The NIH-CPSI was administered at five time points (T1-T5). Figure 20 illustrates individual trajectories and the mean case series trend, while Table 12 summarizes descriptive statistics. Given the small sample size (n = 4), results are presented descriptively and should be interpreted with caution.

Baseline Values (T1)

At baseline (T1), total NIH-CPSI scores were as follows: Patient 1: 27; Patient 2: 23; Patient 3: 11; Patient 4: 29. The mean score was 22.5, corresponding overall to a moderate level of symptom burden, with variability across participants.

Figure 21: Individual trajectories and mean case series trend for NIH-CPSI scores across intervention

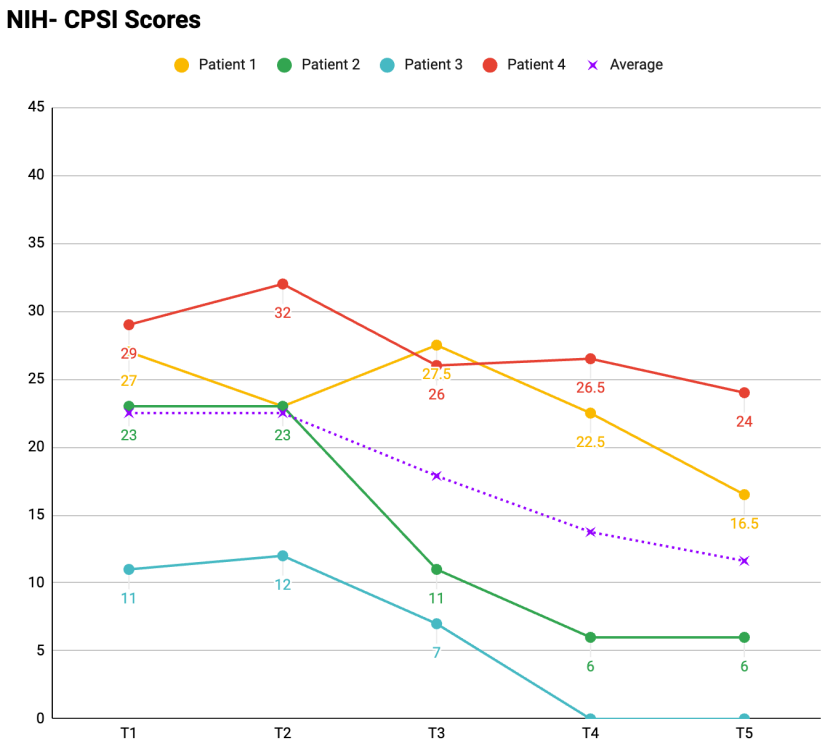


Table 12

Descriptive Statistics - NIH-CPSI Scores (T1-T5)

Patient	T1	T5	Range	% Improvement
Patient 1	**27**	**16.5**	10.5	39%
Patient 2	23	6	17	74%
Patient 3	11	0	11	100%
Patient 4	**29**	**24**	5	17%
Average	**22.5**	**11.625**	**10.875**	**58%**

Observed Trajectories (T1-T5)

By T5, scores were as follows: Patient 1: 16.5 (Δ = -10.5); Patient 2: 6 (Δ = -17); Patient 3: 0 (Δ = -11); Patient 4: 24 (Δ = -5). The mean score decreased from 22.5 at baseline to 11.6 at T5 (Δ = $-$10.9).

All participants showed a reduction in NIH-CPSI scores over the observation period, with absolute changes ranging from 5 to 17 points. The magnitude of change varied across individuals.

Group-Level Patterns

At T5, two participants (Patients 2 and 3) had scores within the mild or asymptomatic range, while two participants (Patients 1 and 4) remained within the moderate range. Overall, scores shifted toward lower symptom burden across participants; however, variability persisted in both baseline severity and magnitude of change.

4.2.3 PDI Results

Functional disability was assessed using the Pain Disability Index (PDI) (see Methods). The PDI was administered at five time points (T1-T5). Figure 21 illustrates individual trajectories and the mean case series trend, while Table 13 summarizes descriptive statistics. Given the small sample size (n = 4), results are presented descriptively and should be interpreted with caution.

Figure 22: Individual trajectories and mean case series trend for PDI scores across intervention

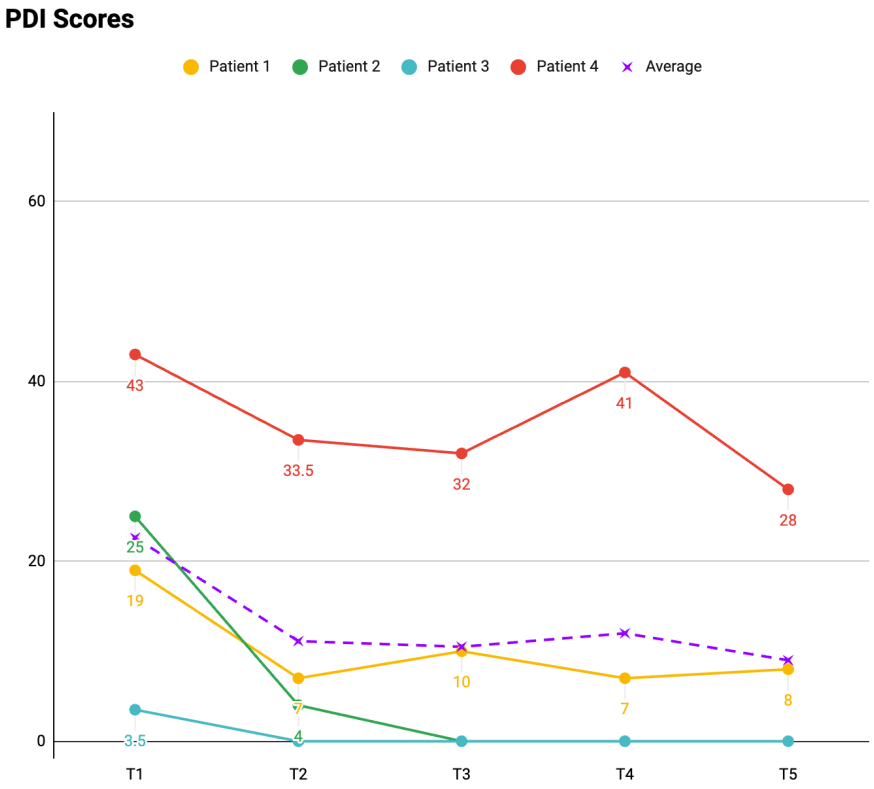


Table 13

Descriptive Statistics - PDI Scores (T1-T5)

Patient	T1	T5	Range	% Improvement
Patient 1	19	8	11	58%
Patient 2	25	0	25	100%
Patient 3	3.5	0	3.5	100%
Patient 4	43	28	15	35%
Average	**22.63**	**9**	**13.63**	**73%**

Baseline Values (T1)

At baseline (T1), PDI scores were as follows: Patient 1: 19; Patient 2: 25; Patient 3: 3.5; Patient 4: 43. The mean score was 22.6, corresponding overall to a moderate level of functional disability, with marked inter-individual variability.

Observed Trajectories (T1-T5)

By T5, scores were as follows: Patient 1: 8 (Δ = -11); Patient 2: 0 (Δ = -25); Patient 3: 0 (Δ = -3.5); Patient 4: 28 (Δ = -15). The mean score decreased from 22.6 at baseline to 9 at T5 (Δ = -13.6).

All participants showed reductions in disability over the observation period, with absolute changes ranging from 3.5 to 25 points. The magnitude of improvement varied across participants.

Group-Level Patterns

At T5, two participants (Patients 2 and 3) reported no disability (score = 0), one participant (Patient 1) demonstrated a low level of disability, and one participant (Patient 4) remained at a moderate level. Overall, scores shifted toward lower levels of disability across participants, although variability persisted in the magnitude of change.

4.3 Clinical Testing Results

Overview

Osteopathic clinical findings were documented at each treatment session using the standardized assessment protocol described in the Methods section. Findings were compiled and analyzed descriptively across participants and sessions to identify recurrent patterns.

Given the exploratory design and reliance on clinician-based assessment, these findings should be interpreted as descriptive and context-dependent, rather than as objective or causal indicators.

Recurrent Clinical Findings

Across the case series, frequently documented findings included psoas hypertonicity, iliac dysfunctions, hip impactions, thoracolumbar hypomobility, paravertebral hypertonicity, and quadratus lumborum tension. These findings were observed across multiple participants and sessions. Some appeared recurrent over time, whereas others were more transient.

Less frequently documented findings included obturator internus/externus hypertonicity, pelvic floor hypertonicity, diaphragmatic restriction, and abdominal quadrant tension. These findings were observed inconsistently and were less commonly recorded across sessions.

Frequency of Reported Findings

The most frequently documented findings are presented in Table 14.

Table 14

Most frequent osteopathic dysfunctions documented across participants (n = 4) across four treatment session

Rank	Dysfunction	N	Laterality trend
1	Psoas hypertonicity / (+) Thomas test	**12**	Bilateral, more Right
2	Iliac dysfunctions (ant/post; mainly anterior)	**10**	Mostly Right
3	Hip impactions	**9**	Right > Bilateral
4	Paravertebral hypertonicity (TX/LX region)	**8**	Bilateral; often Right-biased
5	Quadratus lumborum tension	**7**	Right > Left
6	Thoracolumbar (TX/LX) block/hypomobility	**7**	Central/segmental
7	Obturator internus/externus hypertonicity	**6**	Right > Bilateral
8	Diaphragmatic restriction (esp. right dome)	**5**	Mostly Right
9	Pelvic floor hypertonicity	**4**	Bilateral
10	Abdominal quadrant tension (incl. QID)	**4**	Predominantly Right (QID)

Psoas hypertonicity was the most frequently reported finding (n = 12), followed by iliac dysfunctions (n = 10), hip impactions (n = 9), paravertebral hypertonicity (n = 8), quadratus lumborum tension (n = 7), and thoracolumbar hypomobility (n = 7). Other findings were documented less frequently (n = 4–6).

These counts represent the number of times findings were recorded across sessions and participants and do not reflect independent observations.

Laterality Distribution

Laterality of findings is summarized in Table 15.

Table 15

Laterality distribution of recurrent dysfunctions

Dysfunction	Right	Left	Bilateral	Midline/Not applicable	TOTAL
Psoas hypertonicity	6	2	4	-	12
Iliac dysfunctions	7	2	1	-	10
Hip impactions	5	0	4	-	9
Paravertebral hypertonicity	3	1	4	-	8
Quadratus lumborum tension	4	1	2	-	7
Thoracolumbar (TX/LX) block/hypomobility	-	-	-	7	7
Obturator internus/externus hypertonicity	4	0	2	-	6
Diaphragmatic restriction	4	0	1	-	5
Pelvic floor hypertonicity	1	0	3	-	4
Abdominal quadrant tension (incl. QID)	3	0	1	-	4
TOTAL	**37**	**6**	**22**	**7**	72
%	*51.39%*	*8.33%*	*30.56%*	*9.72%*	

Across all recorded findings, right-sided presentations accounted for 51.4% of observations, compared to 8.3% left-sided, 30.6% bilateral, and 9.7% midline findings.

Right-sided findings were more frequently documented across several categories, including iliac dysfunctions, hip impactions, psoas hypertonicity, quadratus lumborum tension, obturator hypertonicity, and diaphragmatic restriction. Bilateral findings were more commonly associated with psoas, paravertebral musculature, and pelvic floor involvement. Midline findings were primarily limited to thoracolumbar hypomobility.

Given the subjective and examiner-dependent nature of osteopathic assessment, as well as the absence of a comparator group, these observation (particularly regarding laterality) should be interpreted as exploratory and hypothesis-generating.

Summary

Overall, osteopathic assessment identified recurrent lumbopelvic and thoracolumbar patterns across participants, alongside more transient peripheral findings. These findings contribute to the clinical characterization of participants but should be interpreted within the broader biopsychosocial context and methodological limitations of the study.

4.4 Psychosocial Vulnerability Score

Psychosocial vulnerability was assessed using the Psychosocial Vulnerability Index (PSVI) (see Methods). Scores were established during the early phase of care (T0-T2) based on clinical anamnesis, follow-up discussions, and clinician-researcher assessment. Table 16 summarizes PSVI scores across participants.

Given that the PSVI is a study-specific, non-validated instrument, scores are presented for descriptive and contextual purposes only and should be interpreted with caution.

Overview

Total PSVI scores were as follows: Patient 1: 12; Patient 2: 0; Patient 3: 3; Patient 4: 19. Scores ranged from 0 to 19, reflecting substantial inter-individual variability in psychosocial profiles.

Table 16

Psychosocial Vulnerability Scores Across 10 Domains

	DOMAIN	Patient 1	Patient 2	Patient 3	Patient 4
1	**Pain beliefs**	2	0	0	2
2	**Fear/avoidance**	2	0	0	2
3	**Coping strategies**	1	0	1	1.5
4	**Emotional state**	1	0	1	2
5	**Stressful events**	1	0	0	2
6	**Self-esteem/body image**	1	0	0	2
7	**Perceived control**	1	0	0	2
8	**Motivation for change**	0	0	0	2
9	**Health behavior**	1	0	1	1.5
10	**Social impact**	2	0	0	2
	TOTAL /20	**12**	**0**	**3**	**19**

Individual Profiles

- Patient 1 (12/20 - moderate range) demonstrated elevated scores in pain beliefs, fear-avoidance, and social impact, with additional contributions from emotional and behavioral domains.
- Patient 2 (0/20 - low range) did not demonstrate vulnerability across the assessed domains based on the criteria used in this study.
- Patient 3 (3/20 - low range) presented low scores across domains, with minor contributions from coping strategies, emotional state, and health behaviors.
- Patient 4 (19/20 - high range) demonstrated elevated scores across multiple domains, including emotional distress, perceived control, motivation for change, and social impact.

These profiles are presented descriptively and reflect patterns identified within this dataset, based on clinician-researcher assessment rather than standardized psychometric evaluation.

Case Series-Level Patterns

At the group level, two participants (Patients 2 and 3) fell within the low vulnerability range, one participant (Patient 1) within the moderate range, and one participant (Patient 4) within the high range.

The mean score was 8.5/20, corresponding to an overall moderate level; however, this value reflects marked inter-individual variability, with scores distributed across the full range.

Given the small sample size and descriptive nature of the PSVI, these findings should be interpreted as exploratory and hypothesis-generating.

4.5 Results - Conclusion

The results describe patterns of change observed across multiple domains, including pain intensity, symptom burden, functional disability, osteopathic clinical findings, and psychosocial profiles over the intervention period.

Across quantitative measures, reductions were observed in pain intensity (VAS), symptom burden (NIH-CPSI), and functional disability (PDI), with variability in magnitude and trajectories across participants. Three participants showed reductions in both current and worst pain scores, while one participant reported persistently elevated pain levels. NIH-CPSI scores decreased in all participants, with two reaching low or minimal symptom levels and two remaining within the moderate range. PDI scores declined in all participants, ranging from partial to complete reduction in reported disability.

Osteopathic clinical findings revealed recurrent patterns primarily involving the lumbopelvic and thoracolumbar regions, including psoas, iliac, hip, quadratus lumborum, paravertebral, and thoracolumbar findings. Psychosocial vulnerability scores demonstrated substantial inter-individual variability, ranging from low to high levels across participants.

Overall, these findings reflect heterogeneous individual trajectories observed within this small exploratory case series and should be interpreted descriptively, without implying causal relationships.

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5. DISCUSSION

5.1. Interpretation of Results

This study aimed to explore patterns of change observed during individualized osteopathic care in adult men with CPPPS, within a biopsychosocial and regionally contextualized framework.

The results describe heterogeneous clinical trajectories across participants, based on patient-reported outcomes and clinical observations. These findings provide descriptive insight into how osteopathic care may be integrated within CPPPS management. However, given the small sample size (n = 4), absence of a control group, and individualized intervention approach, these observations remain exploratory and hypothesis-generating, and do not support causal inference.

5.1.1 Clinical Heterogeneity and Osteopathic Reasoning

Although all four participants met diagnostic criteria for CPPPS, their baseline presentations demonstrated marked heterogeneity in symptom location, duration, perceived intensity, mechanical aggravators, and psychosocial context. This variability is consistent with current conceptualizations of CPPPS as a multifactorial condition involving dynamic interactions between somatic, neurological, visceral, autonomic, and psychosocial dimensions.

Within this context, care in this study was individualized based on osteopathic clinical reasoning, integrating somatic findings, functional restrictions, symptom narratives, and psychosocial factors. This approach reflects the need for flexible, patient-specific management strategies in complex chronic pain conditions, particularly when standardized treatment pathways show limited effectiveness.

The four cases illustrated distinct clinical profiles:

- **Patient 1** presented with a post-infectious onset of perineal and urethral pain, associated with pelvic floor hypertonicity, thoracolumbar tension, and heightened emotional reactivity.
- **Patient 2**, following vasectomy, exhibited features suggestive of neuropathic involvement, including positional pain along a pudendal distribution and associated lumbopelvic restrictions.
- **Patient 3** presented with chronic penile and testicular pain in the context of prior pelvic trauma, with findings including pelvic floor overactivity and sacroiliac asymmetry.
- **Patient 4** presented with a more complex profile, characterized by high baseline pain, persistent symptom burden, and features suggestive of central sensitization and emotional dysregulation.

Across cases, osteopathic interventions were adapted to these differing presentations, with an emphasis on addressing neuromusculoskeletal restrictions, supporting regional mobility, and integrating the broader psychosocial context. However, given the study design, these interventions cannot be directly linked to observed changes in outcomes.

Variability in clinical trajectories was also observed. While several participants showed improvements across multiple domains, one participant demonstrated limited change despite repeated care. This pattern is consistent with existing literature describing heterogeneous responses in CPPPS, particularly in the presence of elevated psychosocial burden or features suggestive of central sensitization.

Taken together, these observations highlight the relevance of individualized clinical reasoning in CPPPS, while reinforcing that patient response is not uniform. Osteopathic care may be adapted to different clinical presentations, but should be understood as one component within a broader, multidisciplinary management framework.

5.1.2 Quantitative Outcomes - Interpretation and Integration

Overview

Across all validated instruments (VAS, NIH-CPSI, PDI), changes were observed over the course of care. These changes are presented as descriptive outcome trajectories, rather than as evidence of treatment effectiveness, given the small sample size (n = 4), absence of a control group, and the fluctuating nature of CPPPS.

At the group level, reductions were observed in pain intensity, symptom burden, and functional disability. Several participants reached thresholds commonly described as clinically meaningful (e.g., ≥6-point reduction in NIH-CPSI); however, such thresholds vary across studies and should be interpreted with caution in this context (Litwin et *al*., 1999; Nickel et *al*., 2001).

Overall, these findings suggest that symptom evolution may occur across multiple domains during care, while highlighting substantial inter-individual variability.

VAS Results - Pain Intensity

Reductions in “current pain” were observed across participants, with several showing marked improvement over time. In contrast, “worst pain” demonstrated greater variability: some participants reached complete resolution, while others showed partial or no change.

This divergence is consistent with chronic pain literature indicating that peak pain episodes may be more resistant to change than average pain levels (Farrar et *al*., 2001; Hawker et *al*., 2011). Within this case series, these findings suggest that different dimensions of pain may evolve differently over time.

NIH-CPSI Results - Symptom Burden

Changes in NIH-CPSI scores varied across participants, with some demonstrating substantial reductions and others showing more limited change. In certain cases, improvements appeared early in the treatment period, while in others they remained modest.

These patterns are consistent with existing literature describing variability in symptom trajectories and early response phases in CPPPS interventions (Nickel & Tripp, 2004). At the individual level, differing response profiles (including more pronounced improvement in some cases and limited progression in others) are also consistent with previously described heterogeneity in CPPPS populations (Tripp et *al*., 2013).

PDI Results - Functional Recovery

Functional disability decreased in most participants, although the magnitude and trajectory of change varied. In some cases, improvements in function appeared to exceed changes in symptom severity, suggesting that functional adaptation may occur even when symptoms persist.

Conversely, persistent pain did not necessarily preclude partial improvements in daily functioning. These observations align with literature indicating partial dissociation between pain and disability in chronic pain conditions (Tait et *al*., 1990; Turk & Okifuji, 2002; Woolf, 2011).

Cross-Analysis of Quantitative Outcomes

When considered together, the VAS, NIH-CPSI, and PDI measures reveal both convergence and divergence across cases. Refer to table 17 for supporting data regarding cross-analysis.

Participants who demonstrated the greatest reductions in pain generally also showed improvements in symptom burden and function. However, this relationship was not consistent across all participants, with some showing partial or limited change despite ongoing care. These

patterns are consistent with the variability commonly reported in CPPPS and other chronic pain conditions (Nickel et *al*., 2001).

At the same time, discrepancies between instruments highlight that pain intensity, symptom burden, and functional disability represent distinct but interrelated dimensions of the CPPPS experience. The VAS reflects immediate pain perception, the NIH-CPSI captures multidimensional symptom burden, and the PDI reflects functional impact in daily life. This reinforces the importance of multidimensional assessment, as emphasized in chronic pain research (Turk & Okifuji, 2002).

Table 17

*Cross-Analysis of Quantitative Outcomes (VAS, NIH-CPSI, PDI)**

Outcome Measure	Patient 1	Patient 2	Patient 3	Patient 4
VAS "At the Moment"	↓ 75% (mild → minimal)	↓ 100% (mild → 0)	↓ 100% (mild → 0)	↓ 63% (severe → moderate)
VAS "Worst Pain"	↓ 79% (severe → mild)	↓ 100% (moderate → 0)	↓ 100% (severe → 0)	No change (10 → 10)
NIH-CPSI	↓ 39% (moderate → moderate)	↓ 74% (moderate → mild)	↓ 100% (mild → 0)	↓ 17% (moderate → moderate)
PDI	↓ 58% (moderate → mild disability)	**↓ 100% (moderate → 0)**	↓ 100% (mild → 0)	↓ 35% (severe → moderate disability)
Overall Interpretation	Gradual, partial improvement; residual symptoms	**Rapid remission; full recovery**	Complete remission across all instruments	Limited responsiveness; persistent severe pain

**Percentage changes are presented for descriptive purposes and should be interpreted with caution given the small sample size and variability in baseline values.*

Taken together, these findings suggest that clinical trajectories in CPPPS are variable and multidimensional. Improvements may occur in some domains but not others, and the magnitude of change differs between individuals.

Within the limits of this study, these results do not demonstrate effectiveness, but rather provide exploratory insight into how symptom patterns may evolve over time. They also support

the use of multidimensional outcome measures to capture the complexity of CPPPS, consistent with broader biopsychosocial models of chronic pain (Turk & Okifuji, 2002).

Relationship to Study Objectives

The quantitative findings can be interpreted in relation to the study objectives, while remaining within the descriptive scope of the design.

In relation to O1 (H1), the use of validated outcome measures (VAS, NIH-CPSI, PDI) supports the multidimensional assessment of CPPPS, capturing pain, symptom burden, and functional impact within a biopsychosocial framework.

With respect to O2 (H2), the observed changes across these measures illustrate how patient-reported outcomes may evolve over time; however, the study design does not allow attribution of these changes to the intervention.

In relation to O3 (H3), the variability in trajectories (including both substantial improvement and limited response) highlights the heterogeneity of clinical outcomes in CPPPS.

Finally, regarding O4 (H4), the use of standardized outcome measures generated structured data that may facilitate communication within multidisciplinary care settings, supporting the integration of osteopathic care within broader clinical pathways.

5.1.3 Clinical Testing Result Interpretation

Overview

Across sessions, osteopathic clinical findings demonstrated both recurrent and variable patterns. This likely reflects the fluctuating and chronic nature of CPPPS, in which changes in symptoms do not necessarily correspond directly to changes in clinical findings.

Commonly reported findings included psoas hypertonicity, iliac restrictions, hip mobility limitations, thoracolumbar hypomobility, and paravertebral tension, as well as intrapelvic tension involving the pelvic floor and deep rotators. These observations suggest multiregional involvement of the lumbopelvic system, consistent with existing descriptions of CPPPS as a condition involving interacting myofascial, biomechanical, and autonomic components (Anderson et al., 2005; Tu et al., 2016).

However, given the nature of manual assessment, these findings should be interpreted as clinician-reported observations, subject to examiner variability, rather than objective measures of dysfunction. Across sessions, some findings appeared relatively stable, while others fluctuated or resolved more rapidly. This distinction provides a descriptive framework for interpreting clinical patterns, without implying causal or mechanistic relationships.

Laterality

An asymmetrical distribution of findings was observed, with a predominance of right-sided involvement across several regions, including the pelvis, hip, psoas, and diaphragm. While such asymmetry may be consistent with known anatomical and functional tendencies (e.g., limb dominance or diaphragmatic asymmetry) (Kapandji, 2007; Bordoni & Zanier, 2013), this observation should be interpreted with caution, as:

- laterality assessment may be influenced by examiner expectation or perceptual bias
- classification of “dysfunction” is based on clinical judgment and may lack standardized operational criteria
- the sample size is small (n = 4) and lacks a comparator group

Accordingly, this observation is best considered hypothesis-generating, rather than indicative of a consistent biomechanical pattern in CPPPS.

Cross-Analysis of Dysfunctions and Clinical Outcomes

When considered alongside patient-reported outcomes (VAS, NIH-CPSI, PDI), clinical findings did not demonstrate a consistent or direct relationship with symptom trajectories.

Certain findings (e.g., psoas hypertonicity, iliac restrictions, thoracolumbar hypomobility) were documented across multiple sessions, including during periods of symptom improvement. This suggests that some findings may represent longer-standing adaptations rather than factors directly associated with short-term symptom fluctuation, in line with literature indicating that structural changes may persist independently of pain (Franke et *al*., 2015).

Other findings (particularly those involving the pelvic floor, obturator region, diaphragm, and abdominal tissues) appeared more variable. In some cases, their resolution coincided with reported improvements in pain or function; however, these associations were not consistent and do not support causal interpretation.

At the individual level, variability was evident. Some participants showed concurrent changes in clinical findings and outcomes, while others presented persistent findings despite limited or partial symptom improvement. These patterns are consistent with the heterogeneity of CPPPS and with broader chronic pain literature describing variable relationships between physical findings and symptom experience (Nickel et *al*., 2001; Tripp et *al*., 2013).

Taken together, these observations support a descriptive distinction between:

- findings that appear relatively persistent across sessions
- findings that appear more variable over time

This distinction may assist in structuring clinical reasoning, particularly when differentiating between longer-term patterns and short-term fluctuations. However, it should be understood as a heuristic framework, rather than a model of symptom causation.

Interpretation of Dysfunction Categories

Table 18

*Cross-analysis of persistent and transient dysfunction categories with clinical outcomes (VAS, NIH-CPSI, and PDI) in men with CPPPS **

Category	Persistent Adaptive Dysfunctions	Transient Symptomatic Dysfunctions
Examples	Psoas hypertonicity, iliac restrictions, hip impactions, thoracolumbar hypomobility	Pelvic floor hypertonicity, obturator hypertonicity, right diaphragmatic restriction, abdominal quadrant tension
Pattern Across Sessions	Recurring across multiple sessions; resistant to full resolution	Typically resolved within 1-2 sessions; rarely recurred
VAS Relationship	Improvement occurred despite persistence; weak correlation with pain scores	Resolution coincided with sharp pain reduction
NIH-CPSI Relationship	Persistent despite overall 58% improvement; limited impact on symptom trajectories	Steepest improvements occurred between T2-T3, coinciding with their resolution
PDI Relationship	Participants improved functionally even while dysfunctions persisted	Resolution paralleled clustering of minimal-to-no disability by T5
Clinical Interpretation	Represent chronic biomechanical adaptations requiring long-term integration	Act as direct symptomatic drivers; should be prioritized for short-term symptomatic relief

**The categorization of findings as "persistent" or "transient" is based on descriptive patterns observed within this dataset and should be interpreted as a heuristic classification rather than a validated or generalizable model.*

The distinction between persistent and transient dysfunction categories provides a clinically oriented framework for interpreting observed patterns. Persistent findings appeared to recur across sessions and were often present despite symptom improvement, suggesting a potential role as longer-term biomechanical adaptations. In contrast, more transient findings appeared to fluctuate over time and, in some cases, coincided with short-term changes in reported symptoms.

However, given the exploratory design, small sample size, and absence of standardized criteria for defining dysfunction categories, these observations should be interpreted cautiously and do not establish causal or directional relationships.

Relationship to Study Objectives

These findings can be interpreted in relation to the study objectives, within the descriptive scope of the design.

In relation to O1 (H1), the recurrent identification of dysfunction patterns illustrates how osteopathic assessment may contribute to describing structural and functional dimensions of CPPPS within a biopsychosocial framework.

With respect to O2 (H2), the documentation of both persistent and variable findings aligns with the objective of exploring changes in mobility and function over time, without establishing causal relationships.

In relation to O3 (H3), the use of a standardized clinical testing approach supports the feasibility of tracking somatic and visceral findings longitudinally across sessions.

Finally, regarding O4 (H4), the structured documentation of clinical findings generates data that may be communicated within multidisciplinary contexts, supporting the integration of osteopathic assessment within broader care pathways.

5.1.4 Psychosocial Vulnerability Profiles

Overview

The Psychosocial Vulnerability Index (PSVI) revealed substantial variability in psychosocial profiles across participants, with scores ranging from 0 to 19. The case series mean (8.5/20) fell within the moderate range; however, this average masked marked inter-individual differences, with participants distributed across low, moderate, and high categories.

It is important to note that the PSVI is a study-specific, non-validated instrument, and the findings should therefore be interpreted as descriptive representations of psychosocial context rather than standardized measures of risk.

At the individual level, Patient 1 (12/20) presented a moderate profile, with elevated scores in pain beliefs, fear-avoidance, and social impact, alongside contributions from emotional and behavioral domains. Patient 2 (0/20) demonstrated no identifiable vulnerabilities based on the criteria used in this study, reflecting a low psychosocial burden. Patient 3 (3/20) also fell within the low range, with minor contributions from coping strategies, emotional state, and health behaviors. In contrast, Patient 4 (19/20) exhibited a high psychosocial vulnerability profile, with elevated scores across multiple domains, including emotional distress, perceived control, motivation, and social impact. These profiles are based on clinician-researcher interpretations derived from qualitative data collected during the study.

Cross-Analysis with Qualitative Outcomes

When these profiles were considered alongside qualitative observations (including anamnesis, follow-up discussions, and clinical field notes), differences in psychosocial context appeared to align with variations in reported clinical trajectories.

Participants with lower PSVI scores (Patients 2 and 3) reported relatively stable emotional states, active engagement in care, and fewer perceived barriers to participation, and also demonstrated reductions in pain and disability measures over time. Patient 1, with a moderate PSVI score, exhibited a more gradual and fluctuating trajectory, including variations in confidence and activity levels. Patient 4, with a high PSVI score, reported persistent emotional distress, reduced perceived control, and lower engagement, alongside more limited changes in symptom measures.

These observations suggest that psychosocial context may be relevant to understanding variability in clinical trajectories. However, several important limitations must be emphasized. The

PSVI is not a validated instrument, scoring was based on clinical interpretation and is therefore subject to bias, qualitative data were not analyzed using formal methodological approaches, and the small sample size (n = 4), without a comparator group, limits generalizability.

Accordingly, the observed alignment between psychosocial profiles and clinical outcomes should be interpreted as descriptive and hypothesis-generating, rather than indicative of predictive or causal relationships. While these observations are consistent with broader literature suggesting that psychosocial factors (e.g., coping strategies, emotional distress, perceived control) are associated with variability in chronic pain experiences (Nicholas et *al*., 2011; Edwards et *al*., 2016), such relationships cannot be established within the present study.

Case Series–Level Interpretation

At the case series level, the contrast between low and high psychosocial vulnerability highlights the heterogeneity of psychosocial context in CPPPS. Although similar clinical findings were documented across participants, their reported experiences and trajectories differed, supporting multidimensional models of chronic pain in which symptom expression and functional impact emerge from interactions between biological, psychological, and social factors.

Table 19 illustrates the relationship between psychosocial vulnerability profiles and the clinical trajectories observed in this study.

Table 19

*Psychosocial Vulnerability Profiles and Clinical Outcomes in CPPPS**

Profile (PSVI Score)	Patient Characteristics	Clinical Trajectory	Qualitative Outcomes	Interpretation
Low (0-6)	P2 (0/20): no vulnerabilities. P3 (3/20): mild coping and health behavior issues.	Rapid to complete remission (pain, disability).	Confidence, proactive behaviors, emotional stability.	Resilience facilitated full recovery.
Moderate (7-13)	P1 (12/20): maladaptive beliefs, fear-avoidance, social withdrawal.	Gradual but meaningful improvement.	Fluctuating confidence, partial withdrawal.	Vulnerabilities slowed recovery but did not prevent progress.
High (14-20)	P4 (19/20): severe distress, low control, poor motivation, heavy social impact.	Limited response; persistent pain and disability.	Helplessness, poor motivation, social isolation.	Psychosocial overload amplified pain persistence and reduced treatment responsiveness.

**The interpretations presented in Table 19 are based on descriptive patterns observed within this dataset and should be understood as heuristic, rather than predictive or causal, relationships.*

The patterns observed suggest that factors such as emotional regulation, behavioral engagement, and perceived control may be associated with differences in clinical trajectories. However, these associations should be interpreted cautiously, as they do not establish directionality or causation and may reflect complex, bidirectional interactions between symptoms and psychosocial context.

Relationship to Study Objectives

In relation to the study objectives, these psychosocial findings provide descriptive insight rather than confirmatory evidence. They illustrate variability in psychosocial context within a biopsychosocial framework (O1), document parallel patterns between psychosocial profiles and observed trajectories without implying predictive associations (O2), support a multidimensional interpretation of patient evolution through the integration of psychosocial and clinical data (O3),

and demonstrate how structured psychosocial documentation may facilitate interdisciplinary communication (O4).

Overall, these findings contribute to an exploratory understanding of psychosocial variability in CPPPS and its potential relevance within multimodal care approaches.

5.1.5 Integrated Cross-Analysis of Quantitative, Clinical, and Psychosocial Data

The integration of quantitative outcomes, clinical findings, and psychosocial profiles allows for a multidimensional interpretation of participant trajectories within this case series. When examined together, these data reveal heterogeneous response patterns across individuals, reflecting variability in symptom evolution, clinical findings, and psychosocial context. Given the small sample size (n = 4) and uncontrolled design, these patterns should be interpreted as descriptive and hypothesis-generating.

Three broad response profiles were observed. Participants with lower psychosocial vulnerability (Patients 2 and 3) demonstrated reductions across pain, symptom burden, and disability measures over time, alongside fewer or less persistent clinical findings. The participant with moderate psychosocial vulnerability (Patient 1) showed more gradual and partial reductions across measures, with ongoing clinical findings documented throughout the intervention. In contrast, the participant with high psychosocial vulnerability (Patient 4) demonstrated limited change across pain and symptom measures, with only partial improvement in functional outcomes and persistent clinical findings.

These patterns suggest that differences in psychosocial context and clinical presentation may be relevant when interpreting variability in trajectories. However, no predictive or causal relationships can be established within the present study.

Across participants, reductions in pain and symptom measures were often observed earlier in the intervention period, while changes in functional disability appeared to consolidate

over time. In the absence of a comparator group, and given the fluctuating nature of CPPPS, these temporal patterns should be interpreted cautiously and may reflect natural symptom variability, contextual influences, or non-specific effects of care.

The relationship between clinical findings and symptom evolution appeared variable. Some findings persisted across sessions despite reductions in reported pain and disability, while others appeared more transient and changed over shorter timeframes. These observations suggest that clinical findings and symptom experience may not be directly coupled, consistent with broader chronic pain literature. The distinction between “persistent” and “transient” findings may therefore provide a useful descriptive framework, but does not represent a validated classification.

A predominance of right-sided findings was observed across participants. While descriptively notable, its interpretation remains uncertain. Although anatomical and functional asymmetries have been proposed in the literature, the present data do not allow conclusions regarding their clinical significance in CPPPS. This observation should therefore be considered hypothesis-generating.

The combined use of VAS, NIH-CPSI, and PDI further highlights that pain intensity, symptom burden, and functional disability represent related but distinct dimensions. Discrepancies between these measures were observed, with some participants demonstrating greater improvements in function than in symptom scores, and others reporting persistent pain despite partial functional gains. These findings reinforce the importance of multidimensional assessment in CPPPS, as different outcome domains may evolve along distinct trajectories.

Overall, this integrated analysis suggests that CPPPS trajectories may be influenced by a combination of clinical findings, psychosocial context, and inherent symptom variability. However, the relative contribution of each factor cannot be determined within this study.

In relation to the study objectives, these findings provide descriptive insight rather than confirmatory evidence. The study documents variability in pain, function, and psychosocial context

(O1), captures heterogeneous trajectories across validated outcome measures (O2), and illustrates the feasibility of systematically documenting clinical findings over time (O3). It also demonstrates how integrating multiple data sources may support communication within a broader care context (O4).

Taken together, these results contribute to an exploratory understanding of CPPPS and the potential role of osteopathic assessment within multimodal management. These observations provide a descriptive foundation for considering clinical implications, which are addressed in the following section.

5.2 Clinical Implications

5.2.1 Effectiveness of Osteopathy in Managing CPPPS

This exploratory case series describes changes observed over the course of individualized osteopathic care across multiple dimensions of CPPPS, including pain intensity, symptom burden, and functional disability. At the case level, reductions in VAS, NIH-CPSI, and PDI scores were documented, with several participants reaching commonly cited thresholds for clinically meaningful change (e.g., ≥6-point reduction in NIH-CPSI, acknowledging variability across studies). These findings are presented as descriptive clinical trajectories rather than evidence of treatment effectiveness.

Given the small sample size, absence of a control group, and the fluctuating nature of CPPPS, these observations should be interpreted as preliminary clinical signals. They suggest a potential role for osteopathic care within CPPPS management, while requiring confirmation in controlled study designs.

The observed changes are consistent with literature indicating that manual therapy may be associated with modulation of pain perception, autonomic regulation, and musculoskeletal function in chronic pain populations (Franke et *al*., 2015; Licciardone et *al*., 2005). In this series,

changes were also noted across urinary, sexual, and psychosocial dimensions, reflecting the multidimensional nature of CPPPS (Nickel & Tripp, 2004). However, the present design does not allow attribution of these changes to specific mechanisms or to the intervention itself.

Variability in response was observed across participants. While several cases demonstrated meaningful improvement, one participant showed limited change. This heterogeneity is consistent with current understandings of CPPPS as a multifactorial condition involving musculoskeletal, neurological, and psychosocial components. Within this context, osteopathy may be more appropriately viewed as a contributory component within a broader, multimodal care strategy, rather than a stand-alone intervention.

These observations align with contemporary models emphasizing phenotype-based and multidisciplinary approaches (e.g., UPOINT), in which multiple domains are addressed through complementary interventions. Osteopathy may contribute particularly to neuromusculoskeletal and functional aspects, while other domains may require concurrent psychological, pharmacological, or physiotherapeutic management.

5.2.2 Structural Patterns and Clinical Implications

An important implication of this study lies in the identification of two recurring patterns of clinical findings (transient symptomatic dysfunctions and persistent adaptive dysfunctions) as well as an observed predominance of right-sided findings. These patterns are best understood as descriptive and hypothesis-generating, offering a potential framework for clinical reasoning rather than definitive mechanistic classifications.

Transient dysfunctions (e.g., pelvic floor and obturator hypertonicity, diaphragmatic restriction, abdominal tension) appeared to fluctuate in parallel with symptom changes. In some cases, their resolution coincided with improvements in VAS and NIH-CPSI scores and reductions in disability. These observations suggest that such dysfunctions may be particularly relevant during symptomatic phases and may be associated with the current symptom experience.

In contrast, persistent dysfunctions (e.g., psoas hypertonicity, iliac restrictions, thoracolumbar hypomobility) were documented across sessions, including during periods of symptom improvement. These patterns may reflect longer-standing biomechanical or postural adaptations, consistent with literature indicating that structural alterations can persist independently of pain (Franke et *al*., 2015). Clinically, these findings may be more relevant for long-term management and recurrence prevention than for short-term symptom modulation.

A predominance of right-sided findings was also observed. While this asymmetry may be consistent with known anatomical and biomechanical tendencies, it should be interpreted cautiously due to the susceptibility of laterality assessment to examiner bias, the absence of standardized operational definitions, and the small sample size. As such, this observation remains exploratory and requires validation in future studies.

Overall, the distinction between transient and persistent patterns, together with the observation of laterality, may provide a useful heuristic for structuring osteopathic reasoning, while remaining provisional.

5.2.3 Psychosocial Profiling and Phenotypic Mapping

Psychosocial factors appeared to be associated with variability in clinical trajectories. The PSVI enabled descriptive stratification into three profiles, which corresponded to differing patterns of change: lower vulnerability was associated with more favorable trajectories, moderate vulnerability with partial improvement, and higher vulnerability with limited response.

These observations are consistent with literature indicating that factors such as catastrophizing, fear-avoidance, and emotional distress are associated with variability in chronic pain outcomes (Nicholas et *al*., 2011; Edwards et *al*., 2016). However, within the present study, these relationships should be interpreted as associative rather than predictive.

The integration of psychosocial profiling with clinical findings and outcome measures supported the identification of three descriptive response profiles: responder, partial responder, and limited responder. These profiles should be understood as clinical heuristics that may assist in anticipating variability in response and guiding individualized management, rather than as fixed or predictive categories.

5.2.4 Integration, Professional Limits, and Regional Contribution

The variability in observed trajectories reinforces that osteopathy should not be conceptualized as a universal solution for CPPPS. In presentations characterized by lower psychosocial burden and symptom-linked dysfunctions, it may represent a relevant primary or early intervention. In more complex cases, particularly those involving significant psychosocial or central sensitization components, osteopathy appears more appropriately positioned within an interdisciplinary care model.

The case of Patient 4 illustrates these limits. Despite repeated care, symptoms persisted, highlighting the importance of referral to psychological, urological, or specialized pain management services when appropriate. Recognizing such boundaries supports sound clinical decision-making and aligns osteopathic practice with evidence-based chronic pain management frameworks (Tripp et *al*., 2013).

A strength of this study lies in the use of validated outcome measures (VAS, NIH-CPSI, PDI), alongside structured psychosocial profiling (PSVI), enabling systematic monitoring across multiple domains. This approach facilitates communication across disciplines and situates osteopathic care within established chronic pain frameworks.

Within the Quebec healthcare context, where access to specialized pelvic pain services may be limited, osteopathy may contribute as a complementary discipline, supporting continuity of care across professional boundaries. This role, however, should be understood as integrative rather than substitutive.

5.2.7 Summary

This case series describes patterns of change observed during osteopathic care in men with CPPPS. These observations suggest that osteopathy may have a role within a multimodal, phenotype-informed approach, particularly in presentations characterized by lower psychosocial burden and symptom-linked dysfunction patterns.

The integration of psychosocial profiling, phenotypic mapping, and structured outcome measurement supports more nuanced clinical reasoning and individualized care planning. Similarly, distinguishing between transient and persistent dysfunctions may help clarify short-term versus long-term therapeutic priorities.

Importantly, osteopathy appears most appropriately positioned within an interdisciplinary framework, where it complements (rather than replaces) psychological, medical, and physiotherapeutic interventions.

Taken together, these implications highlight potential areas of contribution while reinforcing the need for structured outcome measurement and more rigorous research to further define osteopathy's role in CPPPS management.

5.3 Clinical Learning Framework

Building on the clinical patterns described in Section 5.2, this study proposes a Clinical Learning Framework (Figure 22, Table 20) to support structured reasoning in CPPPS. This framework is intended as a practice-informed, hypothesis-generating model rather than a validated protocol, and should be interpreted in light of the methodological limitations outlined in Section 5.5.

Its objective is to translate observed associations—particularly the interaction between symptom trajectories, dysfunction patterns, and psychosocial factors—into a structured approach

to assessment and clinical decision-making. In doing so, it aims to support consistency in clinical reasoning while preserving the individualized nature of osteopathic care.

1. Multimodal assessment

Consistent with the multidimensional presentation of CPPPS highlighted in Section 5.2, the framework emphasizes a multimodal intake strategy integrating biological, psychological, and social dimensions.

This includes:

- validated outcome measures (VAS, NIH-CPSI, PDI, PSVI)
- a structured clinical interview
- and review of relevant medical information

Together, these elements support the development of a comprehensive baseline and allow clinicians to situate osteopathic findings within a broader clinical context. This approach reflects the understanding that CPPPS cannot be interpreted through isolated symptoms, but rather through interacting domains of dysfunction and patient experience.

2. Longitudinal monitoring (EPT template)

Given the variability in symptom trajectories observed across cases (Section 5.2.1), the framework proposes structured follow-up using the EPT template to track changes over time.

By systematically reassessing pain characteristics, functional symptoms, treatment response, and psychosocial adaptation, clinicians may identify evolving patterns rather than relying on isolated observations. This longitudinal structure supports differentiation between short-term fluctuations and more consistent trends, which is particularly relevant in conditions characterized by symptom variability.

3. Clinical testing protocol

In line with the recurrent patterns identified in Section 5.2.2, the framework incorporates a standardized clinical testing sequence to improve consistency and facilitate comparison across sessions.

A structured approach (observation → dynamic testing → mobility → provocation → palpation) supports the identification of recurring dysfunction patterns, including those described as transient or persistent. While these findings remain clinician-dependent and should be interpreted cautiously (Section 5.5), their repeated assessment may contribute to pattern recognition and structured clinical reasoning.

4. Treatment Priority planning

Drawing from the distinctions outlined in Section 5.2.2, the framework proposes differentiating between:

- transient dysfunctions, which appeared to fluctuate alongside symptoms
- persistent dysfunctions, which were observed across sessions

This distinction may assist clinicians in prioritizing interventions, with a focus on symptom-associated findings in the short term, while addressing longer-standing adaptations progressively. This approach does not imply causal relationships, but rather reflects a pragmatic organization of clinical findings to guide decision-making.

5. Psychosocial profiling and phenotypic mapping

Consistent with the variability in trajectories described in Section 5.2.3, the framework incorporates psychosocial profiling using the PSVI to contextualize patient presentation.

Rather than serving as a predictive tool, this approach may help identify patterns of vulnerability and inform clinical decisions regarding pacing, expectations, and potential need for interdisciplinary care. The resulting descriptive profiles (e.g., responder, partial responder, limited responder) are intended as clinical heuristics, supporting individualized management rather than fixed categorization.

Purpose and limits of the Clinical Learning Framework

This Clinical Learning Framework is proposed as both a clinical and educational tool, offering a structured approach to integrating outcome measures, clinical findings, and psychosocial context in CPPPS.

Importantly, its scope remains limited. As outlined in Section 5.5, the observations underlying this framework are derived from a small, uncontrolled case series and should not be interpreted as establishing effectiveness or causal mechanisms. Rather, the framework represents a conceptual translation of observed patterns into structured clinical reasoning support.

In practice, it reinforces the importance of situating osteopathic care within a broader interdisciplinary context. In presentations characterized by significant psychosocial burden, features suggestive of central sensitization, or medical complexity, timely referral to appropriate healthcare providers is warranted. In this sense, the framework supports not only clinical reasoning, but also recognition of professional boundaries.

Table 20 summarizes the framework's core components and their clinical applications, providing a structured reference for implementation.

Having outlined the clinical and educational contributions of this framework, it is equally important to consider the study's limitations and the strategies employed to mitigate them. This ensures that the findings are interpreted within their appropriate methodological context.

Table 20

Components of the Clinical Learning Framework for CPPPS

Pillar	Key Components	Educational Value
1. Integration of Multimodal Assessment	- Validated measures (VAS, NIH-CPSI, PDI, PSVI) - Structured interview (pain history, symptoms, lifestyle, coping, expectations) - Medical history review (notes, imaging, labs)	Teaches holistic intake: combine metrics, narrative, medical context for prognosis & planning
2. Evolution Post-Treatment (EPT) Template	- Pain: intervals, VAS, distribution - Functional: urinary, digestive, sexual - Response: immediate relief/aggravation, new symptoms - Psychosocial: coping, stress, relational impact	Trains longitudinal tracking, prevents anecdotal interpretation, ensures no biopsychosocial dimension is missed
3. Clinical Testing Protocol	- Observation/posture - Dynamic tests (e.g., Gillet, seated flexion) - Mobility (lumbar & hip ROM) - Provocation (Thomas, FABER, FADIR) - Palpation (pelvic floor, psoas, fascia, viscera)	Builds reproducibility & comparability, teaches systematic testing sequence, fosters pattern recognition
4. Treatment Priority Planning	- Transient drivers: pelvic floor, diaphragm, obturators, fascia - Persistent adaptations: psoas, iliac, thoracolumbar restrictions	Reinforces reasoning: distinguish drivers vs. adaptations, sequence care accordingly
5. Psychosocial Profiling & Phenotypic Mapping	- PSVI stratification: responder, partial, refractory - 10 domains (beliefs, fear-avoidance, coping, mood, stress, self-esteem, control, motivation, health behaviors, social impact)	Normalizes psychosocial screening, teaches adaptation by phenotype, reframes referral as professional strength

Having outlined the clinical and educational contributions of this framework, it is equally important to consider the study's limitations and the strategies employed to mitigate them. This ensures that the findings are interpreted within their appropriate methodological context.

5.5 Study Limitations and Mitigation Strategies

This exploratory case series provides a descriptive account of clinical changes observed during osteopathic care in men with CPPPS. Several limitations must be acknowledged, as they restrict causal interpretation, generalizability, and methodological rigor. Accordingly, the findings

should be interpreted as hypothesis-generating rather than as evidence of effectiveness. These constraints are consistent with early-stage clinical research and reflect a progression from exploratory observation toward hypothesis development.

5.5.1 Methodological Constraints

The study employed a prospective multiple-case series design without randomization or a control group, which precludes causal inference. In the absence of a comparator, observed changes may reflect natural symptom fluctuation, regression to the mean, placebo effects, or non-specific therapeutic factors such as the clinician–patient interaction (Nicholas et al., 2011).

A key limitation also relates to the qualitative component. Interviews were not audio-recorded and no formal thematic analysis was conducted. As such, qualitative data are best understood as contextual clinical narratives, which limits auditability and independent verification. To enhance transparency, a detailed reflective logbook was maintained throughout the study to document patient narratives, clinical observations, and key elements of each session.

The relatively short follow-up period (four weeks post-treatment) further limits conclusions regarding the durability of observed changes and the potential for relapse. In addition, the absence of blinding for both participants and assessor increases susceptibility to expectancy and confirmation bias.

Despite these constraints, methodological rigor was supported through the use of validated, multidimensional outcome measures (VAS, NIH-CPSI, PDI), repeated measurements across timepoints, and triangulation with clinical findings and patient narratives. While these strategies enhance interpretability, they do not eliminate bias inherent to the design.

5.5.2 Sampling Limitations

The study used a non-probabilistic convenience sampling strategy, introducing potential selection bias. Participants were recruited through medical referral and were already engaged in healthcare pathways, which may reflect higher levels of health-seeking behavior or openness to complementary care. As such, the sample may not be representative of the broader CPPPS population.

The small sample size (n = 4) further limits statistical power and external validity and does not capture the full heterogeneity of CPPPS presentations. In addition, recruitment and treatment were conducted by a single practitioner, which may limit reproducibility across clinicians and practice settings.

To support transferability, detailed clinical and contextual descriptions of each case were provided. Physician-confirmed diagnoses, clearly defined eligibility criteria, and systematic documentation contributed to internal consistency and clinical credibility. Future studies should include larger, more diverse samples and multiple practitioners to strengthen generalizability.

5.5.3 Measurement and Subjectivity

Although validated instruments were used, all primary outcomes were self-reported and therefore remain vulnerable to recall bias, expectation effects, and social desirability. Osteopathic clinical findings relied on palpation and practitioner interpretation, introducing observer-dependent variability. These findings should therefore be considered clinician-reported observations rather than objective measures.

In addition, no objective physiological markers (e.g., pelvic floor EMG, heart rate variability, quantitative sensory testing) were prospectively collected, and medical documentation was not standardized as an outcome measure.

Standardized data collection forms, repeated measurements, and the integration of psychosocial profiling (PSVI) with clinical findings were used to support transparency and contextual interpretation. Future research should incorporate objective biomarkers, blinded assessors, and more rigorous qualitative methodologies to strengthen reliability.

5.5.4 Investigator- Practitioner Dual Role

The investigator both delivered the intervention and collected all clinical and qualitative data, introducing risks of therapeutic allegiance, expectancy effects, and interpretive bias. This dual role may have influenced both data collection and interpretation, particularly in the absence of independently recorded qualitative data.

Furthermore, as the study was conducted within a training context, the investigator's level of clinical experience may have influenced assessment precision and consistency of intervention delivery.

To mitigate these effects, reflexivity was explicitly acknowledged, and structured documentation, repeated measures, and supervisory oversight were implemented. Future studies should separate treatment and evaluation roles, incorporate independent qualitative analysis, and use blinded outcome assessors where feasible.

5.5.5 Contextual Limitations

This study was conducted within the Quebec healthcare system, where osteopathy is not formally regulated and access to interdisciplinary pelvic pain services is variable. These contextual factors may have influenced patient expectations, referral pathways, and engagement, and limit transferability to other healthcare contexts.

At the same time, situating the study within this environment enhances ecological validity by reflecting real-world clinical conditions. Future research should include cross-regional

comparisons to better understand how healthcare system organization influences outcomes and the integration of osteopathy within multidisciplinary care pathways.

Summary

The limitations of this study (related to design, sampling, measurement, researcher role, and context) restrict causal inference and generalizability. The findings should therefore be understood as preliminary insights that inform future research, rather than as evidence of effectiveness.

These constraints also highlight clear directions for future work, including controlled and adequately powered study designs, integration of objective outcome measures, improved qualitative rigor, separation of clinical and research roles, and multi-center collaboration.

Taken together, this study represents a foundational exploratory contribution, offering clinically grounded insights while emphasizing the need for more rigorous investigation to support evidence-informed practice in CPPPS management.

5.5 Perspectives

Building on the study's findings and limitations, several perspectives emerge across five domains: clinical practice, scientific inquiry, education, community and public health, and professional development. These reflections are intended to extend interpretation beyond the immediate results and should be understood as exploratory and practice-informing rather than prescriptive.

Together, they highlight potential directions for integrating osteopathy within CPPPS care pathways while situating these observations within broader clinical, systemic, and research contexts.

5.4.1 Clinical Perspectives

The variability in clinical trajectories observed in this case series underscores the importance of individualized, context-sensitive care in CPPPS. Rather than reflecting uniform response patterns, participants demonstrated differing evolutions across domains of pain, function, and symptom burden.

Within this variability, psychosocial context and the nature of clinical findings appeared relevant to interpreting trajectories. Participants with lower psychosocial burden and more variable (transient) dysfunction patterns tended to show more favorable evolution, whereas those with higher psychosocial load and more persistent findings showed more limited change. These observations are associative and consistent with broader literature on chronic pain variability, particularly the role of psychosocial and central sensitization factors (Tripp et *al*., 2009), but do not establish predictive relationships.

Clinically, these findings support the relevance of a phenotype-informed and staged approach to management. Osteopathy may be considered as a component of care in presentations characterized by predominantly neuromusculoskeletal contributors, while more complex profiles may benefit from early integration within multidisciplinary pathways. In such contexts, structured assessment (including psychosocial screening) may assist in guiding clinical decision-making, although its prognostic value remains to be established.

5.4.2 Scientific Perspectives

From a scientific standpoint, this study contributes descriptive observations regarding the interaction between symptom trajectories, clinical findings, and psychosocial context in CPPPS.

The distinction observed between more stable (persistent) and more variable (transient) clinical findings offers a potential framework for interpreting clinical patterns. However, this distinction remains conceptual and does not imply mechanistic relationships. Similarly, the

predominance of right-sided findings observed in this dataset is descriptively notable but remains exploratory, particularly given the susceptibility of laterality assessment to examiner bias and the absence of standardized criteria.

These findings highlight the need for further investigation using larger, controlled study designs. Future research should aim to:

- validate phenotype-informed approaches
- assess the role of psychosocial profiling tools
- and incorporate objective outcome measures (e.g., imaging, neurophysiological markers)

Such work may help clarify the interactions between biomechanical, neurophysiological, and psychosocial domains, and support the development of more consistent clinical models.

5.4.3 Educational Perspectives

The Clinical Learning Framework developed in this study provides a structured model for teaching clinical reasoning in CPPPS. By integrating outcome measures, clinical findings, and psychosocial context, it illustrates how complex presentations may be approached in a systematic and multidimensional manner.

A key contribution lies in supporting a shift from symptom-focused reasoning toward pattern recognition and contextual interpretation. Encouraging learners to anticipate variability in clinical trajectories, rather than expecting linear improvement, may enhance clinical adaptability.

The integration of psychosocial assessment within osteopathic reasoning also reflects evolving expectations in healthcare education, where patient-centered and biopsychosocial approaches are increasingly emphasized. Simulation-based learning and interdisciplinary exposure may further support competencies in collaboration, referral, and management of complex chronic pain presentations.

5.4.4 Community and Public Health Perspectives

Participants' clinical histories suggested patterns of delayed diagnosis, fragmented care, and variable access to multidisciplinary services. While these observations cannot be generalized from this small sample, they are consistent with broader literature describing barriers in the management of male pelvic pain.

These insights highlight potential areas for community and public health engagement, including:

- improving awareness of CPPPS
- reducing stigma associated with male pelvic pain
- facilitating earlier access to multidisciplinary care

Expanding access to non-pharmacological and integrated care approaches may also help address current gaps in service provision. In this context, osteopathy may contribute as part of coordinated care models, particularly in settings where access to specialized services is limited.

5.4.5 Professional Perspectives

This study also raises considerations regarding the positioning of osteopathy within the healthcare system. The presence of physician referrals suggests a degree of openness to osteopathy as a complementary approach in complex cases. The use of validated outcome measures and structured documentation may further support interprofessional communication and clinical credibility.

However, osteopathy in Quebec remains variably integrated and lacks formal regulation, which may limit its accessibility and recognition. Within this context, the present findings contribute to ongoing discussions regarding osteopathy's potential role within interdisciplinary care, without establishing effectiveness.

Professional development in this area may involve:

- engagement in collaborative research
- participation in multidisciplinary teams
- and alignment with evidence-informed clinical practices

Efforts toward integration and regulation should be supported by rigorous research and cross-disciplinary collaboration.

Summary

The perspectives derived from this study extend across clinical, scientific, educational, community, and professional domains. Collectively, they contribute to a more nuanced understanding of CPPPS management and highlight potential directions for future development.

Clinically, they support the relevance of individualized and multidimensional approaches. Scientifically, they generate testable hypotheses. Educationally, they provide a framework for structured reasoning. At the community level, they draw attention to barriers in access and awareness. Professionally, they inform discussions on integration within healthcare systems.

These reflections must be interpreted within the methodological limits of the study, including the small sample size, case series design, and reliance on self-reported and clinician-reported data. As such, they represent preliminary insights that inform future research and practice, rather than definitive conclusions.

Taken together, this section reflects a transition from outcome description toward structured reflection, supporting the development of more rigorous research, refined clinical reasoning, and integrated models of care in CPPPS.

6. CONCLUSION

This study explored patterns of change observed during individualized osteopathic care in men with Chronic Primary Pelvic Pain Syndrome (CPPPS), within a biopsychosocial and regionally contextualized framework. By combining validated outcome measures (VAS, NIH-CPSI, PDI), structured clinical assessment, and psychosocial profiling (PSVI), it aimed to provide a multidimensional description of clinical trajectories in a population for which management remains complex and often inconsistent.

Rather than demonstrating effectiveness, the findings describe heterogeneous and multidimensional trajectories across participants and outcome domains. Some individuals showed substantial improvement over time, while others demonstrated more limited change. This variability is consistent with current understandings of CPPPS as a multifactorial condition shaped by interactions between musculoskeletal, neurophysiological, and psychosocial dimensions.

The integration of outcome measures, clinical findings, and psychosocial profiles highlights the relevance of multidimensional assessment and individualized clinical reasoning. In particular, the observed variability in trajectories supports the need to interpret symptom evolution within each patient's broader context, rather than assuming linear or directly correlated relationships between findings and outcomes.

From a clinical perspective, these observations suggest that osteopathy may contribute as one component within broader management strategies for CPPPS. Its potential relevance appears greater in presentations characterized by lower psychosocial burden or symptom-linked dysfunction patterns, while more complex profiles may require early integration within interdisciplinary care pathways. These findings reinforce the importance of collaboration and appropriate referral in the management of chronic pelvic pain.

This work also contributes to the development of a structured clinical reasoning approach through the proposed Clinical Learning Framework. Conceived as a practice-informed and

educational model, this framework supports the integration of biopsychosocial reasoning in osteopathic care, without constituting a validated clinical protocol.

Beyond clinical implications, this study provides exploratory insights relevant to research, education, and healthcare organization. It generates hypotheses regarding the interaction between clinical findings, psychosocial context, and symptom trajectories, while also highlighting systemic challenges within the Quebec healthcare context, including variability in access to multidisciplinary care and the limited integration of osteopathy within formal care pathways.

These findings must be interpreted in light of the study's methodological limitations, including the small sample size, absence of a control group, reliance on self-reported outcomes, and the subjectivity inherent to manual assessment. As such, this work represents an exploratory contribution grounded in clinical observation, rather than evidence of causal relationships or treatment effectiveness.

In conclusion, this study contributes to a more nuanced understanding of CPPPS by documenting the variability and multidimensionality of clinical trajectories observed during care. It supports the relevance of individualized, biopsychosocial approaches and underscores the need for more rigorous, controlled, and interdisciplinary research. Within this context, osteopathy may be positioned as a complementary component of integrative care models, with its role to be further defined through future investigation.

DISCLAIMER

I acknowledge having used ChatGPT (Version GPT-5, OpenAI; https://chat.openai.com/) as a digital assistant throughout the preparation of this thesis. The tool was used to support linguistic refinement, document structuring, and conceptual synthesis, while ensuring that all scientific interpretation, clinical reasoning, and analytical conclusions are entirely my own.

Specifically, ChatGPT was used to:

- Rephrase and edit portions of the text for clarity, coherence, and conciseness.
- Assist in structuring sections of the manuscript, including chapter organization, figure legends, and academic formatting.
- Enhance scientific language and stylistic consistency in accordance with academic standards (APA format, terminology uniformity).
- Support the synthesis of complex concepts.

ChatGPT was not used to generate or interpret any original data, nor to perform literature analysis or clinical evaluation. All research design, data interpretation, and conclusions were completed independently by the author. All AI-assisted outputs were carefully reviewed, corrected, and validated by the author to ensure scientific accuracy, academic rigor, and professional integrity.

Dates of use: March 2024 - October 2025

Typical prompts included: *“Rephrase this paragraph for scientific clarity while maintaining technical accuracy”; “Summarize and organize key mechanisms of pelvic pain pathophysiology,”;“Summarize my clinical session notes into a structured SOAP format”; “Help me make this paragraph more concise”; “Draft a figure/table/acronym legend ”* and *“Help me generate a APA reference for this source”*

REFERENCES

American Association of Colleges of Osteopathic Medicine. (2017). *Glossary of osteopathic terminology* (3rd ed.).

Anloague, P. A., & Huijbregts, P. (2009). Anatomical variations of the lumbar plexus: A descriptive anatomy study with proposed clinical implications. *Journal of Manual & Manipulative Therapy, 17*(4), e107-e114. https://doi.org/10.1179/106698109791352201

Antolak, S. J., Hough, D. M., Pawlina, W., & Spinner, R. J. (2002). Anatomical basis of chronic perineal pain: The ischial spine and pudendal nerve entrapment. *Pain Medicine, 3*(2), 109-117. https://doi.org/10.1046/j.1526-4637.2002.02021.x

Apkarian, A. V., Baliki, M. N., & Geha, P. Y. (2009). Towards a theory of chronic pain. *Progress in Neurobiology, 87*(2), 81-97. https://doi.org/10.1016/j.pneurobio.2008.09.018

Apkarian, A. V., Hashmi, J. A., & Baliki, M. N. (2009). Pain and the brain: Specificity and plasticity of the brain in clinical chronic pain. *Pain, 152*(3 Suppl), S49-S64. https://doi.org/10.1016/j.pain.2009.11.010

Asbring, P., & Nilsdotter, A. (2003). Pain, gender and legitimacy: Negotiating chronic back pain in men and women. *Gender & Society, 17*(3), 328-346.

Baron, R., Binder, A., & Wasner, G. (2010). Neuropathic pain: Diagnosis, pathophysiological mechanisms, and treatment. *The Lancet Neurology, 9*(8), 807-819. https://doi.org/10.1016/S1474-4422(10)70143-5

Bear, M. F., Connors, B. W., & Paradiso, M. A. (2020). *Neuroscience: Exploring the brain* (4th ed.). Wolters Kluwer.

Bergeron, A., Dubé, M., & Pelletier, L. (2021). Access to chronic pain services in Quebec: A regional health system analysis. *Canadian Journal of Pain, 5*(2), 18-29.

Blackburn-Munro, G., & Blackburn-Munro, R. E. (2001). Chronic pain, chronic stress and depression: Coincidence or consequence? *Journal of Neuroendocrinology, 13*(12), 1009-1023. https://doi.org/10.1046/j.1365-2826.2001.00739.x

Bordoni, B. (2023). Anatomy, abdomen and pelvis, pelvic floor. In *StatPearls*. https://www.ncbi.nlm.nih.gov/books/NBK482200/

Bordoni, B., & Marelli, F. (2019). A new concept of biotensegrity incorporating fascial system. *Cureus, 11*(4), e4623. https://doi.org/10.7759/cureus.4623

Bordoni, B., & Zanier, E. (2013). Anatomic connections of the diaphragm: Influence of respiration on the body system. *Journal of Multidisciplinary Healthcare, 6*, 281-291. https://doi.org/10.2147/JMDH.S45443

Brawn, L. A., Morissette, C., Tripp, D. A., & Nickel, J. C. (2014). Symptoms of pain and urologic symptoms in men with chronic prostatitis/chronic pelvic pain syndrome. *The Journal of Urology, 191*(3), 584-590. https://doi.org/10.1016/j.juro.2013.09.029

Broom, A., Kirby, E., Good, P., & Wootton, J. (2015). Reflections on pain: The role of gender, masculinity, and narratives in chronic pain management. *Sociology of Health & Illness, 37*(8), 1211-1225.

Bushnell, M. C., Čeko, M., & Low, L. A. (2013). Cognitive and emotional control of pain and its disruption in chronic pain. *Nature Reviews Neuroscience, 14*(7), 502-511. https://doi.org/10.1038/nrn3516

Cagnie, B., Danneels, L., Van Tiggelen, D., De Loose, V., & Cambier, D. (2005). Individual and work-related risk factors for neck pain among office workers: A cross-sectional study. *European Spine Journal, 16*(5), 679-686. https://doi.org/10.1007/s00586-005-1020-7

Chaitow, L. (2012). *Fascial dysfunction: Manual therapy approaches*. Handspring.

Chaitow, L., Bradley, D., & Gilbert, C. (2012). *Multidisciplinary approaches to breathing pattern disorders*. Elsevier.

Chila, A. G. (Ed.). (2011). *Foundations of osteopathic medicine* (3rd ed.). Lippincott Williams & Wilkins.

Clauw, D. J. (2015). Diagnosing and treating chronic musculoskeletal pain based on the underlying mechanism(s). *Best Practice & Research Clinical Rheumatology, 29*(1), 6-19. https://doi.org/10.1016/j.berh.2015.04.024

Clemens, J. Q., Meenan, R. T., O'Keeffe Rosetti, M. C., Kimes, T., & Calhoun, E. A. (2015). Prevalence and incidence of chronic prostatitis/chronic pelvic pain syndrome in U.S. men. *The Journal of Urology, 173*(5), 1732-1738. https://doi.org/10.1097/01.ju.0000158717.55740.3a

Clemens, J. Q., Mullins, C., Kusek, J. W., Kirkali, Z., & Link, C. L. (2015). The MAPP Research Network: A novel study of urologic CPPS. *BMC Urology, 14*, 57. https://doi.org/10.1186/1471-2490-14-57

Clemens, J. Q., Rodriguez, L. V., Kusek, J. W., et al. (2019). Current approaches to the treatment of chronic prostatitis/chronic pelvic pain syndrome: New data from the MAPP Research Network. *Current Urology Reports, 20*(10), 68.

Collins, M. M., Stafford, R. S., O'Leary, M. P., & Barry, M. J. (2002). How common is prostatitis? A national survey of physician visits. *The Journal of Urology, 159*(4), 1224-1228. https://doi.org/10.1016/S0022-5347(01)69587-X

Collins, M. M., et al. (1998). The epidemiology of chronic pelvic pain in men. *The Journal of Urology, 159*(6), 2129-2132.

Crouch, J. J., Beauregard, M., & Tu, F. F. (2017). Pelvic-visceral interactions: The interplay between the bowel, bladder and pelvic pain. *Current Pain and Headache Reports, 21*(12), 49. https://doi.org/10.1007/s11916-017-0645-6

D'Alessandro, G., Cerritelli, F., Cortelli, P., & Chiera, M. (2020). Osteopathic principles and tenets: A contemporary interpretation—Part 1. *Healthcare, 8*(4), 354. https://doi.org/10.3390/healthcare8040354

D'Alessandro, G., Chaitow, L., & Hartman, D. (2020). *Foundations of osteopathic medicine* (4th ed.). Wolters Kluwer.

D'Alessandro, G., & Furze, G. (2004). The role of empathy in osteopathic education and practice. *International Journal of Osteopathic Medicine, 7*(1), 26-34. https://doi.org/10.1016/S1746-0689(07)60110-3

da Silva, A., Lepetre-Mouelhi, S., & Couvreur, P. (2022). Micro- and nanocarriers for pain alleviation. *Advanced Drug Delivery Reviews, 187*, 114359. https://doi.org/10.1016/j.addr.2022.114359

Daniels, N. A., Link, C. L., & Barry, M. J. (2018). Prevalence and correlates of chronic prostatitis-like symptoms in the Boston Area Community Health Survey. *Journal of Clinical Epidemiology, 58*(8), 804-810. https://doi.org/10.1016/j.jclinepi.2018.02.003

Daven (Davia), J., & Welty, C. (2014). Manual therapy and education for physical therapy management of male chronic pelvic pain syndrome. *[Details needed]*.

Degenhardt, B. F., Fossum, C., Meeker, W. C., & Snider, K. T. (2017). Evidence for the efficacy of osteopathic manipulative treatment in treating somatic dysfunctions: A systematic review and meta-analysis. *Journal of the American Osteopathic Association, 117*(10), 654-667. https://doi.org/10.7556/jaoa.2017.124

Drake, R. L., Vogl, A. W., & Mitchell, A. W. M. (2019). *Gray's anatomy for students* (4th ed.). Elsevier.

Dufour, M., Langlois, K., Pillu, M., & Del Valle Acedo, S. (2017). *Biomécanique fonctionnelle: Membres - Tête - Tronc* (2nd ed.). Elsevier Masson.

Edwards, R. R., Dworkin, R. H., Sullivan, M. D., Turk, D. C., & Wasan, A. D. (2016). The role of psychosocial processes in the development and maintenance of chronic pain. *The Journal of Pain, 17*(9), T70-T92.

Engel, G. L. (1977). The need for a new medical model: A challenge for biomedicine. *Science, 196*(4286), 129-136.

Engeler, D., Baranowski, A. P., Berghmans, B., et al. (2020). Guidelines on chronic pelvic pain. *European Urology, 79*(1), 82-99. https://doi.org/10.1016/j.eururo.2020.08.013

European Association of Urology. (2023). *EAU guidelines on chronic pelvic pain* (Milan 2023; ISBN 978-94-92671-19-6). EAU Guidelines Office. https://uroweb.org/guidelines/chronic-pelvic-pain/chapter/introduction

Farrar, J. T., Young, J. P., LaMoreaux, L., Werth, J. L., & Poole, R. M. (2001). Clinical importance of changes in chronic pain intensity measured on an 11-point numerical pain rating scale. *Pain, 94*(2), 149-159. https://doi.org/10.1016/S0304-3959(01)00349-9

Finnerup, N. B., et al. (2015). Pharmacotherapy for neuropathic pain in adults: A systematic review and meta-analysis. *The Lancet Neurology, 14*(2), 162-173.

Fitzcharles, M.-A., Cohen, S. P., Clauw, D. J., Littlejohn, G., Usui, C., & Häuser, W. (2021). Nociplastic pain: Towards an understanding of prevalent pain conditions. *The Lancet, 397*(10289), 2098-2110. https://doi.org/10.1016/S0140-6736(21)00392-5

FitzGerald, M. P., Kotarinos, R., & Lemack, G. E. (2013). Pelvic floor physical therapy for men with chronic pelvic pain syndrome. *International Urogynecology Journal, 24*(6), 939-947. https://doi.org/10.1007/s00192-013-1974-7

Franke, H., Franke, J. D., & Fryer, G. (2015). Osteopathic manipulative treatment for nonspecific low back pain: A systematic review and meta-analysis. *BMC Musculoskeletal Disorders, 16*, 286. https://doi.org/10.1186/s12891-015-0745-8

Fryer, G. (2017). Integrating osteopathic approaches based on biopsychosocial therapeutic mechanisms. Part 1: The mechanisms. *International Journal of Osteopathic Medicine, 25*, 30-41. https://doi.org/10.1016/j.ijosm.2017.05.002

Gatchel, R. J., Peng, Y. B., Peters, M. L., Fuchs, P. N., & Turk, D. C. (2007). The biopsychosocial approach to chronic pain: Scientific advances and future directions. *Psychological Bulletin, 133*(4), 581-624.

Ghei, M., et al. (2005). Botulinum toxin in the treatment of bladder dysfunction. *BJU International, 96*(3), 324-328.

Gilron, I., Watson, C. P. N., Cahill, C. M., & Moulin, D. E. (2006). Neuropathic pain: A practical guide for the clinician. *CMAJ, 175*(3), 265-275. https://doi.org/10.1503/cmaj.060146

Gray, D. (2019). Osteopathic manipulative treatment as a novel way to manage post-vasectomy pain syndrome. *[Details needed]*.

Grundy, L., Erickson, A., & Brierley, S. M. (2018). Visceral pain. *Annual Review of Physiology, 81*, 261-284. https://doi.org/10.1146/annurev-physiol-020518-114525

Hains, G., Descarreaux, M., & Hains, F. (2009). Chronic pelvic pain syndrome and spinal manipulative therapy: A literature review. *Journal of the Canadian Chiropractic Association, 53*(4), 293-302.

Hains, G., Descarreaux, M., & Hains, F. (2009). Chronic pelvic pain syndrome and pudendal neuralgia: A neurogenic-myofascial pain syndrome. *Canadian Journal of Clinical Medicine, 16*(2), 34-40.

Hanno, P. M., Burks, D. A., Clemens, J. Q., Dmochowski, R. R., Erickson, D., Fitzgerald, M. P., … Mayer, R. (2011). AUA guideline for the diagnosis and treatment of interstitial cystitis/bladder pain syndrome. *The Journal of Urology, 185*(6), 2162-2170. https://doi.org/10.1016/j.juro.2011.03.064

Heim, C., Ehlert, U., & Hellhammer, D. H. (2000). The potential role of hypocortisolism in the pathophysiology of stress-related bodily disorders. *Psychoneuroendocrinology, 25*(1), 1-35. https://doi.org/10.1016/S0306-4530(99)00035-9

International Association for the Study of Pain. (2020). IASP terminology. https://www.iasp-pain.org/resources/terminology/

International Association for the Study of Pain. (2020). IASP announces revised definition of pain. https://www.iasp-pain.org/publications/iasp-news/iasp-announces-revised-definition-of-pain/

International Association for the Study of Pain. (2021). IASP terminology: Definitions of pain terms. https://www.iasp-pain.org/resources/terminology/

Jensen, T. S., Baron, R., Haanpää, M., Kalso, E., Loeser, J. D., Rice, A. S. C., & Treede, R.-D. (2011). A new definition of neuropathic pain. *Pain, 152*(10), 2204-2205. https://doi.org/10.1016/j.pain.2011.06.017

Ji, R.-R., Nackley, A., Huh, Y., Terrando, N., & Maixner, W. (2013). Neuroinflammation and central sensitization in chronic and widespread pain. *Anesthesiology, 118*(5), 1160-1169. https://doi.org/10.1097/ALN.0b013e318289bbdd

Kapandji, I. A. (2007). *The physiology of the joints. Volume 3: The trunk and vertebral column* (6th ed.). Churchill Livingstone.

Kosek, E., Cohen, M., Baron, R., Gebhart, G. F., Mico, J. A., Rice, A. S., Rief, W., & Sluka, K. A. (2021). Do we need a third mechanistic descriptor for chronic pain states? *Pain, 162*(11), 2657-2659. https://doi.org/10.1097/j.pain.0000000000002252

Krieger, J. N., et al. (2002). Epidemiology of prostatitis. *International Journal of Antimicrobial Agents, 19*(2), 88-93.

Kuner, R. (2010). Central mechanisms of pathological pain. *Nature Medicine, 16*(11), 1258-1266. https://doi.org/10.1038/nm.2231

Kuo, H. C. (2005). Urodynamic evidence of effectiveness of botulinum A toxin injection in refractory interstitial cystitis. *The Journal of Urology, 173*(1), 118-122.

Kutch, J. J., Yani, M. S., Asavasopon, S., Kirages, D. J., Rana, M., Cosand, L., … Mackey, S. C. (2017). Altered resting-state neuromotor connectivity in men with chronic prostatitis/chronic pelvic pain syndrome: A MAPP Network neuroimaging study. *NeuroImage: Clinical, 13*, 317-323. https://doi.org/10.1016/j.nicl.2016.12.015

Labat, J. J., Riant, T., Robert, R., Amarenco, G., Lefaucheur, J. P., & Rigaud, J. (2008). Diagnostic criteria for pudendal neuralgia by pudendal nerve entrapment (Nantes criteria). *Neurourology and Urodynamics, 27*(4), 306-310.

Labat, J. J., Riant, T., Robert, R., et al. (2008). Pudendal neuralgia: A clinical approach and etiologic considerations. *Journal of Pain Research, 1*, 39-46.

Lafave, M., & Sutter, D. (2012). Pudendal nerve entrapment in a bareback rodeo cowboy: A case study. *[Details needed]*.

Lanius, R. A., Vermetten, E., & Pain, C. (Eds.). (2010). *The impact of early life trauma on health and disease: The hidden epidemic*. Cambridge University Press.

Lee, D. (2011). *The pelvic girdle: An integration of clinical expertise and research* (4th ed.). Churchill Livingstone.

Lee, D. G., Lee, L. J., & McLaughlin, L. (2008). Stability, continence and breathing: The role of fascia following pregnancy and delivery. *Journal of Bodywork and Movement Therapies, 12*(4), 333-348. https://doi.org/10.1016/j.jbmt.2008.05.003

Li, H., et al. (2022). Manual therapy treatment for penile pain: A clinical report with 6-month follow-up. *[Details needed]*.

Licciardone, J. C., Gatchel, R. J., & Aryal, S. (2005). Recovery from chronic low back pain with osteopathic manipulation treatment: Results from the OSTEOPATHIC trial. *The Spine Journal, 5*(6), 600-612. https://doi.org/10.1016/j.spinee.2005.03.012

Loubser, P. G., Jansen, C. W. S., & Stoutenberg, M. (2020). Biomechanical relationships and dysfunction in the pubic symphysis: Relevance for pelvic pain. *Manual Therapy and Posturology, 10*(3), 201-211. *[Verify journal]*

Loubser, P. G., Palacios, M. R., & Dehart, A. N. (2020). The role of sacroiliac joint dysfunction in patients with pelvic pain: Clinical perspectives. *Journal of Bodywork and Movement Therapies, 24*(2), 162-169.

Magistro, G., Wagenlehner, F. M., Grabe, M., Weidner, W., & Naber, K. G. (2016). Contemporary management of chronic prostatitis/chronic pelvic pain syndrome. *European Urology, 69*(2), 286-297. https://doi.org/10.1016/j.eururo.2015.04.003

Marx, J. (2006). ICAOR 2006: Does osteopathic treatment influence symptoms of CP/CPPS? *[Conference abstract; details needed]*.

Mayer, E. A., & Bushnell, M. C. (2009). *Functional pain syndromes: Presentation and pathophysiology*. IASP Press.

McSweeney, T. P., Thomson, O. P., & Johnston, R. (2012). The immediate effects of osteopathic treatment on chronic pain. *Journal of Bodywork and Movement Therapies, 16*(2), 203-209. https://doi.org/10.1016/j.jbmt.2011.05.002

Mehik, A., Hellström, P., Lukkarinen, O., Sarpola, A., & Järvelin, M. R. (2000). Epidemiology of prostatitis in Finnish men: A population-based cross-sectional study. *BJU International, 86*(4), 443-448. https://doi.org/10.1046/j.1464-410x.2000.00886.x

Milligan, E. D., & Watkins, L. R. (2009). Pathological and protective roles of glia in chronic pain. *Nature Reviews Neuroscience, 10*(1), 23-36. https://doi.org/10.1038/nrn2533

Moisset, X., et al. (2020). Pharmacological and non-pharmacological treatments for neuropathic pain. *Revue Neurologique, 176*(6), 420-426.

Moore, K. L., Dalley, A. F., & Agur, A. M. R. (2018). *Clinically oriented anatomy* (8th ed.). Wolters Kluwer.

Nabi, G., Wallis, M., & Fernando, R. (2020). Pharmacological management of chronic pelvic pain in men: A review. *BJU International, 126*(6), 740-748. https://doi.org/10.1111/bju.15027

Newman, P., et al. (2021). Successful resolution of chronic testicular pain with an impairment-based treatment program: A case study with one-year follow-up. *[Details needed]*.

Nicholas, M., Vlaeyen, J. W., Rief, W., Barke, A., Aziz, Q., Benoliel, R., … Treede, R. D. (2019). The IASP classification of chronic pain for ICD-11: Chronic primary pain. *Pain, 160*(1), 19-27.

Nickel, J. C., & Tripp, D. A. (2008). Chronic prostatitis/chronic pelvic pain syndrome: A biopsychosocial model. *Urologic Clinics of North America, 35*(1), 81-89. https://doi.org/10.1016/j.ucl.2007.09.005

Nickel, J. C., & Tripp, D. A. (2017). The biopsychosocial model. *Current Urology Reports, 18*(6), 34. https://doi.org/10.1007/s11934-017-0696-3

Nickel, J. C., & Tripp, D. A. (2019). Psychosocial impact of CP/CPPS and evidence for targeted intervention. *World Journal of Urology, 37*(6), 1039-1045. https://doi.org/10.1007/s00345-018-2542-4

Nickel, J. C., Downey, J., Hunter, D., & Clark, J. (2001). Preliminary validation of a translated and abbreviated NIH-CPSI in men with CP/CPPS. *Urology, 57*(6), 1029-1033. https://doi.org/10.1016/S0090-4295(01)00958-6

Nickel, J. C., Tripp, D. A., Pontari, M. A., Moldwin, R., Mayer, R., Carr, L. K., … Litwin, M. S. (2011). Interstitial cystitis/painful bladder syndrome and associated medical conditions. *The Journal of Urology, 186*(2), 569-574. https://doi.org/10.1016/j.juro.2011.03.132

Nickel, J. C., et al. (2012). Interstitial cystitis/bladder pain syndrome: A review of the literature. *The Journal of Urology, 188*(4), 1393-1399.

Okeson, J. P. (2017). Neurophysiology of orofacial pain. In L. M. S. Chaves, C. de Siqueira, & J. P. Okeson (Eds.), *Contemporary oral medicine* (pp. 1-23). Springer. https://doi.org/10.1007/978-3-319-28100-1_8-2

OpenStax. (2013). Referred pain mechanism and clinical mapping. In *Anatomy & physiology*. https://openstax.org/books/anatomy-and-physiology

Parsons, C. L., et al. (2009). Interstitial cystitis: Analysis of 423 consecutive patients. *Urology, 69*(1), 73-78.

Pastore, A. L., Palleschi, G., Maceroni, P., et al. (2018). Autonomic dysfunction in men with CP/CPPS: Sympathetic skin response. *Urologia Internationalis, 101*(3), 317-322. https://doi.org/10.1159/000482814

Pastore, E. A., Katzman, W. B., & Goldstein, R. B. (2018). Physiotherapy and osteopathic interventions for pelvic pain: A scoping review. *Journal of Bodywork and Movement Therapies, 22*(1), 1-11.

Peters, K. M., et al. (2007). Sacral neuromodulation for refractory interstitial cystitis: A prospective study. *The Journal of Urology, 178*(6), 2020-2025.

Pollard, C. A. (1984). Preliminary validity study of the Pain Disability Index. *Perceptual and Motor Skills, 59*(3), 974. https://doi.org/10.2466/pms.1984.59.3.974

Pontari, M. A. (2008). Chronic prostatitis/chronic pelvic pain syndrome in elderly men: Toward better understanding and treatment. *Drugs & Aging, 25*(6), 431-439. https://doi.org/10.2165/00002512-200825060-00003

Pontari, M. A. (2016). Chronic prostatitis/chronic pelvic pain syndrome. *Journal of Andrology, 27*(5), 549-556. https://doi.org/10.2164/jandrol.106.001503

Pontari, M. A., & Ruggieri, M. R. (2004). Mechanisms in prostatitis/chronic pelvic pain syndrome. *The Journal of Urology, 172*(3), 839-845. https://doi.org/10.1097/01.ju.0000135701.00274.20

Potts, J. M., et al. (2000). Chronic scrotal pain: Evaluation and management. *Urology, 56*(6), 947-952.

Qin, Z., Liu, X., Sun, C., & Li, H. (2014). Fibrosis-related changes in CP/CPPS: A review. *International Urology and Nephrology, 46*(4), 595-600. https://doi.org/10.1007/s11255-013-0600-3

Ramin-Wright, A., Dudukovic, N., Kalbermatten, D. F., & Zimmermann, R. (2020). Chronic pelvic pain in women: A multidisciplinary approach. *Swiss Medical Weekly, 150*, w20347. https://doi.org/10.4414/smw.2020.20347

Rees, J., Abrahams, M., & Doble, A. (2015). Therapeutic options for CP/CPPS. *Expert Opinion on Pharmacotherapy, 16*(18), 2701-2714. https://doi.org/10.1517/14656566.2015.1096302

Rees, J., et al. (2015). Surgical management of chronic pelvic pain. *Nature Reviews Urology, 12*(3), 155-164.

Robert, R., Labat, J.-J., Rigaud, J., & Delavierre, D. (2022). Pudendal neuralgia: From diagnosis to multidisciplinary management. *Progrès en Urologie, 32*(2), 101-110. https://doi.org/10.1016/j.purol.2021.11.001

Robert, R., Valade, M., & Brulé, M. (2023). Myofascial compression of the pudendal nerve: An overlooked cause of male pelvic pain. *Pelviperineology, 42*(1), 12-18.

Roch, M., et al. (2021). The female pelvic floor fascia anatomy: A systematic review. *Life, 11*(9), 900. https://doi.org/10.3390/life11090900

Sant, G. R., et al. (2007). Interstitial cystitis in children and adolescents. *Urology, 69*(4), 473-479.

Scholz, J., Finnerup, N. B., Attal, N., Aziz, Q., Baron, R., Bennett, M. I., … Treede, R.-D. (2019). The IASP classification of chronic pain for ICD-11: Chronic neuropathic pain. *Pain, 160*(1), 53-59. https://doi.org/10.1097/j.pain.0000000000001365

Seminowicz, D. A., & Davis, K. D. (2006). Cortical responses to pain in healthy individuals depend on pain catastrophizing. *Pain, 120*(3), 297-306. https://doi.org/10.1016/j.pain.2005.11.008

Shoskes, D. A., Nickel, J. C., & Dolinga, R. (2017). Management of male chronic pelvic pain syndrome. *Urologic Clinics of North America, 34*(4), 483-495. https://doi.org/10.1016/j.ucl.2017.03.003

Shoskes, D. A., Nickel, J. C., Kattan, M. W., & Buckley, J. (2017). Clinical phenotyping of CP/CPPS and correlation with symptom severity. *Urology, 110*, 148-153.

Shoskes, D. A., Nickel, J. C., Kattan, M. W., & Zeitlin, S. I. (2017). Phenotypically directed multimodal therapy for CP/CPPS: UPOINT clinical phenotyping. *World Journal of Urology, 35*(1), 97-102.

Siccardi, M. A. (2022). Anatomy, bony pelvis and lower limb: Pelvic fascia. In *StatPearls*. https://www.ncbi.nlm.nih.gov/books/NBK518984/

Sirois, M., Fortin, M., & Hudon, C. (2024). Access to chronic pain care in remote and urban regions of Quebec: A population-based study. *Frontiers in Pain Research, 5*, 1291101.

Sluka, K. A., & Walsh, D. (2003). Transcutaneous electrical nerve stimulation: Basic science mechanisms and clinical effectiveness. *The Journal of Pain, 4*(3), 109-121. https://doi.org/10.1054/jpai.2003.434

Song, P. H. (2020). UPOINT system: A diagnostic/therapeutic algorithm for CP/CPPS. *Urogenital Tract Infection, 15*(2), 27-32. https://doi.org/10.14777/uti.2020.15.2.27

Standring, S. (Ed.). (2021). *Gray's anatomy: The anatomical basis of clinical practice* (42nd ed.). Elsevier.

Tozzi, P. (2015). A unifying neuro-fasciagenic model of somatic dysfunction—Part 1. *Journal of Bodywork and Movement Therapies, 19*(2), 310-326. https://doi.org/10.1016/j.jbmt.2014.11.015

Tozzi, P., Bongiorno, D., & Vitturini, C. (2012). Fascial release effects on the neuromuscular system: A pilot study. *Journal of Bodywork and Movement Therapies, 16*(3), 380-390.

Tripp, D. A., Curtis Nickel, J., & Katz, L. (2006). The role of psychosocial processes in chronic prostatitis/chronic pelvic pain syndrome. *World Journal of Urology, 24*(1), 39-45. https://doi.org/10.1007/s00345-005-0059-0

Tripp, D. A., Nickel, J. C., Wang, Y., & Shoskes, D. A. (2009). Catastrophizing and pain-contingent rest predict patient adjustment in men with chronic prostatitis/chronic pelvic pain syndrome. *The Journal of Pain, 10*(6), 682-689. https://doi.org/10.1016/j.jpain.2008.12.005

Tu, F. F., Fitzgerald, C. M., Kuiken, T., & Farrell, T. (2005). Vaginal pressure-pain thresholds: Validation and reliability in healthy women. *American Journal of Obstetrics and Gynecology, 192*(6), 1829-1834.

Tu, F. F., Holt, J., Gonzales, J., & Fitzgerald, C. M. (2016). Physical therapy evaluation and treatment of pelvic pain disorders. *Obstetrics and Gynecology Clinics of North America, 43*(3), 509-524. https://doi.org/10.1016/j.ogc.2016.04.001

van Balken, M. R., et al. (2003). Percutaneous tibial nerve stimulation as neuromodulative treatment of chronic pelvic pain. *European Urology, 43*(2), 158-163.

van der Kolk, B. A. (2014). *The body keeps the score: Brain, mind, and body in the healing of trauma*. Viking.

Weiss, J. M. (2001). Pelvic floor myofascial trigger points: Manual therapy for interstitial cystitis and the urgency-frequency syndrome. *The Journal of Urology, 166*(6), 2226-2231.

Wiffen, P. J., et al. (2017). Gabapentin for chronic neuropathic pain in adults. *Cochrane Database of Systematic Reviews, (6)*, CD007938.

WikiLectures. (n.d.). *Pelvis - male sagittal* [Digital image]. https://www.wikilectures.eu/w/Pelvis#/media/File:Pelvis-male_sagittal.png

Woolf, C. J. (2011). Central sensitization: Implications for the diagnosis and treatment of pain. *Pain, 152*(3 Suppl), S2-S15. https://doi.org/10.1016/j.pain.2010.09.030

Youngjoo, K., et al. (2023). Defining chronic pain: Updated clinical perspectives. *London Pain Journal, 14*(1), 23-29. *[Verify journal]*

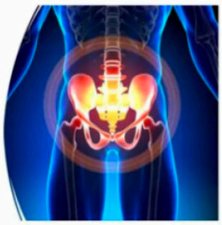
Youngjoo, S., Hee-Jung, K., & Jae-Hyuk, S. (2023). Chronic pain: Pathophysiology and clinical implications. *Journal of Pain Research, 16*, 45-54. https://doi.org/10.2147/JPR.S389382

APPENDIX 1: Recruitment Publication

1.1 Recruitment Publication - French Version

VOUS SOUFFREZ DE DOULEURS PELVI-PÉRINÉALES CHRONIQUES?

PARTICIPEZ À UNE ÉTUDE SUR L'IMPACT DE L'OSTÉOPATHIE DANS LA GESTION DES DOULEURS PÉLVI-PÉRINÉALES CHRONIQUES CHEZ L'HOMME



Cette recherche vise à explorer les effets des manipulations ostéopathiques sur la douleur, la fonctionnalité et la qualité de vie chez des hommes souffrant de douleurs pelviennes chroniques non spécifiques, résistantes aux traitements médicaux conventionnels. Cette étude propose une approche holistique et non invasive pour traiter la douleur pelvienne par l'intermédiaire de l'ostéopathie.

QUI PEUT PARTICIPER ?

1. **Homme**
2. âgé de **18 à 70 ans.**
3. présentant des douleurs pelvi-périnéales chroniques non spécifiques **diagnostiquée par un médecin spécialiste**
4. Acceptant de signer un **consentement de partage d' informations médicales** nécessaires pour la recherche.

QU'EST CE QUE VOTRE PARTICIPATION IMPLIQUE?

Traitement ostéopathique personnalisé gratuit:

- **Durée** : Quatre séances en personne réparties sur quatres semaines
- **Lieu** : École d'ostéopathie ENOSI, Montréal Québec.
- **Suivi** : Appel téléphonique de 30 minutes pour évaluer les effets à long terme, un mois après la fin du traitement.

ÉQUIPE DE RECHERCHE

CHERCHEUR PRINCIPALE

Charlotte Boivin-Carrier, *B. Com, Finissante à ENOSI*
malepelvicpain@gmail.com
514-831-0301

SUPERVISÉ PAR

Anaïs Beaupré, *D.O., M.Sc., Directrice pédagogique, superviseur de mémoire*

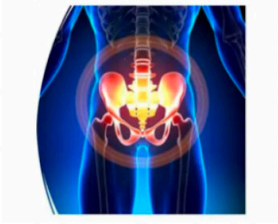
Diego Legrand, *Pharm.D., H.C., M.Sc., Directeur scientifique*

ENOSI
ÉCOLE D'OSTÉOPATHIE
MEMBRE DE L'ASSOCIATION RITMA

1.2 Recruitment Publication - English Version

ARE YOU EXPERIENCING CHRONIC PELVI-PERINEAL PAIN?

JOIN A RESEARCH STUDY ON OSTEOPATHY'S IMPACT ON NON-SPECIFIC MALE PELVIC PAIN



This research aims to explore the effects of osteopathic manipulations on pain, functionality, and quality of life in men suffering from non-specific chronic pelvic pain not treatable by conventional medicine. This study offers a non-invasive, holistic approach to addressing pelvic pain through osteopathic treatment.

WHO CAN PARTICIPATE ?

1. **Male**
2. Aged between **18 and 70 years**
3. presenting non-specific chronic pelvic-perineal pain **diagnosed by a medical specialist**
4. Agreeing to sign a consent form for **sharing medical information** required for the research.

WHAT DOES PARTICIPATION INVOLVE?

Free personalized osteopathic treatment

- **Duration:** Four in-person sessions over four weeks (one session/ week)
- **Location:** ENOSI Osteopathy School, Quebec.
- **Follow-Up:** A phone consultation of 30min to assess long-term outcomes one month post-treatment

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RESEARCH TEAM

PRINCIPAL INVESTIGATOR

Charlotte Boivin-Carrier, *B. Com, Finishing student at ENOSI*

malepelvicpain@gmail.com

514-831-0301

SUPERVISED BY

Anaïs Beaupré, *D.O., M.Sc., Pedagogic Director, Thesis supervisor*

Diego Legrand, *Pharm.D., H.C., M.Sc., Scientific Director*

ENOSI

OSTEOPATHY SCHOOL
MEMBER OF RITMA ASSOCIATION

APPENDIX 2: Medical Information Checklist provided to Collaborating Urologist

PATIENT 1 MEDICAL INFORMATION		
Field	**Description**	**Notes/Observations**
Age	Participant's age.	
Weight	Participant's weight.	
Height	Participant's height.	
Occupation	Participant's occupation (to assess lifestyle factors).	
Hobbies	Participant's hobbies (to assess lifestyle factors).	
Medical History		
Previous Diagnoses	Any prior medical diagnoses, especially related to pelvic or musculoskeletal issues.	
Surgical History	Any surgeries, particularly those related to the pelvic region.	
Trauma History	Any history of physical trauma, especially in the pelvic or related regions.	
Chronic Conditions	Ongoing conditions such as diabetes, hypertension, or others.	
Medications	List of current medications (if any).	
Allergies	Known allergies.	
Family Medical History	Relevant family health issues (e.g., pelvic pain, autoimmune disorders).	
Systems review		
Cardio	Cardiovascular symptoms (e.g., palpitations, chest pain, high blood pressure).	
Pulmo	Respiratory symptoms (e.g., shortness of breath, chronic cough).	
Digestive	Gastrointestinal symptoms (e.g., bloating, constipation, diarrhea, reflux).	
Tegumentary	Skin-related issues (e.g., rashes, dryness, discoloration).	
Ortho	Orthopedic symptoms (e.g., joint pain, stiffness, muscular discomfort).	
Endocrino	Endocrine symptoms (e.g., fatigue, weight changes, thyroid dysfunction).	
Urological	Urological and genital symptoms (e.g., urinary frequency, pain, sexual dysfunction).	
Emotional	Emotional and psychological health (e.g., stress, anxiety, mood changes).	
Reason for Consultation		
Primary Complaint	The main symptom or issue leading to the consultation.	
Duration of Symptoms	How long the symptoms have been present.	
Severity of Symptoms	Self-reported severity of symptoms (e.g., mild, moderate, severe).	
Aggravating Factors	*Activities or conditions that worsen symptoms.*	
Relieving Factors	*Activities or conditions that alleviate symptoms.*	
Impact on Daily Life	*How the symptoms affect the participant's daily activities and quality of life.*	
Investigation		
Imagerie		
Blood Tests		
Rectal Exam		
Previous Treatments		
Type of Treatments	Any previous therapies or treatments (e.g., physiotherapy, medication).	
Effectiveness	Self-reported effectiveness of past treatments.	
Lifestyle Factors		
Exercise Routine	*Frequency and type of physical activity.*	
Dietary Habits	*General dietary patterns.*	
Sleep Quality	*Self-reported sleep quality and duration.*	
Stress Levels	*Perceived levels of stress.*	
Hydration	*General hydration patterns.*	

APPENDIX 3: Consent forms

3.1 Consent Form to share medical data

3.1.1 Consent Form to share medical data - english version

ENOSI

Medical Information Sharing Consent Form

Project Title: The Impact of Osteopathy on Non-Specific Pelvic Pain in Men

Dear Participant,

You are invited to participate in a study aimed at evaluating the effectiveness of osteopathic treatment in reducing pain, improving functionality, and enhancing the quality of life for men suffering from chronic pelvic pain. This study involves analyzing targeted osteopathic techniques as a non-invasive alternative to traditional treatments.

As part of this research, we request your consent to share relevant information from your medical records regarding your health status, medical history, and care journey with the researcher. These data will enable a better understanding of your clinical situation, help tailor your treatment accordingly, and allow analysis of the study results.

Important Information:

Confidentiality:

- All shared information will remain strictly confidential and protected.
- Medical data will be coded and anonymized before analysis to preserve your privacy.
- No identifiable information will be disclosed in the study results or scientific publications.

Voluntary Participation:

- Your participation is entirely voluntary.
- You may refuse consent or withdraw it at any time without explanation

Use of Data:

- The information collected will be used solely for this research.
- Data will be destroyed two years after the study concludes, in 2027.

Contact:

- Should you have any questions regarding this study or your participation, please contact the researcher, Charlotte Boivin-Carrier, at 514-831-0301 or by e-mail at malepelvicpain@gmail.com

Consent:

By signing this document, I acknowledge that:

- I have received clear information regarding the study's objective and the sharing of my medical data.
- I understand that my information will be treated confidentially and anonymously.
- I consent to sharing relevant medical information from my records with the researcher for the purposes of this study.
- I am free to withdraw my consent at any time without any consequence on my medical care.

I, _____

Authorize _____

To share with Charlotte Boivin-Carrier, researcher, the following information regarding my medical record:

_____

_____

_____

For the care or services received during the following period:_____

This autorisation is valid for a period of _____ days as of the date this document is signed.

Participant Name: _____

Signature: _____

Date: _____

Thank you for your participation in this research. Your contribution is valuable in improving the understanding and treatment of chronic pelvic pain.

3.1.2 Consent form to share medical data - French version

ENOSI

Formulaire de consentement de partage d'information médicale

Titre du projet : L'impact de l'ostéopathie sur les douleur pelviennes non spécifiques chez les hommes

Cher participant,

Vous êtes invité à participer à une étude qui vise à évaluer l'efficacité du traitement ostéopathique pour réduire la douleur, améliorer la fonctionnalité et la qualité de vie des hommes souffrant de douleurs pelviennes chroniques. Cette étude repose sur l'analyse de techniques ostéopathiques ciblées comme alternative non invasive aux traitements traditionnels.

Dans le cadre de cette recherche, nous vous demandons votre consentement pour que votre médecin traitant partage avec la chercheuse les informations pertinentes de votre dossier médical liées à votre état de santé, à vos antécédents médicaux et à votre parcours de soins. Ces données permettront de mieux comprendre votre situation clinique, d'adapter votre traitement a votre situation, et pour fin d'analyse des résultats de l'étude.

Informations importantes :

1. **Confidentialité :**
   - Toutes les informations partagées seront strictement confidentielles et protégées.
   - Les données médicales seront codifiées et anonymisées avant leur analyse, afin de préserver votre vie privée.
   - Aucune donnée nominative ne sera divulguée dans les résultats de l'étude ou dans les publications scientifiques.
2. **Volontariat :**
   - Votre participation est entièrement volontaire.
   - Vous pouvez refuser de consentir ou retirer votre consentement à tout moment.
3. **Utilisation des données :**
   - Les informations collectées seront utilisées uniquement dans le cadre de cette recherche.
   - Elles seront détruites deux ans après la fin de l'étude, soit en 2027.
4. **Contact :**
   - Si vous avez des questions concernant cette étude ou votre participation, vous pouvez contacter la chercheuse, Charlotte Boivin-Carrier, au 514-831-0301 ou par courriel à l'adresse malepelvicpain@gmail.com

Consentement

En signant ce document, je reconnais que :

- J'ai reçu des informations claires concernant l'objectif de l'étude et le partage de mes données médicales.
- Je comprends que mes informations seront traitées de manière confidentielle et anonymisée.
- J'accepte que mon médecin traitant partage les informations médicales pertinentes de mon dossier avec la chercheuse pour les besoins de cette étude.
- Je suis libre de retirer mon consentement à tout moment sans conséquence sur mes soins.

Je, soussigné(e), _____
Autorise _____
à partager avec Charlotte Boivin-Carrier, chercheuse, les informations suivantes issues de mon dossier médical
_____
_____
_____

Cette autorisation concerne les soins ou services reçus durant la période suivante :
_____

Cette autorisation est valide pour une durée de _____ jours à compter de la date de signature du présent document.

Nom du participant : _____
Signature : _____
Date : _____

Merci pour votre participation à cette recherche. Votre contribution est précieuse pour améliorer la compréhension et le traitement des douleurs pelviennes chroniques.

3.2 Consent form to participate to a study

ENOSI

Formulaire de consentement

Titre du projet : L'impact de l'ostéopathie sur les douleur pelviennes non spécifiques chez les hommes

Présentation du chercheur

Cette recherche est réalisée dans le cadre du projet d'étude de Charlotte Boivin-Carrier, dirigé par Diego Legrand (directeur scientifique) et Anais Beaupré (superviseur de mémoire) à ENOSI. Avant d'accepter de participer à ce projet de recherche, veuillez prendre le temps de lire et de comprendre les renseignements qui suivent. Ce document vous explique le but de ce projet de recherche, ses procédures, avantages, risques et inconvénients. Nous vous invitons à poser toutes les questions que vous jugerez utiles à la personne qui vous présente ce document.

Nature de l'étude

L'objectif de cette étude est d'évaluer l'efficacité du traitement ostéopatique dans la prise en charge des douleurs pelviennes chroniques chez l'homme. Plus précisément, l'étude vise à mesurer la réduction de la douleur, les améliorations fonctionnelles et l'amélioration de la qualité de vie grâce à des techniques ostéopathiques ciblées. En traitant les dysfonctions musculosquelettiques, les restrictions fasciales et les compressions nerveuses, cette recherche cherche à fournir des données sur l'ostéopathie en tant qu'alternative non invasive et durable aux traitements traditionnels.

Déroulement de la participation

- **Durée :** Quatre séances en personne sur une période de huit semaines (une séance toutes les deux semaines), suivies d'une séance de suivi un mois plus tard.
- **Lieu :** École d'Ostéopathie ENOSI, Québec.
- **Traitements :**
  - Mobilisation sacrée et lombaire.
  - Libération myofasciale des structures pelviennes.
  - Techniques diaphragmatiques et respiratoires pour améliorer la fonction thoraco-abdominale.
- **Mesures d'évaluation :**
  La douleur, la fonctionnalité pelvienne et la qualité de vie seront évaluées à l'aide d'outils validés tels que l'Échelle Visuelle Analogique (VAS), l'Indice des Symptômes de Prostatite Chronique du NIH (NIH-CPSI) et l'Indice de Douleur et de Handicap Pelvien (PPDI). Les amplitudes de mouvement lombaire et de la hanche seront également évaluées avant et après le traitement.
- **Suivi :** Consultation téléphonique de 30 minutes pour évaluer les résultats à long terme un mois après la fin du traitement.

Avantages, risques ou inconvénients possibles liés à votre participation :

- **Avantages :**
  - Votre participation pourrait permettre une diminution de la douleur pelvienne, une amélioration des fonctions pelviennes et une meilleure qualité de vie grâce aux traitements ostéopathiques proposés.
  - Vous bénéficierez d'une évaluation détaillée et de traitements personnalisés dans le cadre de cette étude.
  - Vous contribuerez à l'avancement des connaissances scientifiques sur les effets de l'ostéopathie dans la prise en charge des douleurs pelviennes chroniques.
- **Risques ou inconvénients :**
  - Les manipulations ostéopathiques peuvent occasionner de légères sensations d'inconfort ou des douleurs temporaires après le traitement.

- Le déplacement aux séances et le temps consacré à votre participation peuvent représenter une contrainte.
- Comme dans toute intervention manuelle, il existe un risque rare mais possible d'effets indésirables, comme une augmentation temporaire des symptômes.

Précisions :

Toutes les mesures seront prises pour minimiser les risques, et vous pourrez interrompre votre participation à tout moment si vous le souhaitez, sans que cela n'entraîne de conséquence négative pour vous. Un suivi sera effectué pour évaluer les éventuels effets secondaires ou désagréments liés aux traitements.

Participation volontaire et droit de retrait

Vous êtes libre de participer à ce projet de recherche. Vous pouvez aussi mettre fin à votre participation sans conséquence négative ou préjudice et sans avoir à justifier votre décision. Si vous décidez de mettre fin à votre participation, il est important d'en prévenir le chercheur dont les coordonnées sont incluses dans ce document. Tous les renseignements personnels vous concernant seront alors détruits à moins que vous autorisiez le chercheur à les conserver, ceux-ci se verront conservés selon les mesures décrites ci-après.

Confidentialité et gestion des données

Les chercheurs sont tenus d'assurer la confidentialité aux participants. À cet égard, voici les mesures qui seront appliquées dans le cadre de la présente recherche :

- les noms des participants ne paraîtront dans aucun rapport;
- les divers documents de la recherche seront codifiés et seul le chercheur aura accès à la liste des noms et des codes;
- les résultats individuels des participants ne seront jamais communiqués;
- les matériaux de la recherche, incluant les données, seront conservés sous clefs et seront détruites deux ans après la fin de la recherche - soit en 2027.
- la recherche fera l'objet de publications dans des revues scientifiques, et aucun participant ne pourra y être identifié.

Remerciements

Votre collaboration est précieuse pour nous permettre de réaliser cette étude et nous vous remercions d'y participer.

Signatures

Je soussigné(e) _____ consens librement à participer à la recherche intitulée : « titre complet de la recherche ». J'ai pris connaissance du formulaire et j'ai compris le but, la nature, les avantages, les risques et les inconvénients du projet de recherche. Je suis satisfait(e) des explications, précisions et réponses que le chercheur m'a fournies, le cas échéant, quant à ma participation à ce projet.

_____ _____

Signature du participant, de la participante **Date**

Un résumé des résultats de la recherche sera expédié aux participants qui en feront la demande en indiquant l'adresse où ils aimeraient recevoir le document. Les résultats ne seront pas disponibles avant le _____. Si cette adresse changeait d'ici cette date, vous êtes invité(e) à informer le chercheur de la nouvelle adresse où vous souhaitez recevoir ce document.

L'adresse (électronique ouL'adresse (électronique ou postale) à laquelle je souhaite recevoir un résumé des résultats de la recherche est la suivante :

_____

_____

_____

J'ai expliqué le but, la nature, les avantages, les risques et les inconvénients du projet de recherche au participant. J'ai répondu au meilleur de ma connaissance aux questions posées et j'ai vérifié la compréhension du participant.

_____ _____

Signature du chercheur Date

Renseignements supplémentaires

Si vous avez des questions sur la recherche, sur les implications de votre participation ou si vous souhaitez vous retirer de la recherche, veuillez communiquer avec Charlotte Boivin-Carrier, Chercheur principale, au numéro de téléphone suivant : (514) 831-0301, ou à l'adresse courriel suivante : malepelvicpain@gmail.com.

Vous pouvez aussi communiquer en tout temps avec le directeur scientifique de ENOSI (Diego LEGRAND) à l'adresse : recherche@enosi.ca ou au (514) 430-4966.

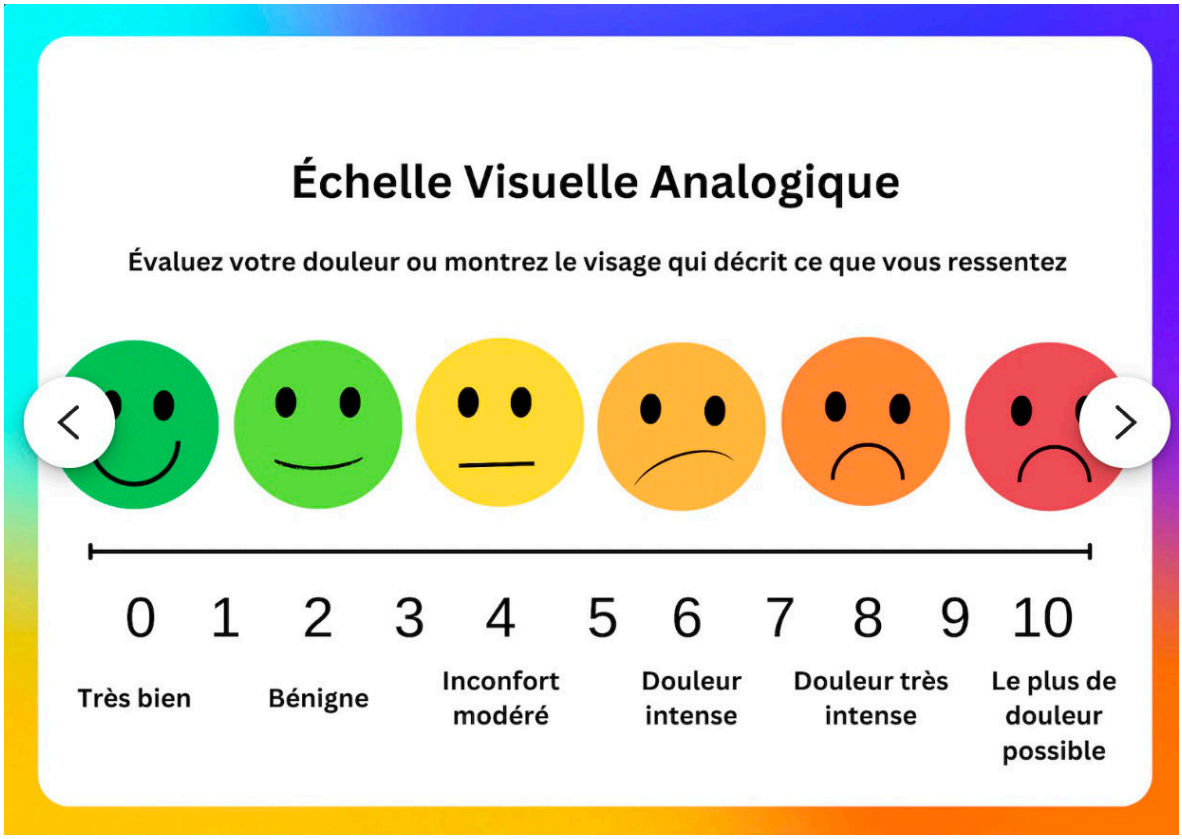
Plaintes ou critiques

Toute plainte ou critique sur ce projet de recherche pourra être adressée au département de recherche de ENOSI : recherche@enosi.ca

Copie du participant

APPENDIX 5: Standardized Questionnaire

5.1 Visual Analogue Scale



5.2 NIH-Chronic Prostatitis Symptom Index (NIH-CPSI)

NIH-Chronic Prostatitis Symptom Index (NIH-CPSI)

Pain or Discomfort

1. In the last week, have you experienced any pain or discomfort in the following areas?

		Yes	No
a.	Area between rectum and testicles (perineum)	❑1	❑0
b.	Testicles	❑1	❑0
c.	Tip of the penis (not related to urination)	❑1	❑0
d.	Below your waist, in your pubic or bladder area	❑1	❑0

2. In the last week, have you experienced:

		Yes	No
a.	Pain or burning during urination?	❑1	❑0
b.	Pain or discomfort during or after sexual climax (ejaculation)?	❑1	❑0

3. How often have you had pain or discomfort in any of these areas over the last week?

- ❑0 Never
- ❑1 Rarely
- ❑2 Sometimes
- ❑3 Often
- ❑4 Usually
- ❑5 Always

4. Which number best describes your AVERAGE pain or discomfort on the days that you had it, over the last week?

❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
0	1	2	3	4	5	6	7	8	9	10
NO PAIN										PAIN AS BAD AS YOU CAN IMAGINE

Urination

5. How often have you had a sensation of not emptying your bladder completely after you finished urinating, over the last week?

6. How often have you had to urinate again less than two hours after you finished urinating, over the last week?

- ❑0 Not at all
- ❑1 Less than 1 time in 5
- ❑2 Less than half the time
- ❑3 About half the time
- ❑4 More than half the time
- ❑5 Almost always

Impact of Symptoms

7. How much have your symptoms kept you from doing the kinds of things you would usually do, over the last week?

- ❑0 None
- ❑1 Only a little
- ❑2 Some
- ❑3 A lot

8. How much did you think about your symptoms, over the last week?

- ❑0 None
- ❑1 Only a little
- ❑2 Some
- ❑3 A lot

Quality of Life

9. If you were to spend the rest of your life with your symptoms just the way they have been during the last week, how would you feel about that?

- ❑0 Delighted
- ❑1 Pleased
- ❑2 Mostly satisfied
- ❑3 Mixed (about equally satisfied and dissatisfied)
- ❑4 Mostly dissatisfied
- ❑5 Unhappy
- ❑6 Terrible

Scoring the NIH-Chronic Prostatitis Symptom Index Domains

5.3 Pain Disability Index

Index de l'incapacité reliée à la douleur

Nom: Date:

Les échelles d'évaluation ci-dessous sont conçues pour mesurer le degré auquel plusieurs aspects de votre vie sont actuellement perturbés par la douleur persistante. Autrement dit, nous voulons savoir à quel point votre douleur vous empêche de faire ce que vous feriez normalement, ou de le faire aussi bien qu'à l'habitude. Répondez à chaque catégorie en indiquant l'impact général de la douleur dans votre vie, et non seulement l'impact lorsque votre douleur est très intense.

Pour chacune des 5 catégories d'activités de vie inscrites, encerclez un chiffre sur l'échelle qui décrit le niveau d'incapacité que vous éprouvez habituellement. Un score de 0 signifie que vous n'avez aucune incapacité et un score de 10 signifie que toutes les activités dans lesquelles vous étiez normalement impliquées ont été totalement perturbées ou entravées par votre douleur.

1. Famille / Responsabilités domestiques: Cette catégorie fait allusion aux activités liées à la maison ou à la famille. Elle inclut les tâches ménagères ou les travaux exécutés autour de la maison (par exemple le jardinage) et des commissions ou les services effectués pour des membres de la famille (par exemple conduire les enfants à l'école).

aucune incapacité 0 1 2 3 4 5 6 7 8 9 10 **incapacité totale**

2. Loisirs: Cette catégorie inclut les passe-temps, le sport et les autres loisirs.

aucune incapacité 0 1 2 3 4 5 6 7 8 9 10 **incapacité totale**

3. Activités sociales: Cette catégorie fait allusion aux activités qui impliquent la participation des amis et des connaissances différents des membres de la famille. La catégorie inclut les fêtes, le théâtre, les concerts, dîner au restaurant ainsi que les autres fonctions sociales.

aucune incapacité 0 1 2 3 4 5 6 7 8 9 10 **incapacité totale**

4. Profession: Cette catégorie fait allusion aux activités qui font partie ou sont directement liées à son travail. Cela inclut aussi des activités non rémunérées comme celui d'un travailleur au foyer ou le bénévolat.

aucune incapacité 0 1 2 3 4 5 6 7 8 9 10 **incapacité totale**

5. Autonomie: Cette catégorie inclut les activités liées à sa capacité de répondre soi-même à ses besoins personnels et à ses soins quotidiens (par exemple se doucher, s'habiller, etc.)

aucune incapacité 0 1 2 3 4 5 6 7 8 9 10 **incapacité totale**

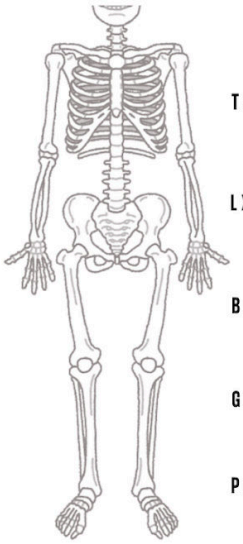
SCORE TOTAL: ____ /50

APPENDIX 6: Clinical Evaluation

6.1 Clinical evaluation Sheet

FICHE CLINIQUE

2. OBSERVATION



TX/K

LX

BASSIN

GENOU

PIED

3. TEST SPECIFIQUES

CRETE ILLIAC

TFD

TFA

GILLET

THOMAS

FABER

TRENDELBURG

4. TEST OSTEO

SC

C7/T1

TX

K

LX

SX

Coccyx

SI

MI

RI

RE

TRACTION

TRACTION

Lig. Inguinal

Diaphragme

5. PALPATION

PALPATION MUSCU

M. TRANS ABDO

M. OBLIQUE INT+ EXT

M. PSOAS

M. ADD

M. PLANCHER PELVIEN

M. OBTURATEUR INT

M. OBTURATEUR EXT

M. PELVITROCH

M. PIRIFORME

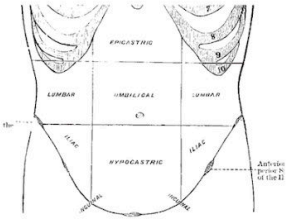
M. ADD

M. GLUTÉAUX

M. CDL

M. PARASPINAIUX

PALPATION ABDO



6.2 Description of Clinical Tests Used in the Evaluation Protocol

Test Name	Patient Position	Examiner Action	Positive Finding / Interpretation	Source
Observation & Regional Assessment				
Postural Observation	Standing	Observe alignment of head, shoulders, spine, pelvis, knees, and feet in frontal and sagittal planes.	Asymmetry, excessive curvatures, pelvic obliquity, valgus/varus knees, or pronation suggesting altered load transfer.	Preece et *al*., 2008
Dynamic Observation				
Iliac Crest Alignment (Seated/Standing)	Seated and standing	Palpate both iliac crests and compare heights in both positions.	Height difference indicating pelvic obliquity or load transfer asymmetry.	Preece et *al*., 2008
Gillet Test	Standing	Examiner palpates PSIS while patient flexes hip and knee on the tested side.	Lack of PSIS movement inferiorly indicates sacroiliac hypomobility.	Laslett et *al*., 2005
Mobility Testing				
Lumbar Spine ROM	Standing	Patient performs flexion, extension, side bending, and rotation while examiner observes movement and pain response.	Pain or restricted segmental movement suggests articular or myofascial dysfunction.	MacDonald et *al*., 2006
Passive Hip ROM	Supine	Examiner moves hip passively in flexion, extension, abduction, adduction, internal/external rotation.	Limitation or pain indicating capsular tightness, muscle shortening, or joint dysfunction.	Reiman et al., 2012
Pain Provocation Tests				
Thomas Test	Supine, one knee to chest	Examiner flexes one hip while observing the contralateral thigh's position.	Thigh lifting off the table indicates tightness of iliopsoas or rectus femoris.	Harvey, 1998
FABER (Patrick's) Test	Supine	Place foot of tested leg on opposite knee (figure-four); press on flexed knee and opposite ASIS.	Pain in anterior hip = hip pathology; posterior SI area pain = sacroiliac dysfunction.	Laslett et *al*., 2005
FADIR Test	Supine	Examiner flexes, adducts, and internally rotates the hip.	Groin pain or reproduction of symptoms suggests femoroacetabular impingement or deep gluteal tension.	Martin et *al*., 2008
Osteopathic Articular Testing				
Segmental Motion Testing (T1-L5, Sacrum, SIJ)	Prone or seated	Assess intersegmental mobility through springing and motion palpation.	Hypomobility or asymmetrical motion indicates somatic dysfunction.	Barral & Mercier, 2005
Osteopathic Myofascial Testing				

Palpation of Thoracolumbar Fascia, Gluteals, Adductors, Pelvic Diaphragm	Prone or supine	Palpate for tone, texture, tenderness, and tissue resistance.	Increased tone, trigger points, or fascial densification indicating myofascial restriction.	Gerwin et *al*., 2004; Chaitow, 2006
Osteopathic Visceral Testing				
Visceral Mobility (Bladder, Prostate, Sigmoid Colon)	Supine	Gentle mobilization assessing organ motility and fascial tension.	Restricted or painful movement reflecting visceral or autonomic dysfunction.	Barral & Mercier, 2005

APPENDIX 7: Treatment

7.1 Osteopathic Techniques Used (AO / WHO Terminology [1])

1. OSTEOARTICULAR

(Articular techniques, mobilization and pumping)

- Vertebral normalization T6-T12
- Normalization of the thoracolumbar junction (T12-L1)
- Vertebral normalization L1-L5
- Lumbosacral decompression L5-S1 (including respiratory-assisted variant)
- Sacral normalization
- Coccygeal normalization
- Pubic symphysis normalization
- Sacroiliac joint normalization
- Hip joint normalization

2. MYOFASCIAL

(Myofascial techniques, tissue release, balanced tension / trigger point approaches)

Muscles and myofascial chains

- Pelvic floor muscles
- Obturator internus
- Obturator externus
- Levator ani
- Piriformis
- Pelvitrochanteric muscles
- Psoas (including lower limb-assisted variant)
- Transversus abdominis

[1] *Terminology aligned with the World Health Organization (WHO) Benchmarks for Training in Osteopathy and internationally accepted osteopathic classifications.*

- Internal oblique
- External oblique
- Adductors
- Quadratus lumborum
- Gluteal muscles
- Quadriceps

Diaphragm and pressure coordination

- Thoracic diaphragm myofascial release
- Diaphragmatic pumping technique
- Release of the diaphragmatic crura
- Harmonization of the **three diaphragms** (thoracic, abdominal, pelvic)

3. VISCERAL - ABDOMEN / PELVIS

(Visceral and visceromotor techniques)

Kidneys

- Technique to correct renal mobility
- Technique to enhance renal motility
- Technique to balance the renal fascial compartments

Digestive system

- Visceral techniques applied to the omentum
- Visceral techniques applied to the sigmoid colon

4. VISCERAL - PELVIC REGION

(Urogenital visceral and visceromyofascial techniques)

Urogenital - General

- Myofascial techniques of the inguinal canal
- Fascial techniques targeting the sacro-recto-genito-vesico-pubic (SRGVP) laminae

Prostate

- Release of the obturator membrane
- Myofascial release of the pelvic floor
- Vasculo-neural stimulation techniques targeting the prostate
- Fascial release techniques of the prostatic fascia
    - including prone-position variant

Bladder

- Stretching of the umbilico-prevesical fascia
- Stretching of the pubovesical ligaments
- Technique to stimulate bladder motility
- Pelvic harmonization technique
- Functional bladder-sacrum coordination

7.2 Examples of pictures shown to participants for education purposes

Figure 7.2A. *Anterior inguinal and femoral cutaneous innervation*

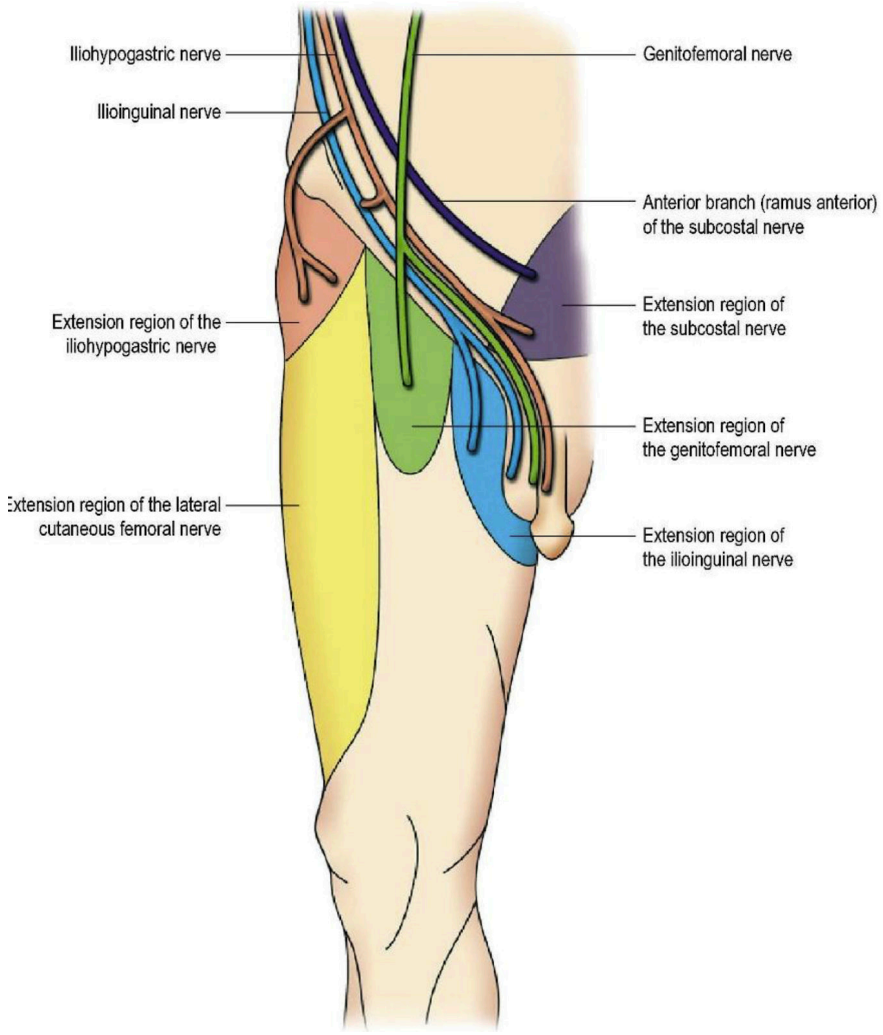
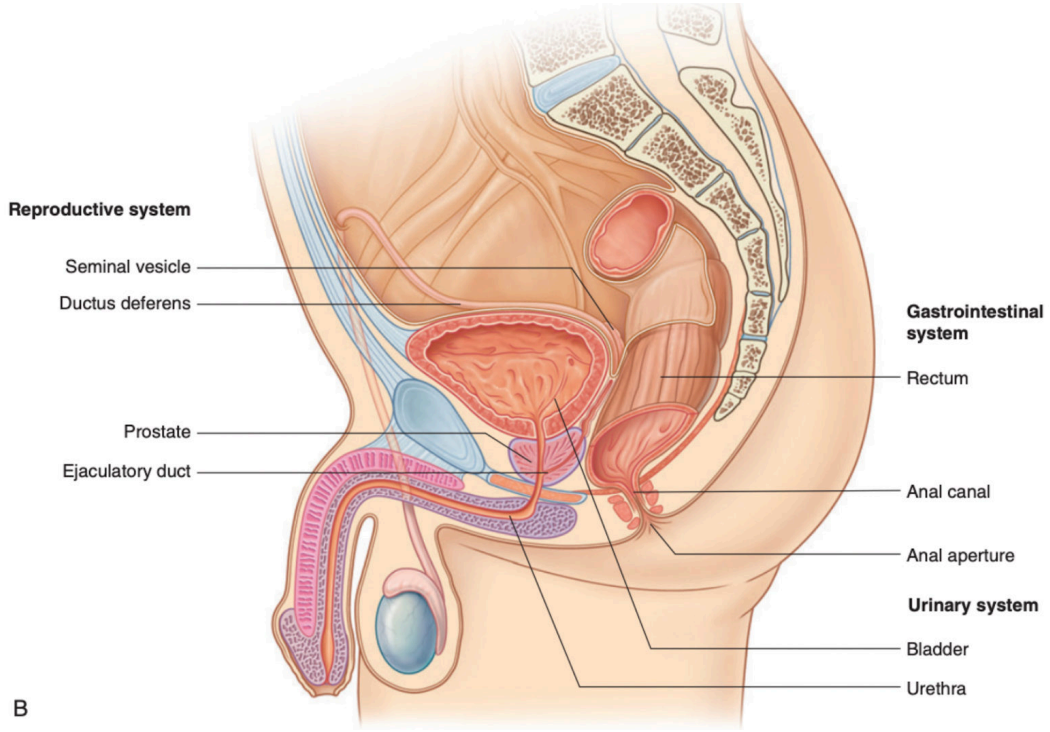


Diagram illustrating the sensory territories of the iliohypogastric, ilioinguinal, genitofemoral, subcostal, and lateral femoral cutaneous nerves in the inguino-pubic and anterior femoral regions.

Adapted from Moore, K. L., Dalley, A. F., & Agur, A. M. R. (2023). Clinically Oriented Anatomy (9th ed.). Wolters Kluwer.

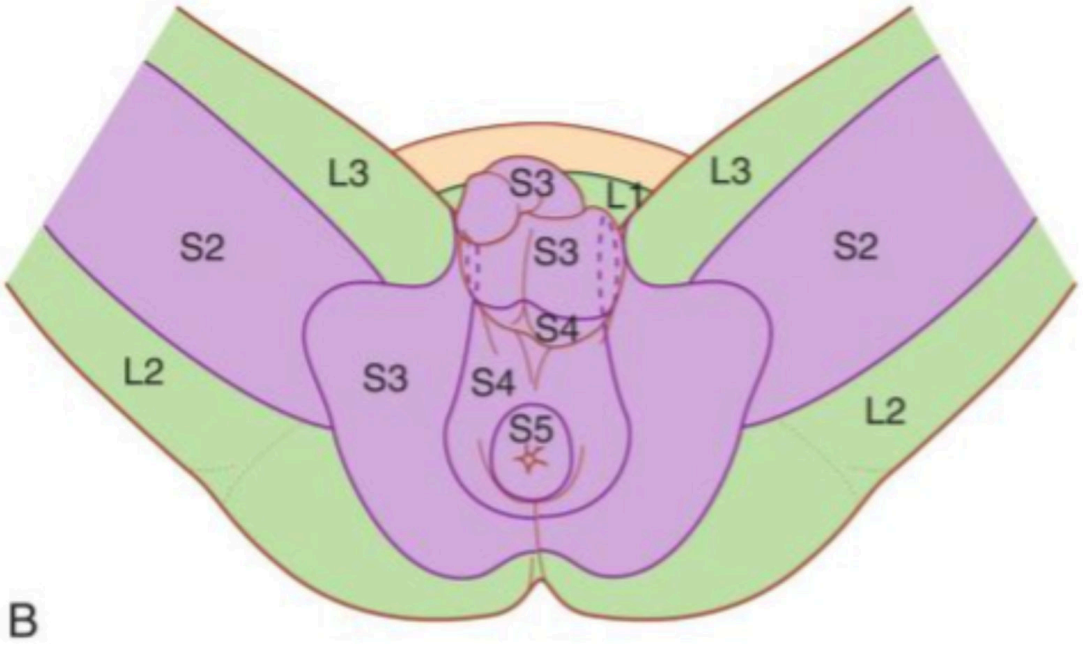
Figure 7.2B. *Sagittal anatomy of the male pelvis (urinary, reproductive, and digestive systems)*



Mid-sagittal section of the male pelvis illustrating the anatomical relationships between the bladder, prostate, urethra, rectum, and genitourinary structures.

From Standring, S. (2021). Gray's Anatomy: The Anatomical Basis of Clinical Practice (42nd ed.). Elsevier.

Figure 7.2C. *Lumbosacral and perineal dermatomal territories*



Schematic representation of lumbosacral (L2-L3) and sacral (S2-S5) dermatomes, including the perineal and anogenital regions.

From Standring, S. (2021). Gray's Anatomy: The Anatomical Basis of Clinical Practice (42nd ed.). Elsevier.

APPENDIX 8: Anatomy of the Male Pelvis

8.1 Orientation and Directional Terms in Human Anatomy

In anatomical science, standardized terminology is employed to describe the orientation and spatial relationships of body structures. The use of anatomical planes and directional terms ensures clarity and consistency in both clinical and academic settings.

Three principal anatomical planes are used to describe sections of the human body (Drake et al., 2019):

- **Frontal (coronal) plane:** divides the body into anterior (front) and posterior (back) parts.
- **Sagittal plane:** oriented perpendicular to the frontal plane, divides the body into right and left portions. When aligned with the midline, it is referred to as the **median sagittal plane**.
- **Transverse (horizontal or axial) plane:** separates the body into superior (upper) and inferior (lower) regions.

Directional terms (see Figure 1) specify the relative position of anatomical structures. These include:

- **Superior (cranial):** toward the head
- **Inferior (caudal):** toward the feet
- **Anterior (ventral):** toward the front
- **Posterior (dorsal):** toward the back
- **Medial:** closer to the midline
- **Lateral:** farther from the midline

Mastery of these terms is essential for the accurate interpretation of anatomical relationships, particularly in complex regions such as the male pelvis, and forms a foundational component of this thesis.

Figure 8.1: The anatomical planes and terms of location and orientation

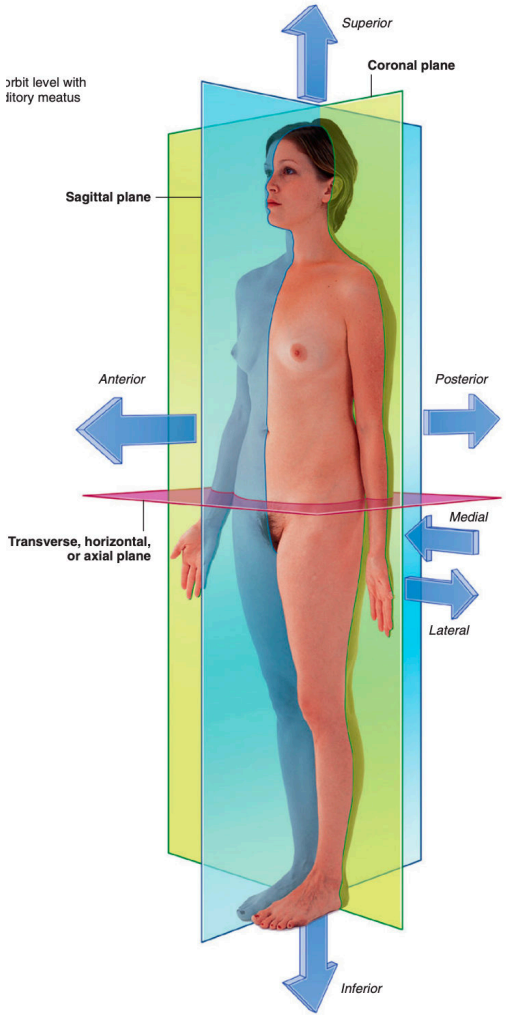


Figure taken from Gray's Anatomy for Students, Edition 4.

8.2 Osteology of the male pelvis

The bony pelvis provides essential structural support and mechanical stability by linking the vertebral column to the lower limbs while enclosing and protecting the pelvic viscera. It is composed of the pelvic girdle-formed by the right and left hip bones (os coxae)-and the pelvic spine, which includes the sacrum and coccyx. Together, these elements form a strong, weight-bearing ring that serves as an attachment site for ligaments, pelvic floor musculature, and lower limb muscles.

hip bones (os coxae)

Each hip bone is formed by the fusion of three embryological components: the ilium, ischium, and pubis. These three bones converge at the acetabulum, a concave socket that articulates with the head of the femur to form the hip joint (*Drake et al., 2019*).

The ilium is the largest and most superior part of the hip bone. It consists of a body, which contributes to the acetabular fossa, and an expanded wing or ala. The superior border of the ala forms the iliac crest, which terminates anteriorly at the anterior superior and anterior inferior iliac spines, and posteriorly at the posterior superior and posterior inferior iliac spines. Inferior to the posterior spines lies the greater sciatic notch. On the medial surface, the iliac fossa provides origin to the iliacus muscle, while the auricular surface articulates with the sacrum at the sacroiliac joint (*Drake et al., 2019*).

The ischium forms the posteroinferior portion of the os coxae. It comprises a body, which also contributes to the acetabulum, and a ramus, which unites with the inferior pubic ramus. A prominent feature of the ischium is the ischial spine, located superior to the ischial tuberosity and separating the greater and lesser sciatic notches. The ischial tuberosity itself is a large, roughened projection that bears body weight in the seated position and serves as an important site of muscular attachment (*Drake et al., 2019*).

The pubis constitutes the anteroinferior part of the hip bone. It consists of a body, a superior ramus, and an inferior ramus. The two pubic bodies join at the midline to form the pubic symphysis, a secondary cartilaginous joint composed of fibrocartilage. The superior aspect of the pubis features the pubic crest and the pubic tubercle, which serve as anatomical landmarks. Together with the ischium, the pubis forms the obturator foramen, a large oval opening that is largely occluded by the obturator membrane. The remaining passage, the obturator canal, allows for the transmission of the obturator nerve and vessels (*Drake et al., 2019*).

The acetabulum is a deep, hemispherical socket formed at the junction of the ilium, ischium, and pubis. It articulates with the femoral head to create the hip joint (articulatio coxae). The acetabular labrum, a fibrocartilaginous rim, enhances joint stability by deepening the cavity while preserving a wide range of motion. Its lateral and anterior orientation supports upright posture and efficient bipedal locomotion (*Drake et al., 2019*).

Figure 8.2A. *Components of the pelvic bone. A. Medial surface. B. Lateral surface.*

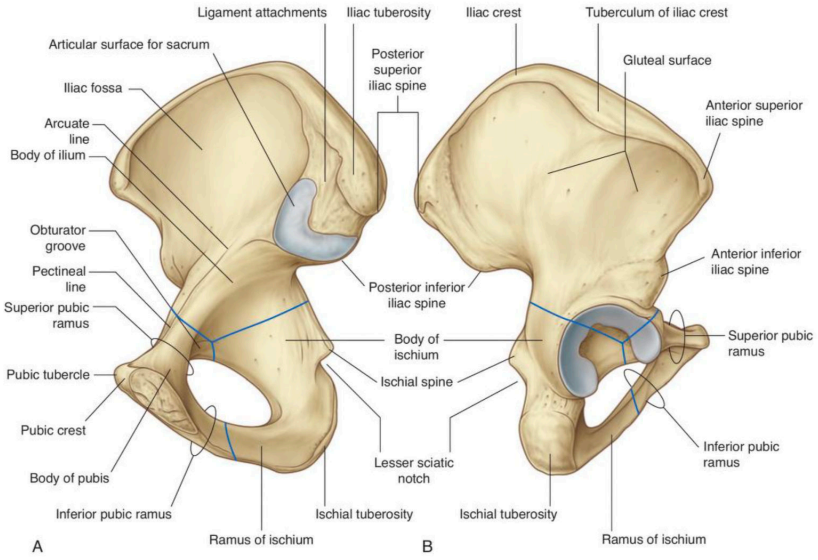


Figure taken from Gray's Anatomy for Students, Edition 4.

Sacrum

Posteriorly, the pelvic spine is formed by the sacrum and coccyx. The sacrum is a triangular bone composed of five fused sacral vertebrae. It articulates superiorly with the fifth lumbar vertebra at the lumbosacral joint and laterally with the iliac bones at the sacroiliac joints. The anterior surface, or pelvic surface, is concave and presents four pairs of anterior sacral foramina through which the anterior rami of the sacral spinal nerves exit. The dorsal surface is convex and marked by the median sacral crest, representing the fused spinous processes. The sacral canal, a continuation of the vertebral canal, terminates at the sacral hiatus. The sacrum transmits the body's weight to the pelvic girdle and plays a key role in pelvic stability (*Drake et al., 2019*).

Figure 8.2B. S*acrum and coccyx. A. Anterior view. B. Posterior view. C. Lateral view*

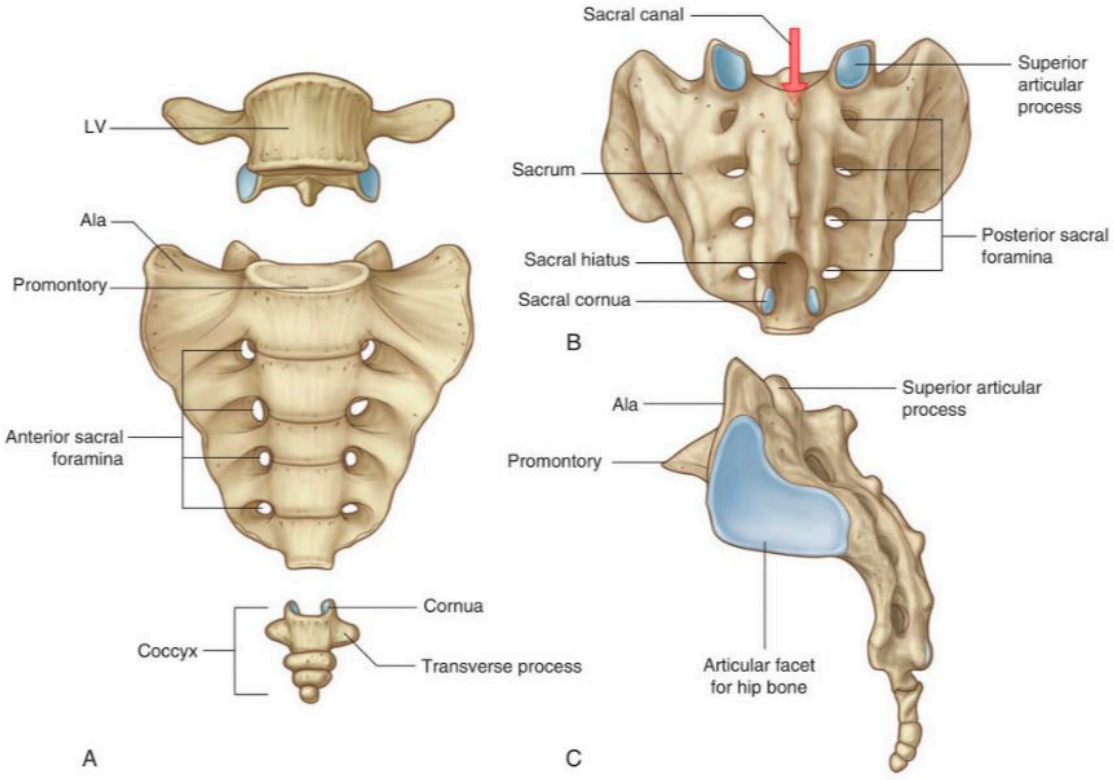


Figure taken from Gray's Anatomy for Students, Edition 4.

Coccyx

The coccyx, or tailbone, is composed of three to five rudimentary vertebrae, typically fused. It articulates with the apex of the sacrum and serves as an attachment site for ligaments and parts of the pelvic floor musculature, such as the coccygeus and levator ani (*Drake et al., 2019*).

Together, the os coxae, sacrum, and coccyx form the osteoligamentous framework of the pelvis, providing mechanical support, transmitting weight, and protecting internal pelvic structures. This osseous foundation also defines key articulations, which are examined in detail in the next section on pelvic arthrology.

8.3 Arthrology of the Male Pelvis

The joints of the male pelvis form a biomechanically cohesive system that ensures the efficient transfer of weight from the axial skeleton to the lower limbs while preserving pelvic stability and permitting essential, albeit limited, mobility. These articulations include both synovial and cartilaginous joints, reinforced by robust ligamentous structures. Together with surrounding musculature, they contribute to posture, locomotion, and visceral support (Drake & All, 2019).

Sacroiliac Joint

The sacroiliac joints are synovial articulations formed between the irregular, L-shaped articular surfaces on the lateral sacrum and corresponding facets of the ilium. These interlocking surfaces resist translational forces and facilitate the transmission of load from the vertebral column to the pelvis. Age-related changes often lead to fibrous transformation or ossification .

Figure 8.3A. *Sacro-iliac joints and associated ligaments. A. Lateral view. B. Anterior view. C. Posterior view*

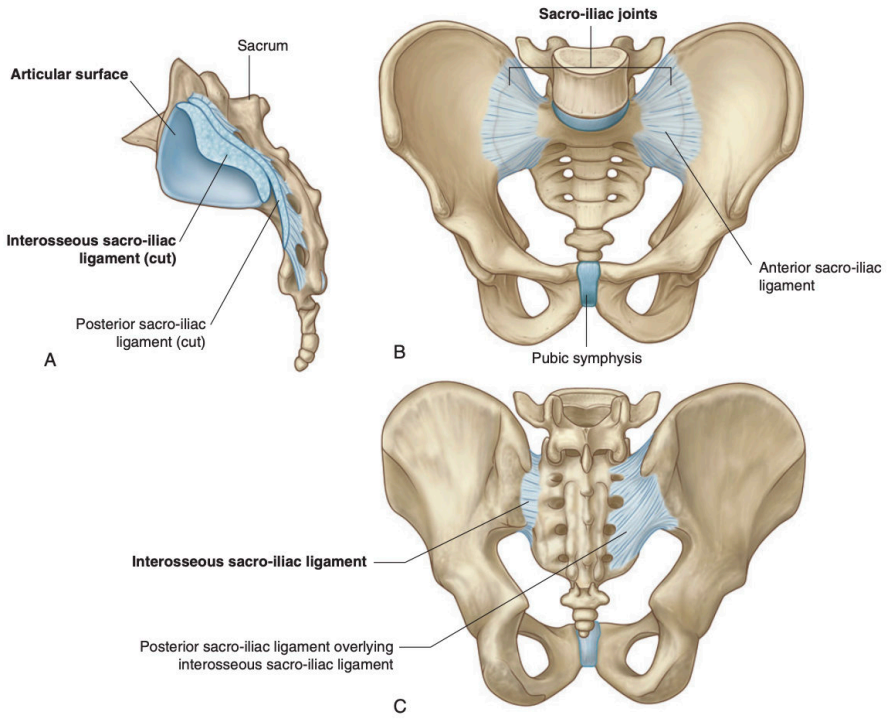


Figure taken from Gray's Anatomy for Students, Edition 4.

Stability of the sacroiliac joint, as represented in figure 5, is primarily maintained by three ligaments: the anterior sacroiliac ligament, a capsular thickening that extends anteroinferiorly; the interosseous sacroiliac ligament, the strongest and most stabilizing, situated posterosuperiorly between the sacrum and ilium; and the posterior sacroiliac ligament, which overlies and reinforces the interosseous ligament (Drake et al., 2019).

Pubic symphysis

The pubic symphysis is a secondary cartilaginous joint located anteriorly between the medial surfaces of the pubic bones. Each surface is covered by hyaline cartilage and joined at the midline by a fibrocartilaginous disc. The joint is reinforced superiorly and inferiorly by the superior

and inferior pubic ligaments, respectively, and is a critical stabilizer of the anterior pelvic ring (Drake et al., 2019).

Figure 8.3B: Pubic symphysis and associated ligaments (p.440)

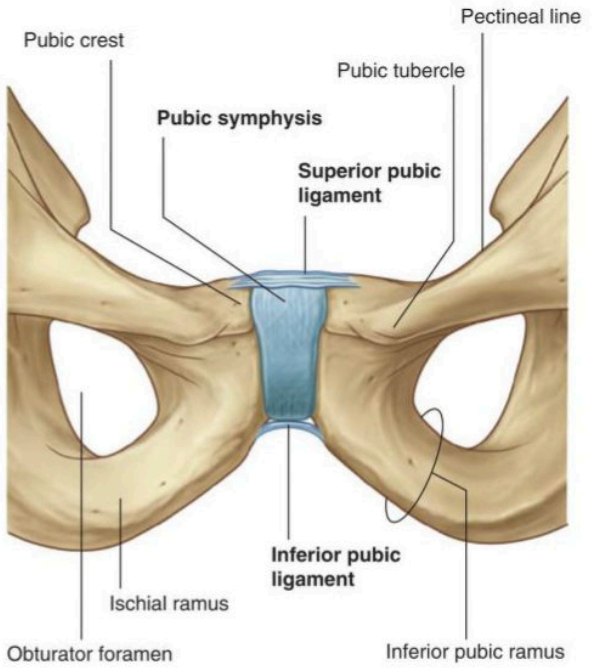


Figure taken from Gray's Anatomy for Students, Edition 4.

Sacrococcygeal Joint

Inferiorly, the sacrococcygeal joint connects the sacrum's apex to the base of the coccyx. Classified as a cartilaginous symphysis, this joint allows minor movement, particularly in youth, before it commonly ossifies with age. It is stabilized by anterior, posterior, and lateral sacrococcygeal ligaments and plays a modest role in defecation and pelvic floor dynamics (Drake et al., 2020).

Lumbosacral Joint

The lumbosacral joint articulates the sacrum with the fifth lumbar vertebra. It comprises a pair of zygapophysial joints between the articular processes and an intervertebral disc between the vertebral bodies of L5 and S1. The disc is thicker anteriorly due to the posterior inclination of the sacrum. Stability is enhanced by the iliolumbar and lumbosacral ligaments, which anchor the transverse processes of L5 to the ilium and sacrum (Drake et al., 2019, p. 438).

Figure 8.3C: Lumbosacral joints and associated ligaments. A. Lateral view. B. Anterior view (p.438)

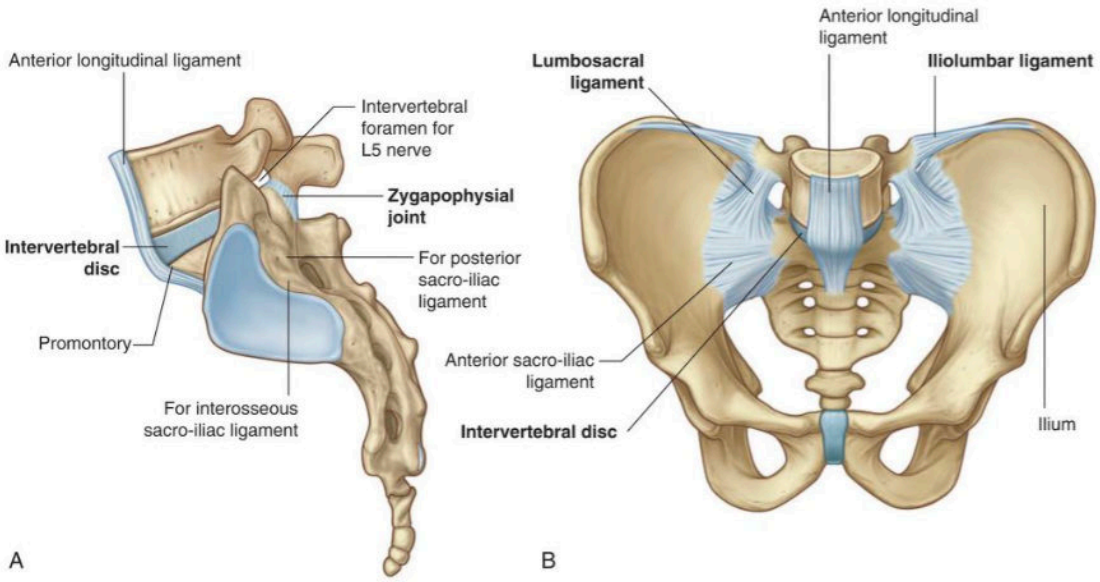


Figure taken from Gray's Anatomy for Students, Edition 4.

Hip Joint

Although not contained within the pelvic cavity, the hip joints (articulationes coxae) are functionally integral to pelvic biomechanics. These synovial ball-and-socket joints connect the femoral heads with the acetabula and are stabilized by the iliofemoral, pubofemoral, and

ischiofemoral ligaments, in addition to the ligamentum teres, which transmits a branch of the obturator artery to the femoral head (Drake et al., 2019).

Figure 8.3D: Fibrous membrane and ligaments of the hip joint. **A.** Fibrous membrane of the joint capsule. Anterior view. **B**. Iliofemoral and pubofemoral ligaments. Anterior view. **C**. Ischiofemoral ligament. Posterior view.

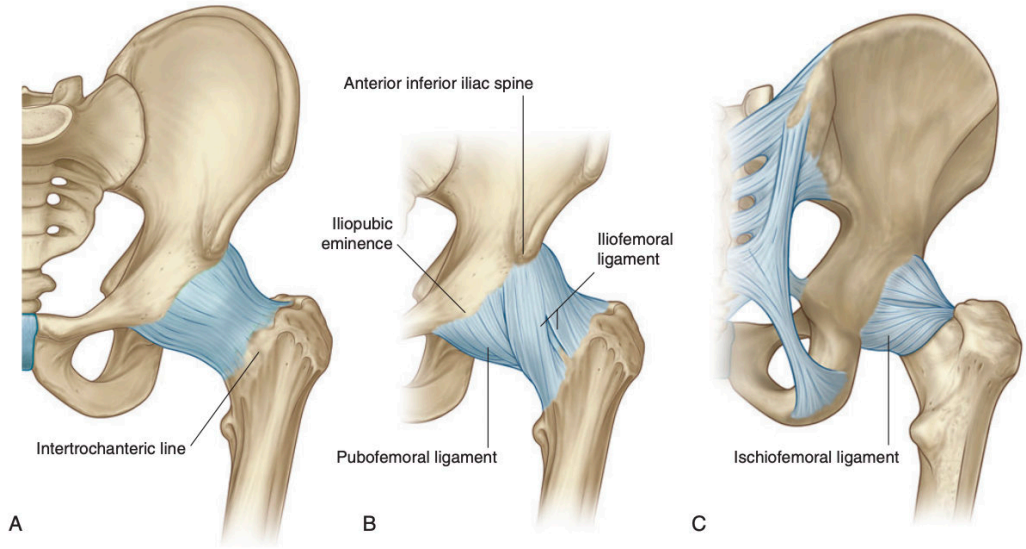


Figure taken from Gray's Anatomy for Students, Edition 4.

Taken together, these pelvic articulations form an integrated system of load-bearing and movement regulation. They are central not only to musculoskeletal mechanics, but also to the stability of the visceral systems they support.

8.4 Topographic Relationships and Communications of the Male Pelvis

Building on the structural overview of the pelvic and perineal regions, this section examines the anatomical relationships that connect the pelvis and perineum with adjacent regions, namely, the abdomen, lower limbs, and gluteal region, via defined apertures and fascial planes. These communications are essential for the passage of visceral, vascular, and neural structures that integrate pelvic and perineal functions with broader systemic physiology (Drake et *al*., 2019).

Superiorly, the pelvic cavity is continuous with the abdominal cavity at the level of the pelvic inlet. In males, the ductus deferens traverses the anterior abdominal wall and crosses the inlet to enter the true pelvis. The sigmoid colon and ureters also descend through this boundary into the pelvic cavity. In females, ovarian vessels, nerves, and lymphatics pass through the inlet to reach the ovaries, which lie just inferior to its level (Drake et *al*., 2019).

Inferiorly, the pelvis communicates with the perineum through a narrow fascial gap between the pubic symphysis and the perineal membrane. This opening transmits structures such as the deep dorsal vein of the penis, along with other neurovascular elements involved in perineal function (Drake et *al*., 2019).

Laterally, three apertures within each pelvic wall establish critical communications with the lower limb and gluteal region. The obturator canal, situated in the superior portion of the obturator foramen, transmits the obturator nerve and vessels to the medial thigh. The greater sciatic foramen, formed by the greater sciatic notch and sacrospinous ligament, allows passage of the sciatic nerve, pudendal nerve, internal pudendal vessels, and the piriformis muscle into the gluteal region. Inferior to this, the lesser sciatic foramen provides reentry into the perineum for the pudendal neurovascular bundle (Drake et *al*., 2019).

Figure 8.4A: Areas of communication between the pelvis and other regions

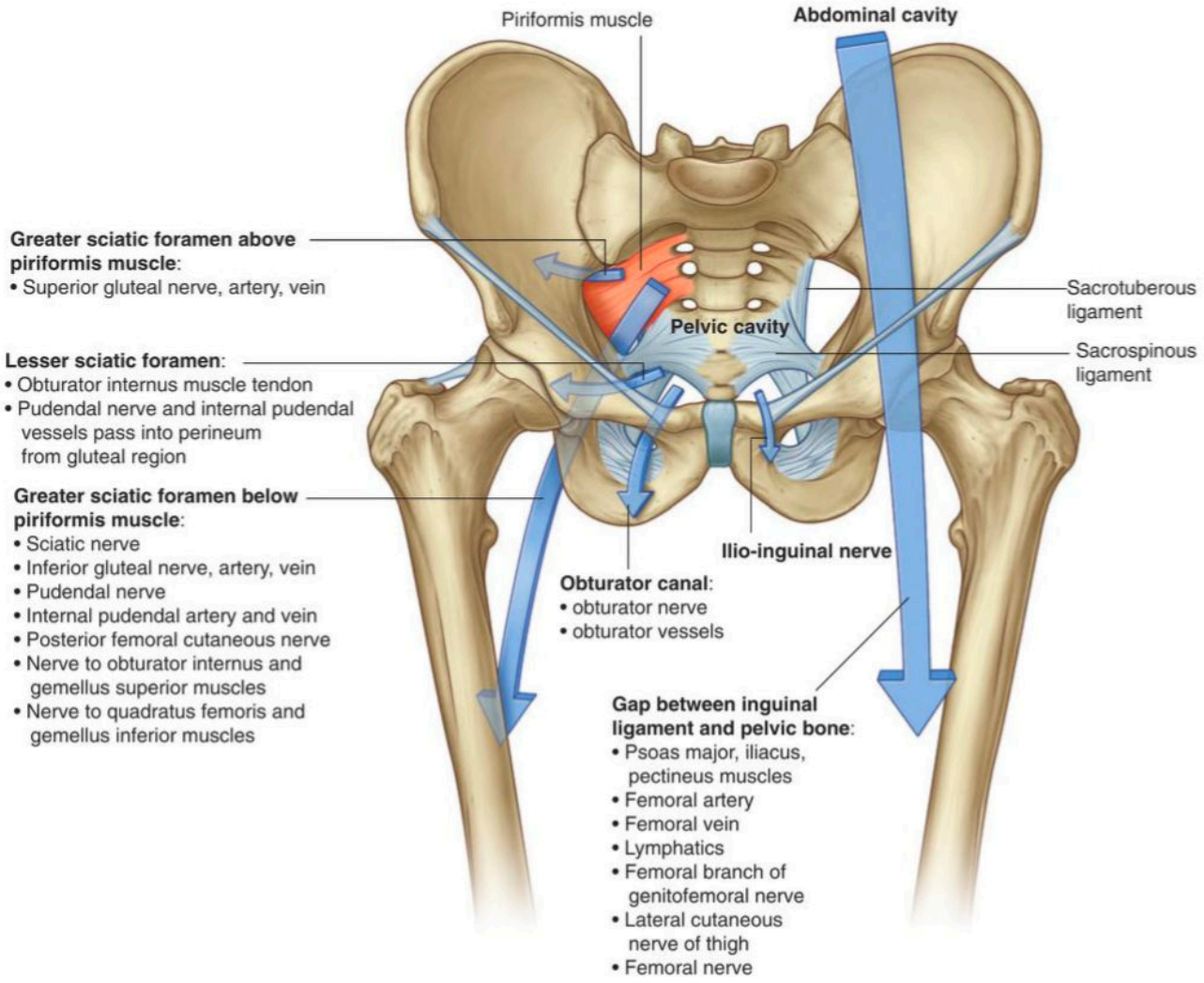


Figure taken from Gray's Anatomy for Students, Edition 4.

The perineum, located inferior to the pelvic floor, maintains additional direct anatomical connections. Posteriorly, it is continuous with the anal canal and associated musculature, while

anteriorly it transitions into the urogenital triangle, which contains erectile tissues, the distal urethra, and perineal muscles. These structures are supported by neurovascular supply originating from within the pelvis (Drake et *al*., 2019).

Figure 8.4B: Areas of communication between the perineum and other regions.

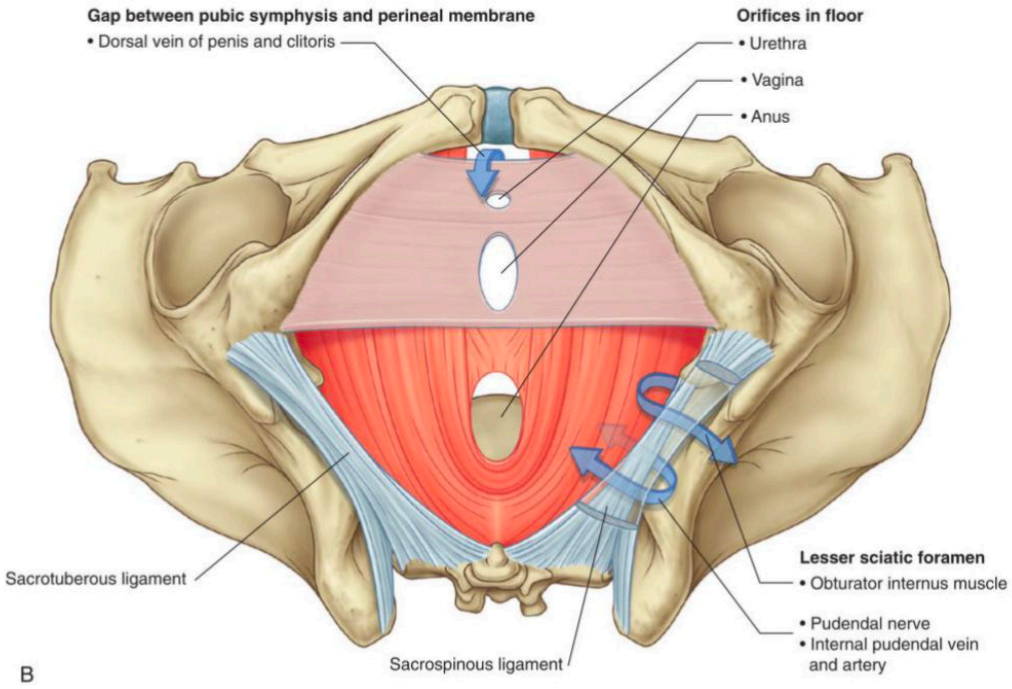


Figure taken from Gray's Anatomy for Students, Edition 4.

Together, these anatomical relationships allow the pelvis and perineum to function as integrated conduits linking the trunk, lower limbs, and perineal structures. This organization supports essential roles in locomotion, reproduction, excretion, and neurovascular integration (Drake et *al*., 2019).

8.5 Myology of the Male Pelvis

The myology of the male pelvis can be categorized into four principal muscle groups: (1) the pelvic wall, which forms the lateral and posterior boundaries of the pelvic cavity; (2) the pelvic diaphragm, which composes the muscular floor and supports visceral structures; (3) the perineum, located inferior to the diaphragm and comprising superficial and deep muscle layers; and (4) hip-associated muscles that anatomically and functionally link the pelvis with the trunk and lower limbs. These muscle groups are critical to pelvic stabilization, postural alignment, intra-abdominal pressure regulation, continence, and visceral support (Drake et *al*., 2019; Moore et *al*., 2018).

Pelvic Wall Muscles

The pelvic wall includes the obturator internus and piriformis, which originate within the pelvis and insert on the greater trochanter of the femur. The obturator internus arises from the internal obturator membrane and surrounding bone, exits via the lesser sciatic foramen, and contributes to the anterolateral pelvic wall. The piriformis originates from the anterior sacrum, passes through the greater sciatic foramen, and forms a major component of the posterolateral wall. Both muscles facilitate hip stability and transmit neurovascular structures through the sciatic foramina (Drake et *al*., 2019).

Table X provides a detailed anatomical overview of the pelvic wall muscles in males, including each muscle's origin, fiber direction, termination, functional role, innervation, vascular supply, and fascial relationships.

Table 8.5A

Pelvic Wall Muscles in Males

Muscle	Origin	Traject & Fiber Direction	Termination	Action	Innervation	Vascularisation
Obturator internus	Internal surface of obturator membrane and adjacent pelvic bones	Passes posteriorly and laterally through the lesser sciatic foramen; fibers run anterolateral to posterolateral	Medial surface of greater trochanter of femur	Laterally rotates the thigh; stabilizes the femoral head in the acetabulum	Nerve to obturator internus (L5-S2)	Obturator artery and internal pudendal artery
Piriformis	Anterior surface of sacrum (S2-S4)	Passes laterally through the greater sciatic foramen; fibers run anteromedial to posterolateral	Superior border of the greater trochanter of femur	Laterally rotates and abducts the thigh; stabilizes the hip joint	Nerve to piriformis (S1-S2)	Superior and inferior gluteal arteries

Figure 8.5A: Pelvic Wall Muscles

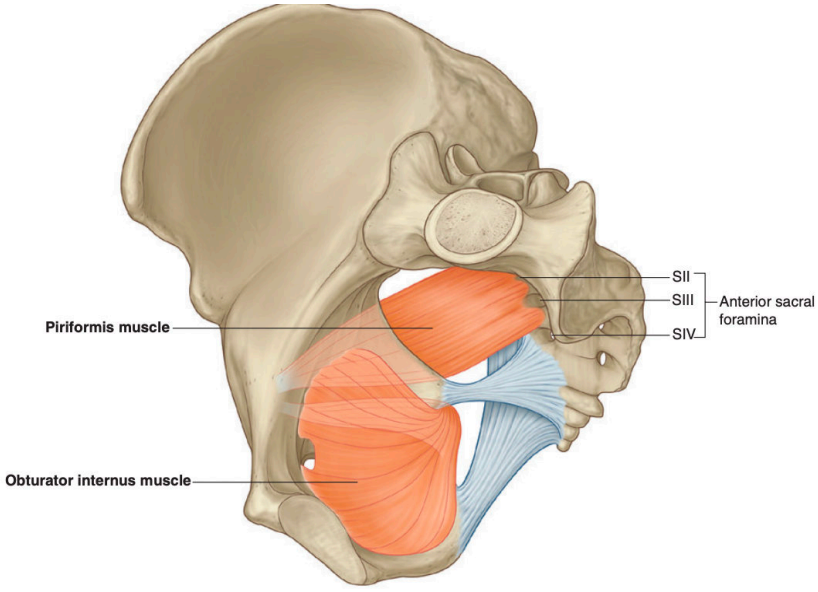


Table and Figure taken from Gray's Anatomy for Students, Edition 4.

Pelvic Diaphragm

The pelvic diaphragm, or muscular pelvic floor, is primarily composed of the levator ani group-puborectalis, pubococcygeus, and iliococcygeus-along with the coccygeus (ischiococcygeus). These muscles originate from the inner pelvic walls and insert into the coccyx, anococcygeal ligament, and perineal body. The diaphragm supports pelvic viscera, maintains continence, and modulates intra-abdominal pressure during physical activity (Moore et *al*., 2018).

Table 8.5B summarizes the descriptive anatomy of the pelvic diaphragm muscles, including their origin, fiber direction, termination, action, innervation, vascularization, and fascial relationships.

Table 8.5B

Pelvic Diaphragm Muscles in Males

Muscle	Origin	Traject & Fiber Direction	Termination	Action	Innervation	Vascularisation
Puborectalis	Posterior surface of the pubic body	Forms a U-shaped sling around the anorectal junction; fibers run medially and posteriorly	Joins with contralateral fibers to form a sling at the posterior rectum	Maintains anorectal angle; critical for fecal continence	Nerve to levator ani (S3-S4), pudendal nerve (S2-S4)	Inferior gluteal artery, internal pudendal artery
Pubococcygeus	Posterior surface of the pubis and anterior part of obturator fascia	Runs posteriorly and medially toward coccyx	Coccyx and anococcygeal ligament	Supports pelvic viscera; reinforces sphincters	Nerve to levator ani (S3-S4)	Inferior gluteal artery, internal pudendal artery
Iliococcygeus	Tendinous arch of levator ani and ischial spine	Passes posteriorly and medially	Anococcygeal body and coccyx	Elevates the pelvic floor; supports viscera	Nerve to levator ani (S3-S4)	Inferior gluteal artery, internal pudendal artery
Coccygeus (Ischiococcygeus)	Ischial spine	Courses medially and posteriorly over sacrospinous ligament	Lateral borders of the lower sacrum and coccyx	Stabilizes sacrum and coccyx; supports pelvic floor	Spinal nerves S4-S5	Inferior gluteal artery

Table adapted from Gray's Anatomy for Students, Edition 4.

Figure 8.5B: Pelvic diaphragm

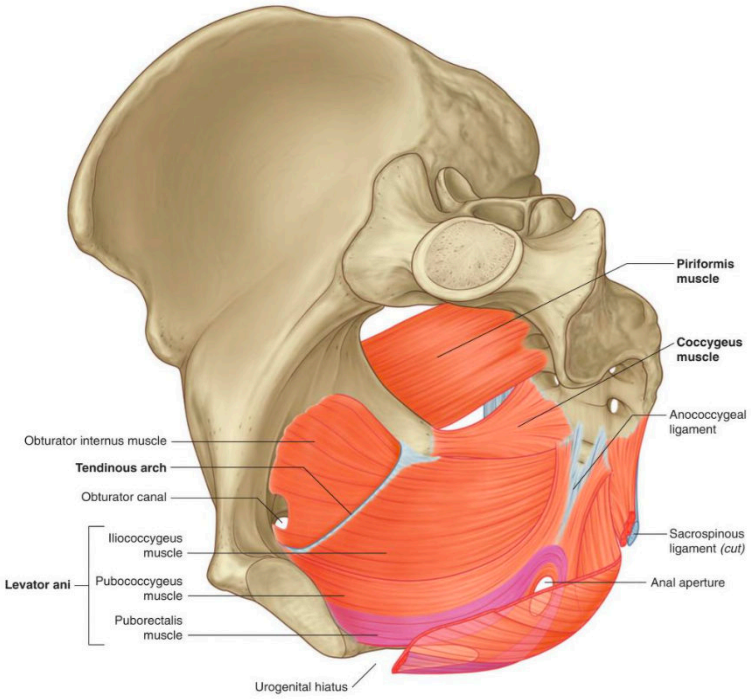


Figure taken from Gray's Anatomy for Students, Edition 4.

Perineum Muscles

The muscles of the perineum are organized into deep and superficial layers, arranged around the urogenital and anal triangles, and located inferior to the pelvic diaphragm.

The deep perineal muscles, situated within the deep perineal pouch above the perineal membrane, include the external urethral sphincter, which surrounds the membranous urethra and maintains voluntary urinary continence, and portions of the deep transverse perineal muscle, which stabilize the perineal body and pelvic floor. These muscles contribute to urogenital support and are innervated by branches of the pudendal nerve (Drake and *al., 2019*).

Figure 8.5C. Deep Perineal Muscles

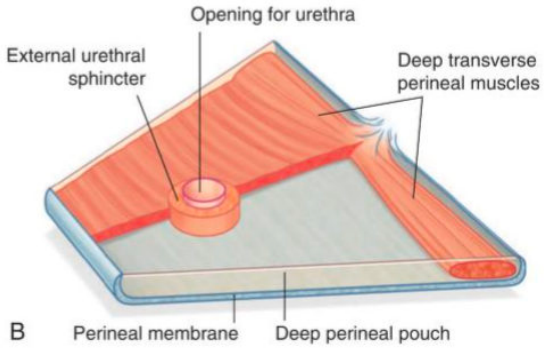


Figure taken from Gray's Anatomy for Students, Edition 4.

The superficial perineal muscles, located in the superficial perineal pouch, include the ischiocavernosus, which compresses the crura of the corpora cavernosa to support erection; the bulbospongiosus, which compresses the corpus spongiosum to assist in erection, ejaculation, and urine expulsion; and the superficial transverse perineal muscles, which stabilize the perineal body (Drake et *al.,* 2019).

Figure 8.5D: Muscles in the superficial perineal pouch in men

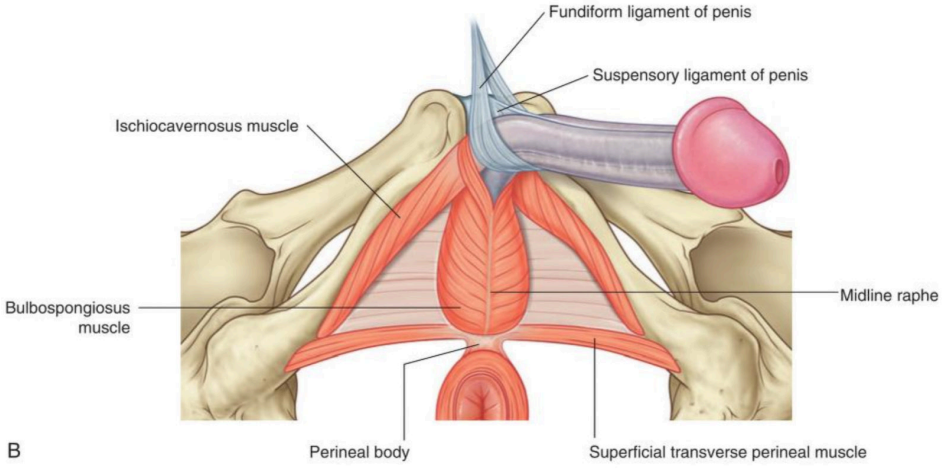


Figure taken from Gray's Anatomy for Students, Edition 4.

Table 8.5C

Perineal Muscles in Males

Muscle	Origin	Traject & Fiber Direction	Termination	Action	Innervation	Vascularisation
Bulbospongiosus	Perineal body and midline raphe	Encircles bulb of penis and extends anteriorly	Perineal membrane and corpus spongiosum	Compresses bulb of penis, assists in erection and emptying of urethra	Pudendal nerve (S2-S4)	Perineal branches of internal pudendal artery
Ischiocavernosus	Ischial tuberosity and ischiopubic ramus	Covers crus of penis, fibers run anteromedially	Tunica albuginea and crus of penis	Compresses crus to maintain erection	Pudendal nerve (S2-S4)	Perineal branches of internal pudendal artery
Superficial transverse perineal	Ischial tuberosity	Runs medially across posterior part of perineum	Perineal body	Stabilizes perineal body	Pudendal nerve (S2-S4)	Perineal branches of internal pudendal artery
External urethral sphincter	Perineal membrane around membranous urethra	Encircles membranous urethra	Fuses with contralateral muscle fibers	Voluntary control of urination	Pudendal nerve (S2-S4)	Deep branches of internal pudendal artery
Deep transverse perineal	Ischial ramus	Runs medially beneath the perineal membrane	Perineal body	Stabilizes the perineal body and supports pelvic floor	Pudendal nerve (S2-S4)	Deep branches of internal pudendal artery

Table adapted from Gray's Anatomy for Students, Edition 4.

Hip Muscles

In addition to the intrinsic musculature of the pelvic floor and wall, the hip bone (os coxae) provides extensive attachment surfaces for muscles originating from or inserting onto the ilium, ischium, and pubis. These muscles span across the pelvis and connect it to the femur, spine, and thorax.

<u>Pelvitrochanteric Muscles</u>

Situated deep in the gluteal region, these muscles originate from the pelvis and insert onto the greater trochanter or intertrochanteric region of the femur. They include the Piriformis, obturator internus (both of which are already described in the subsection pelvic wall), obturator externus, superior gemellus, inferior gemellus and quadratus femoris.

Gluteal Muscles

These muscles arise from the gluteal surface of the ilium and insert onto the femur:

- The **Gluteus maximus** originates from the posterior gluteal line of the ilium, sacrum, and coccyx; inserts on the iliotibial tract and gluteal tuberosity.
- **Gluteus medius** originates between the anterior and posterior gluteal lines; inserts on the lateral surface of the greater trochanter.
- **Gluteus minimus** originates between the anterior and inferior gluteal lines; inserts on the anterior surface of the greater trochanter.

Anterior Hip and Iliopsoas Region

- **Psoas major** originates from the transverse processes and lateral aspects of the bodies of T12 to L5 vertebrae; joins with the **iliacus**, which arises from the iliac fossa; both insert via a common tendon onto the lesser trochanter
- **Psoas minor** (when present) originates from T12-L1 vertebral bodies and inserts into the iliopubic eminence.
- **Iliocapsularis** originates from the anterior inferior iliac spine and inserts on the femoral neck capsule.
- **Rectus femoris** arises from the anterior inferior iliac spine and acetabular rim; inserts into the patellar tendon.
- **Vastus medialis** and **vastus lateralis** originate from the linea aspera and insert into the quadriceps tendon.

- **Sartorius** arises from the anterior superior iliac spine and inserts on the pes anserinus of the tibia.

Medial (Adductor) Group

These muscles originate from the pubis and ischium and insert along the femur's medial aspect:

- **Adductor longus** from the body of the pubis to the middle third of the linea aspera.
- **Adductor brevis** from the inferior pubic ramus to the proximal linea aspera.
- **Adductor magnus** has an adductor part from the ischiopubic ramus to the linea aspera and a hamstring part from the ischial tuberosity to the adductor tubercle.
- **Gracilis** arises from the inferior pubic ramus and inserts on the medial tibia.
- **Pectineus** arises from the pectineal line of the pubis and inserts on the pectineal line of the femur.

Posterior (Ischiocrural / Hamstring) Group

These muscles arise from the ischial tuberosity and extend down the posterior thigh:

- **Semitendinosus** inserts on the medial surface of the tibia.
- **Semimembranosus** inserts on the posterior medial condyle of the tibia.
- **Biceps femoris (long head)** inserts on the head of the fibula; the short head arises from the femoral shaft.

Abdominal Wall Muscles

- **External oblique** arises from the external surfaces of the lower eight ribs and inserts on the iliac crest and linea alba.
- **Internal oblique** originates from the thoracolumbar fascia, iliac crest, and inguinal ligament; inserts on the ribs and linea alba.

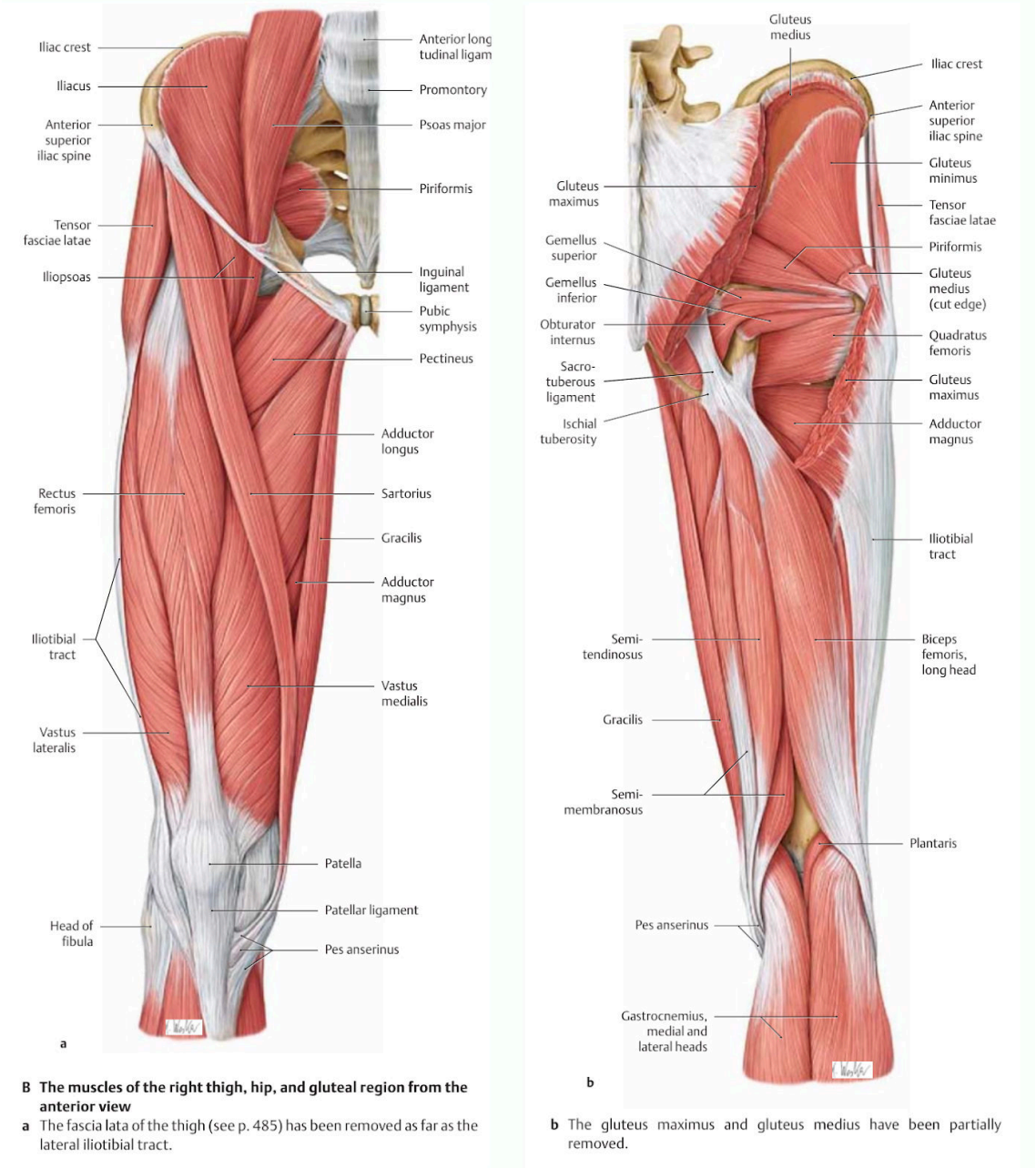
- **Transversus abdominis** originates from the costal cartilages, thoracolumbar fascia, iliac crest, and inguinal ligament; inserts on the linea alba and pubic crest.

Posterior Abdominal Wall and Trunk Muscles

- **Quadratus lumborum** arises from the iliac crest and iliolumbar ligament; inserts on the 12th rib and transverse processes of L1-L4.
- **Latissimus dorsi** originates from the spinous processes of T7-L5, thoracolumbar fascia, iliac crest, and lower ribs; inserts on the intertubercular sulcus of the humerus.
- **Trapezius** arises from the occipital bone, nuchal ligament, and spinous processes of C7-T12; inserts on the clavicle, acromion, and scapular spine.

Together, these muscles form a myofascial link between the trunk, pelvis, and lower limbs. Their coordinated function ensures pelvic alignment, lumbopelvic rhythm, and dynamic stability. Dysfunction can lead to pelvic instability, postural issues, and chronic pain, making them essential to any anatomical study of the male pelvis.

Figure 8.5D: Muscles of the Hip



B The muscles of the right thigh, hip, and gluteal region from the anterior view

a The fascia lata of the thigh (see p. 485) has been removed as far as the lateral iliotibial tract.

b The gluteus maximus and gluteus medius have been partially removed.

Figure taken from Gray's Anatomy for Students, Edition 4.

8.6 Viscera of the Male Pelvis

The viscera of the male pelvis are aligned along an anteroposterior axis and comprise components of the urinary, reproductive, and gastrointestinal systems. These organs are embedded within fascial compartments and receive their vascular and neural supply from branches arising along the pelvic walls (Standring, 2020).

Urinary System

Bladder

The urinary bladder is a distensible musculomembranous organ situated posterior to the pubic symphysis and anterior to the rectum. Its apex continues as the urachus toward the anterior abdominal wall, while its base rests on the prostate. Stabilization is provided by the visceral pelvic fascia, puboprostatic ligaments, lateral vesical ligaments, and the urachus. Anteriorly, the retropubic space separates the bladder from the pubic bones.

Ureters

The ureters are retroperitoneal muscular tubes that convey urine from the kidneys to the bladder. Each crosses the pelvic brim anterior to the common iliac artery and descends to enter the bladder obliquely at the ureterovesical junction. In males, the ureter passes posterior to the ductus deferens and superior to the seminal vesicles.

Urethra

The male urethra, measuring 18-20 cm, is a fibromuscular conduit serving both urinary and reproductive functions. It comprises four segments: preprostatic, prostatic, membranous, and spongy. It begins at the bladder neck, traverses the prostate (receiving the ejaculatory ducts), passes through the deep perineal pouch within the external urethral sphincter, and continues through the corpus spongiosum to terminate at the external urethral meatus.

Reproductive System

The pelvic reproductive organs include the epididymis, ductus deferens, seminal vesicles, ejaculatory ducts, prostate, and bulbo-urethral glands. The epididymis, attached to the posterolateral testis, stores and matures sperm. The ductus deferens ascends in the spermatic cord, passes through the inguinal canal, and crosses the external iliac vessels to reach the base of the bladder, where it joins the seminal vesicle duct to form the ejaculatory duct. These ducts traverse the prostate to empty into the prostatic urethra. The paired bulbo-urethral glands, located in the deep perineal pouch, open into the proximal spongy urethra.

Prostate

The prostate is a fibromuscular gland encasing the prostatic urethra, located inferior to the bladder and superior to the perineal membrane. Its base is continuous with the bladder neck, and its apex rests on the perineal membrane. The gland is enclosed by a fibrous capsule and the visceral endopelvic fascia, anchored anteriorly by the puboprostatic ligaments and separated posteriorly from the rectum by Denonvilliers' fascia.

Gastrointestinal System

Rectum

The rectum extends from the sigmoid colon at S3 to the anal canal, following the curvature of the sacrum and coccyx. It lies anterior to the sacrum (separated by presacral fascia) and posterior to the bladder, seminal vesicles, and prostate (separated by Denonvilliers' fascia). The rectum is characterized by three transverse rectal folds and a terminal dilation, the rectal ampulla. Inferiorly, it is supported by the puborectalis muscle, which maintains the anorectal angle.

Anal Canal

The anal canal measures 2.5-4 cm and extends from the rectoanal junction to the anal verge. It passes through the pelvic diaphragm and is divided by the pectinate line into visceral and somatic zones. It is surrounded by the internal anal sphincter (smooth muscle) and the external

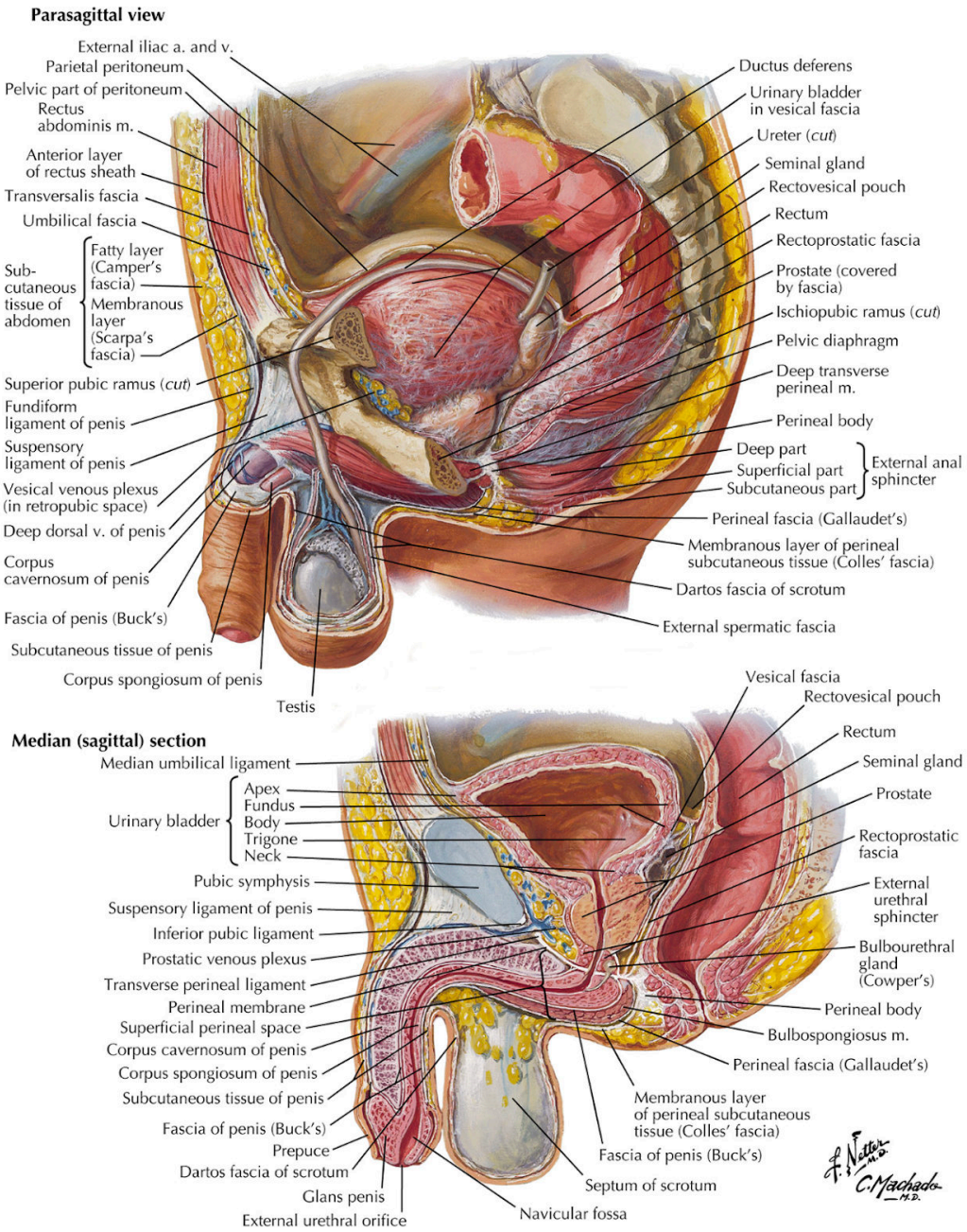
anal sphincter (skeletal muscle). The puborectalis sling further reinforces continence by maintaining the anorectal angle.

Anus

The anus is the terminal opening of the gastrointestinal tract, located posterior to the perineal body and anterior to the coccyx. It is encircled by the terminal portions of the anal sphincters and stabilized by the pelvic floor musculature.

Figure 8.6 represents the main pelvic organs by system, highlighting their attachments, functions, innervation, and vascularization. It offers a concise overview of their anatomical and functional integration within the male pelvis.

Figure 8.6: Visceras of the Male pelvis



8.7 Fascial Architecture of the Male Pelvis

The fasciae of the male pelvis form a continuous connective tissue system that ensures support, compartmentalization, and neurovascular protection. They are classically divided into superficial, parietal, visceral, endopelvic, and peritoneal fasciae, which together create structural and surgical planes while integrating pelvic walls and viscera into a functional continuum.

1. Superficial Fascia

The most external fascial coverings are derived from the anterior abdominal wall. The superficial perineal fascia consists of two layers: a fatty layer (Camper's fascia) and a membranous layer (Colles' fascia). Camper's fascia continues into the scrotum as the dartos fascia, which contains smooth muscle fibers responsible for scrotal wrinkling and thermoregulation. Colles' fascia is continuous with Scarpa's fascia of the anterior abdominal wall and the superficial penile fascia, and it envelops the scrotum and perineum. Posteriorly, Colles' fascia fuses with the perineal membrane, creating a closed compartment for the superficial perineal pouch (Figure 8.8A).

Beneath these layers, the deep penile fascia (Buck's fascia) envelops the corpora cavernosa and corpus spongiosum, enclosing the deep dorsal vein, arteries, and nerves of the penis. Together with the perineal membrane (deep perineal fascia), Buck's fascia maintains penile structural integrity and channels neurovascular elements to the genitalia. Clinically, the arrangement of superficial and deep fasciae is significant: the fusion of Colles' fascia with the perineal membrane restricts the posterior spread of urine or blood following urethral rupture, though fluids may extend into the scrotum, penis, and lower abdominal wall (Standring, 2016).

Figure 8.8A: *Superficial fascia in the male perineum.*

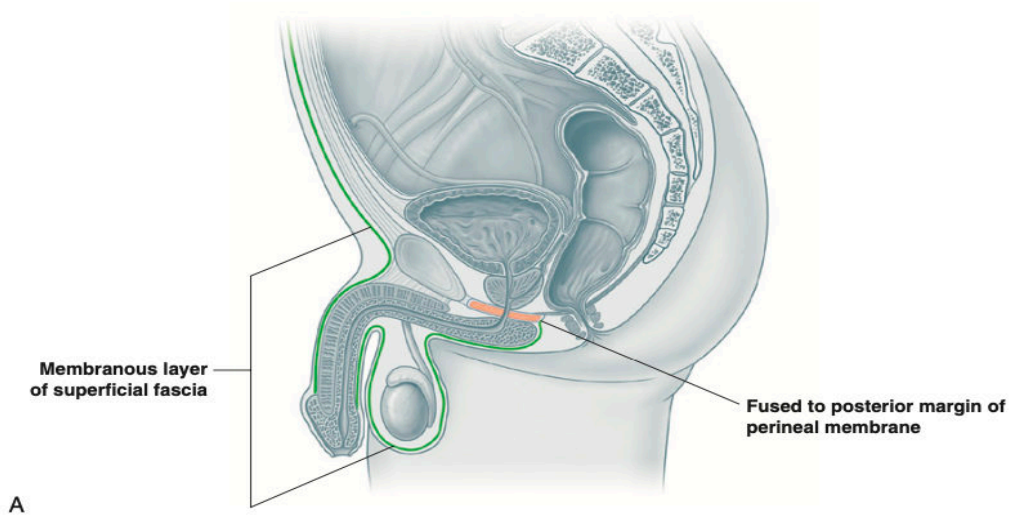


Figure taken from Gray's Anatomy for Students, Edition 4.

2. Pelvic Fascia

For an integrated overview of these superficial fascial layers in relation to the deeper pelvic fasciae, see Figure 19, which demonstrates the continuity from Camper's and Scarpa's fasciae to Colles', Dartos, Buck's, and into the parietal, visceral, and peritoneal fasciae.

2.1 Parietal Pelvic Fascia

The parietal pelvic fascia lines the walls and floor of the pelvis, investing the muscles from which it takes its name. It covers the obturator internus, piriformis, coccygeus, and levator ani muscles, providing smooth surfaces for visceral contact. A notable specialization is the obturator fascia, which thickens into the *arcus tendineus levator ani*, an attachment line for the pelvic diaphragm. Superiorly, the parietal fascia blends with the transversalis fascia of the abdomen, demonstrating continuity between abdominal and pelvic compartments (Standring, 2016).

2.2 Visceral Pelvic Fascia

The visceral pelvic fascia invests and supports the pelvic organs, including the bladder, prostate, seminal vesicles, and rectum. At the prostate, the prostatic fascia encloses the gland and contains the prostatic venous plexus (Santorini's plexus) along with neurovascular bundles essential for erectile function. Posteriorly, the rectovesical septum (Denonvilliers' fascia) separates the prostate and seminal vesicles from the rectum, creating a critical surgical cleavage plane (Walz et al., 2010; Kinugasa, 2012). The puboprostatic ligaments, condensations of visceral and endopelvic fascia, anchor the prostate and bladder neck to the pubis, stabilizing the anterior pelvic organs (Figure 17).

Figure 8.7B. *Visceral fascia surrounding the prostate and rectum.*

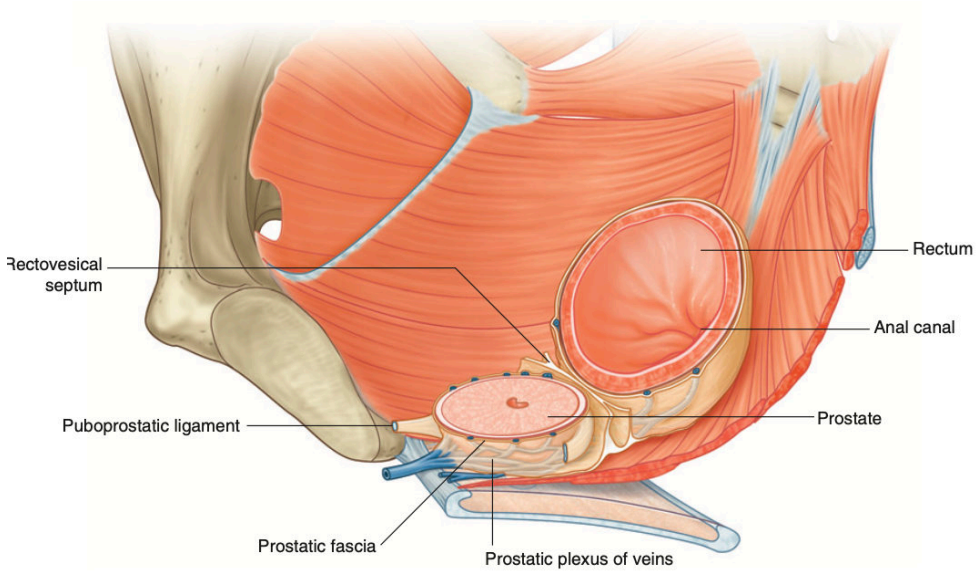


Figure taken from Gray's Anatomy for Students, Edition 4.

2.3 Endopelvic Fascia

Situated between parietal and visceral layers, the **endopelvic fascia** consists of loose connective tissue that allows organ mobility while serving as a conduit for vessels, lymphatics, and

autonomic fibers. This fascia condenses into supportive ligaments: the puboprostatic ligaments anteriorly, the lateral ligaments of the bladder and rectum, and the rectoprostatic fascia. These are not discrete ligaments but localized thickenings within the fascial continuum (Hörmann et al., 2021).

3. Peritoneal Reflections

The innermost fascial covering is the peritoneum, which drapes over pelvic viscera and creates reflections and recesses. Anteriorly, the median, medial, and lateral umbilical folds represent remnants of embryological structures and vessels. Posteriorly, the peritoneum dips between the bladder and rectum to form the rectovesical pouch, the lowest peritoneal recess in males (Figure 8.7C). This pouch is clinically relevant as a common site for the accumulation of blood, pus, or fluid. Smaller folds, such as the rectovesical fold, contribute to organ compartmentalization (Moore et *al*., 2018).

Functional and Clinical Relevance

Together, the superficial, parietal, visceral, endopelvic, and peritoneal fasciae form a sacro-recto-genito-vesico-pubic fascial continuum, extending from the sacrum to the pubis. This system ensures organ stability, neurovascular protection, and compartmentalization while permitting mobility. Clinically, these fasciae define surgical planes (e.g., nerve-sparing prostatectomy, total mesorectal excision), regulate the spread of infections or trauma, and are integral to oncological outcomes. From an osteopathic perspective, restrictions within this fascial network may impair organ motility, alter biomechanics, and contribute to CPPS.

Beyond mechanical support, the pelvic fascia also acts as a conduit for vessels, lymphatics, and nerves. Condensations such as the prostatic fascia and rectovesical septum delineate planes where neurovascular bundles, including the cavernous nerves, are embedded and safeguarded. In this way, the fascial system provides both structural stability and the anatomical framework for the neural pathways that regulate pelvic organ function. A thorough understanding of these fascial

relationships therefore lays the foundation for the next consideration: the innervation of the male pelvis, which governs urinary, sexual, and anorectal control.

Figure 8.7C. *Peritoneal folds and rectovesical pouch*

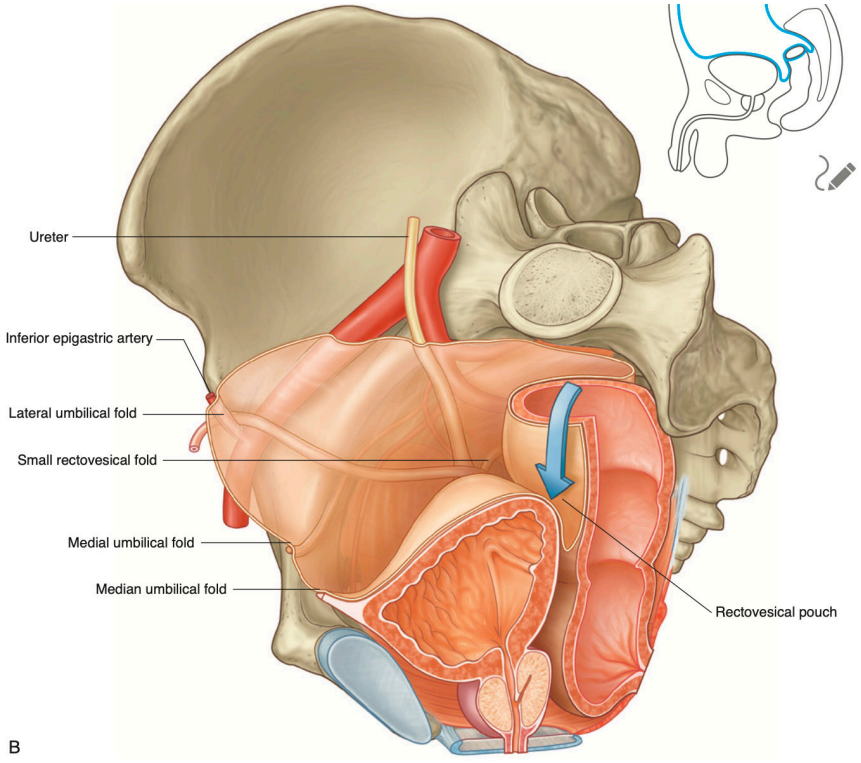


Figure taken from Gray's Anatomy for Students, Edition 4.

Please refer to Table 8.7 for a structured overview of each fascia's anatomical location and clinical relevance.

Table 8.7.

Male Fascias, associations and clinical relevance

Name / Subdivision	Location	Nerve Association	Artery / Vessel Association	Function / Clinical Significance
Superficial Fascia				
Camper's fascia (fatty layer)	Subcutaneous tissue of lower abdomen, perineum, scrotum	Ilioinguinal, posterior scrotal nerves	Superficial perineal vessels	Provides insulation; minimal clinical significance.
Colles' fascia (membranous layer)	Continuation of Scarpa's fascia into perineum; fuses with posterior perineal membrane	Superficial branches of pudendal nerve	Superficial perineal vessels	Compartmentalizes superficial pouch; restricts posterior spread of urine/blood.
Dartos fascia	Specialized fascia of scrotum	Posterior scrotal branches (pudendal); ilioinguinal	Scrotal branches of external pudendal vessels	Regulates testicular temperature by wrinkling scrotal skin.
Superficial penile fascia	Beneath skin of penis	Branches of pudendal nerve	Superficial dorsal vein	Protects superficial neurovascular bundle.
Buck's fascia (deep penile fascia)	Surrounds corpora cavernosa and corpus spongiosum	Dorsal nerves of penis (pudendal)	Deep dorsal vein, dorsal arteries	Maintains penile integrity; encloses neurovascular bundle.
Parietal Fascia				
Obturator fascia	Covers obturator internus; lateral pelvic wall	Obturator nerve; pudendal nerve (close relation)	Obturator vessels	Forms arcus tendineus; attachment for pelvic diaphragm.
Presacral fascia	Anterior to sacrum	Hypogastric nerves, sacral sympathetic trunk	Middle sacral vessels	Defines presacral plane; risk of hemorrhage in rectal surgery.
Levator ani fascia	Covers levator ani muscle	Pudendal nerve (branches)	Inferior rectal vessels	Supports pelvic diaphragm; separates visceral/parietal fascia.
Piriformis fascia	Covers piriformis muscle	Sacral plexus nerves (S1-S4)	Inferior gluteal vessels	Stabilizes wall; transmits nerves/vessels.

Coccygeus fascia	Covers coccygeus	Coccygeal plexus branches	—	Supports pelvic diaphragm; posterior reinforcement.
Transversalis fascia	Inner abdominal wall fascia continuing into pelvis	Femoral nerve (adjacent)	External iliac vessels	Defines Retzius/prevesical space.
Endopelvic Fascia				
Puboprostatic ligaments	From bladder neck/prostate to pubis	Prostatic plexus, dorsal nerve of penis	Dorsal venous plexus, vesical veins	Provides anterior support; continence.
Denonvilliers' fascia (rectovesical septum)	Between rectum and prostate/seminal vesicles	Cavernous nerves (from pelvic plexus)	Prostatic, vesical vessels	Surgical cleavage plane; nerve preservation.
Lateral ligaments of bladder/rectum	Extend laterally	Pelvic splanchnic, hypogastric nerves	Middle rectal, vesical arteries	Anchor viscera; contain neurovascular pedicles.
Sacrogenital ligaments	Sacrum to bladder/prostate	Pelvic plexus branches	Vesical, rectal vessels	Posterior visceral support; suspends viscera.
Delbet's fasciae	Midline sacrum → pubis	Hypogastric nerves, pelvic plexus	Associated pelvic vessels	Defines neurovascular pathways.
Parietal layer of endopelvic fascia	Adheres to walls and muscles	Sacral plexus branches	—	Supports compartments; separates layers.
Visceral layer of endopelvic fascia	Surrounds pelvic organs	Pelvic splanchnic, hypogastric nerves	Vesical, rectal, prostatic vessels	Suspends viscera; defines planes.
Visceral Fascia				
Prostatic fascia	Surrounds prostate	Cavernous nerves, prostatic plexus	Prostatic venous plexus, arteries	Encloses neurovascular bundles; erectile function.
Vesical fascia	Surrounds bladder	Vesical plexus nerves	Superior/inferior vesical arteries	Defines Retzius space; bladder mobility.
Rectal (mesorectal) fascia	Surrounds rectum and mesorectum	Pelvic splanchnic, hypogastric nerves	Superior rectal vessels	Landmark in TME; oncological importance.

Seminal vesicle fascia	Surrounds seminal vesicles	Pelvic plexus branches	Vesiculodeferential vessels	Part of rectovesical septum; prostate surgery.
Perivesical fascia	Around bladder	Vesical plexus	Vesical arteries/veins	Allows bladder expansion; surgical access.
Perirectal fascia	Around rectum	Rectal branches of pelvic plexus	Middle rectal vessels	Defines perirectal space; mobility of rectum.
Peritoneal Folds / Reflections				
Median umbilical fold	Anterior abdominal wall	—	Small perivesical vessels	Embryological remnant.
Medial umbilical folds	Anterior abdominal wall	—	Umbilical artery remnants	Defines bladder dome limits.
Lateral umbilical folds	Anterior abdominal wall	—	Inferior epigastric vessels	Landmark in hernia surgery.
Rectovesical pouch	Reflection between bladder and rectum	Pelvic splanchnic nerves		

Note. Data compiled and adapted from Siccardi (2022); Bordoni (2023); Roch et al. (2021); and “Pelvic Fascia” overview (ScienceDirect, n.d.).

8.8 Innervation of the Male Pelvis

The innervation of the male pelvis is a complex network that integrates voluntary motor control, sensory perception, autonomic regulation, and visceral feedback. Together, these systems maintain pelvic floor stability, continence, bladder and bowel function, and sexual activity. From a neuroanatomical perspective, innervation can be divided into three categories : somatic innervation, which governs voluntary motor and conscious sensory functions; autonomic innervation, which regulates involuntary smooth muscle activity, glandular secretion, and vascular tone; and visceral afferents, which transmit sensory information from pelvic organs to the central nervous system (Standring, 2021). Dysfunctions in any of these systems can contribute to disorders such as urinary incontinence, erectile dysfunction, or chronic pelvic pain (Woolf, 2011).

1. Somatic Innervation

Somatic innervation (Figure 8.8A) derives from the lumbar, sacral, and coccygeal plexuses, ensuring voluntary motor activity and conscious sensory input.

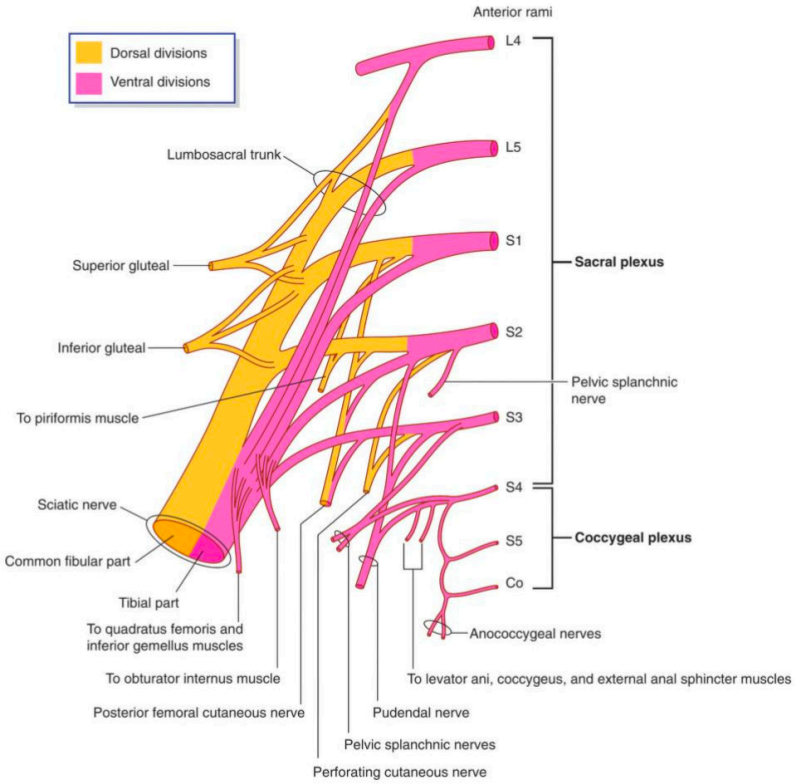
The lumbar plexus provides several important nerves. The iliohypogastric nerve (L1) supplies the lower abdominal wall and suprapubic skin. The ilioinguinal nerve (L1) innervates the root of the penis, anterior scrotum, and medial thigh. The genitofemoral nerve (L1-L2) contributes to the cremaster reflex by innervating the cremaster muscle, and carries sensation from the scrotal skin and anterior thigh. The obturator nerve (L2-L4) innervates the thigh adductors, stabilizing hip movement, and supplies sensory branches to the medial thigh and hip joint (Standring, 2021).

The sacral plexus contributes to the pudendal nerve (S2-S4), the principal somatic nerve of the perineum. Its branches include the inferior rectal nerves, motor to the external anal sphincter and sensory to perianal skin; the perineal nerves, motor to perineal muscles and sensory to the scrotum; and the dorsal nerve of the penis, which provides tactile and erotic sensation from the shaft and glans. Cutaneous innervation to the buttocks is supplied by the superior (L1-L3), middle (S1-S3), and inferior cluneal nerves (S2-S3) (Moore et *al*., 2018)

The coccygeal plexus (S4-Co1) provides motor innervation to the coccygeus and parts of the levator ani, supporting the posterior pelvic floor. It also gives rise to the anococcygeal nerves, which supply sensation to the coccygeal skin, posterior anal triangle, and anococcygeal body. Irritation of these nerves is often implicated in coccydynia (Standring, 2021).

Cutaneous and dermatomal innervation patterns relevant to pelvic pain are illustrated in Figure 8.8B-C-D.

Figure 8.8A: Components and branches of the sacral and coccygeal plexuses.



Note. Adapted from *Gray's Anatomy for Students* (4th ed., p. 512), by R. L. Drake, A. W. Vogl, & A. W. M. Mitchell, 2019, Elsevier. Copyright 2019 by Elsevier.

2. Autonomic Innervation

The autonomic nervous system (ANS) is the subdivision of the peripheral nervous system that regulates involuntary physiological functions, including smooth muscle activity, glandular secretion, and vascular tone. It operates largely below conscious control and maintains homeostasis by balancing excitatory and inhibitory influences across organ systems (Standring, 2021). The ANS is classically divided into two complementary branches: the sympathetic and the parasympathetic divisions.

The sympathetic nervous system arises from the thoracolumbar spinal cord (T1-L2) and promotes “fight or flight” responses, such as smooth muscle contraction and vasomotor regulation. The parasympathetic nervous system, by contrast, originates from the craniosacral outflow (cranial nerves III, VII, IX, X and sacral spinal nerves S2-S4) and promotes “rest and digest” functions, favoring visceral motility, glandular secretion, and sexual arousal (Standring, 2021).

Both divisions converge in nervous plexuses, which are networks of intersecting nerve fibers ensuring integration and distribution of neural signals. In the pelvis, the major autonomic plexuses (notably the superior hypogastric and inferior hypogastric plexuses) act as relay centers where sympathetic and parasympathetic fibers intermingle and project to pelvic organs (Standring, 2021).

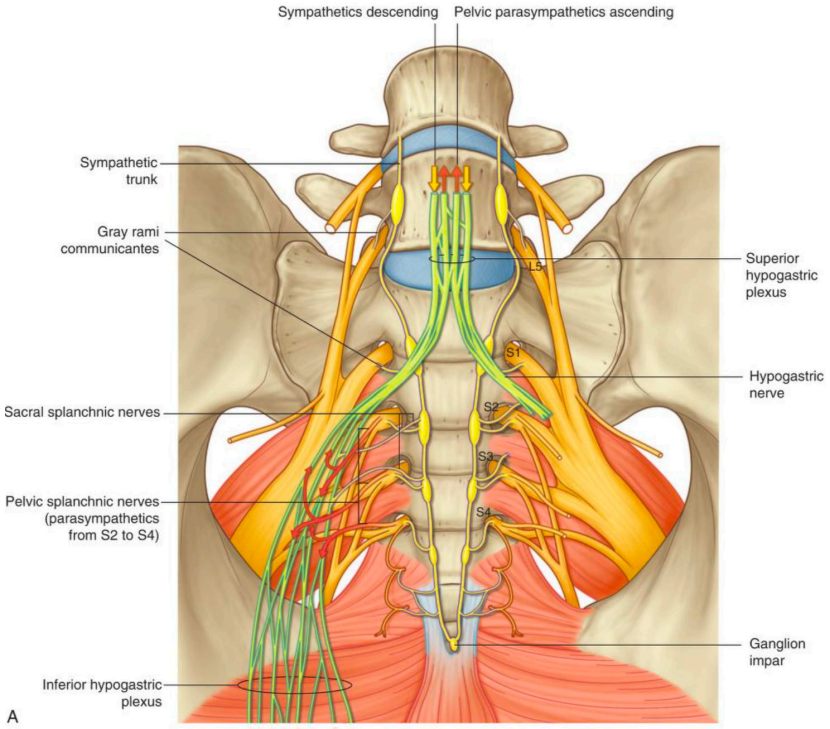
2.1 Sympathetic Division

Sympathetic fibers arise from the lumbar splanchnic nerves (T12-L2). They descend through the superior hypogastric plexus, continue via the hypogastric nerves, and join the inferior hypogastric plexus. Their functions include contraction of the internal urethral sphincter, mediation of emission during ejaculation, and regulation of tone in the prostate, seminal vesicles, and vas deferens. Sensory fibers also travel along these pathways, carrying visceral pain signals from structures above the pelvic pain line (e.g., bladder dome, prostate, upper rectum) (Standring, 2021).

2.2 Parasympathetic Division

Parasympathetic fibers originate from the pelvic splanchnic nerves (S2-S4) and also terminate in the inferior hypogastric plexus. They stimulate detrusor contraction during urination, promote rectal peristalsis, and mediate penile erection through the cavernous nerves. Parasympathetic afferents additionally carry visceral sensory information from structures below the pelvic pain line, such as the urethra, prostate, erectile tissue, and lower rectum (Moore et *al*., 2018).

Figure 8.8B: Autonomic nervous system of the male pelvis.



Note. Adapted from *Gray's Anatomy for Students* (4th ed), by R. L. Drake, A. W. Vogl, & A. W. M. Mitchell, 2019, Elsevier. Copyright 2019 by Elsevier.

2.3 Visceral Plexuses

The inferior hypogastric plexus (pelvic plexus) integrates sympathetic and parasympathetic fibers and distributes branches to all pelvic viscera. Subdivisions include the prostatic plexus, responsible for prostatic secretion, ejaculation, and erectile function; the vesical plexus, which regulates bladder contraction and sphincter tone; and the rectal plexus, which controls rectal motility and anal sphincter regulation (Standring, 2021). This integration underscores the importance of autonomic control in maintaining urological, digestive, and sexual health.

3. Visceral Afferents

Visceral afferents convey sensory input about organ distension, filling, and pain to the central nervous system. Sympathetic afferents (T12-L2) transmit pain from pelvic organs above the pelvic pain line, often perceived as referred pain in the lower abdomen or lumbar region. Parasympathetic afferents (S2-S4) carry signals from organs below the pelvic pain line, producing pain referral to the sacrum, perineum, and genital region. These visceral pathways are central to reflex arcs governing urination, defecation, and sexual function. They are also key contributors to the pathophysiology of chronic pelvic pain, where abnormal signaling and central sensitization amplify pain perception beyond local tissues (Woolf, 2011).

Table 8.8 provides a systematic summary of the major nerves and plexuses involved in male pelvic innervation, detailing their root origins, target structures, and associated motor and sensory functions.

In summary, the innervation of the male pelvis integrates somatic, autonomic, and visceral afferent systems into a unified framework that supports voluntary control, autonomic regulation, and sensory feedback. This organization ensures pelvic floor stability, continence, visceral motility, and sexual activity. Dysfunction in these neural systems may lead to complex clinical presentations, including chronic pelvic pain, erectile dysfunction, or incontinence. Given the intimate relationship between nerves and vessels, which often course together in fascial planes, the next section will

address the vascularisation of the male pelvis, an equally essential component in sustaining pelvic function and contributing to both physiology and pathology.

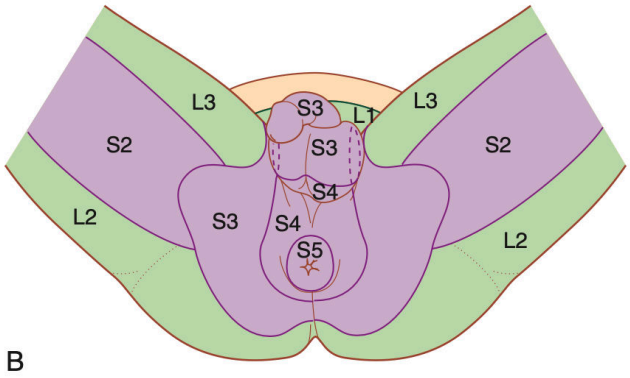
Table 8.8

Comprehensive Overview of Male Pelvic Innervation (Somatic, Autonomic, and Visceral Afferents)

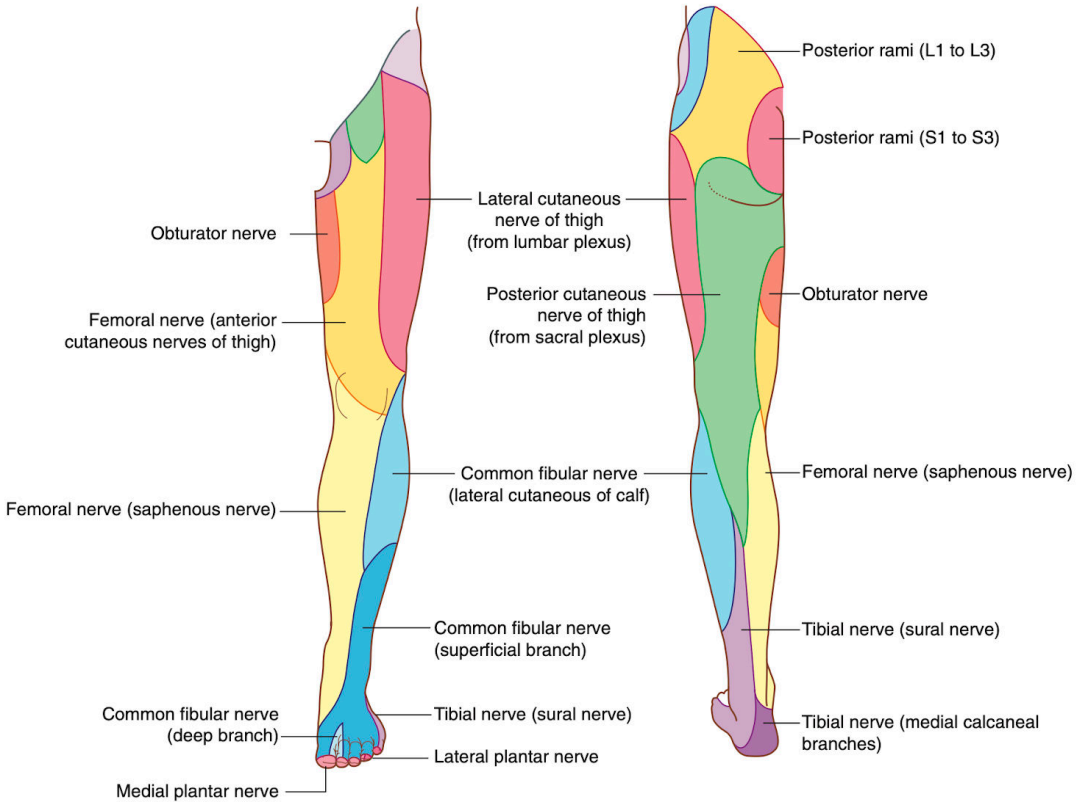
Nerve / Plexus	Roots	Structures Innervated	Motor Functions	Sensory Functions
Somatic				
Iliohypogastric Nerve	**L1**	Lower abdominal wall, suprapubic skin	Abdominal wall contraction (partial)	Sensation above pubis
Ilioinguinal Nerve	**L1**	Root of penis, anterior scrotum, medial thigh	-	Sensation to penis root, scrotum, medial thigh
Genitofemoral Nerve	**L1-L2**	Cremaster muscle, scrotal skin	Cremaster reflex (testis elevation)	Scrotal skin
Obturator Nerve	**L2-L4**	Adductor muscles, medial thigh	Hip adduction, pelvic stabilization	Medial thigh, articular sensation
Pudendal Nerve	**S2-S4**	Perineum, external sphincters, penis, scrotum	Motor to pelvic floor & sphincters	Sensation of penis, scrotum, anal canal
→ Inferior rectal	**S2-S4**	External anal sphincter, perianal skin	Anal sphincter contraction	Perianal sensation
→ Perineal	**S2-S4**	Perineal muscles, scrotal skin	Motor to perineum	Scrotal sensation
→ **Dorsal nerve of penis**	**S2-S4**	**-**	**Penile shaft & glans (tactile, erotic)**	
Cluneal nerves		Buttock skin	-	Cutaneous sensation (buttocks)
→ Superior cluneal	**L1-L3**	Upper buttock skin	-	Cutaneous sensation
→ Middle cluneal	**S1-S3**	Mid-buttock skin	-	Cutaneous sensation
→ Inferior cluneal	**S2-S3**	Lower buttock skin	-	Cutaneous sensation
Coccygeal plexus	**S4-Co1**	Coccygeus; posterior fibers of levator ani (variable); anococcygeal body/ligament	Posterior pelvic floor support; tailbone stabilization	-

→ Anococcygeal nerves	**S4-Co1**	Skin over coccyx and midline posterior anal triangle; anococcygeal ligament	-	Cutaneous sensation over coccyx/anococcygeal region (relevant to coccydynia)
Autonomic				
Sympathetic				
Lumbar splanchnic → superior hypogastric → hypogastric nerves → inferior hypogastric plexus	**T12-L2**	Bladder, prostate, seminal vesicles, urethra, rectum, vessels	Contraction of internal urethral sphincter, emission phase of ejaculation, smooth muscle tone in prostate/vas deferens	Visceral pain (above pelvic pain line), fullness sensation in bladder/rectum
Parasympathetic				
Pelvic splanchnic → inferior hypogastric plexus	**S2-S4**	Bladder, rectum, prostate, penis (cavernous nerves)	Detrusor contraction (urination), rectal motility, penile erection (vasodilation)	Visceral pain (below pelvic pain line), bladder/rectal filling, sexual reflex afferents
Visceral Plexuses (Mixed)				
Inferior hypogastric (pelvic plexus)	**Symp. T12-L2 + Parasymp. S2-S4**	All pelvic viscera	Autonomic integration (ejaculation, erection, urination, defecation)	Bladder, rectal, prostatic, erectile sensation
→ Prostatic plexus		Prostate, seminal vesicles, erectile tissue	Ejaculation, prostatic secretions	Pain/sensation from prostate, seminal vesicles
→ Vesical plexus		Bladder	Detrusor contraction (parasymp.), sphincter tone (symp.)	Bladder filling sensation
→ Rectal plexus		Rectum, anal canal	Rectal motility, sphincter regulation	Rectal distension sensation
Visceral Afferents				
Sympathetic afferents	**T12-L2**	Pelvic viscera above pelvic pain line	-	Pain referral to abdomen/loin
Parasympathetic afferents	**S2-S4**	Pelvic viscera below pelvic pain line	-	Pain referral to sacrum, perineum, genitalia

Figure 8.8C: Dermatomes of the perineum in men

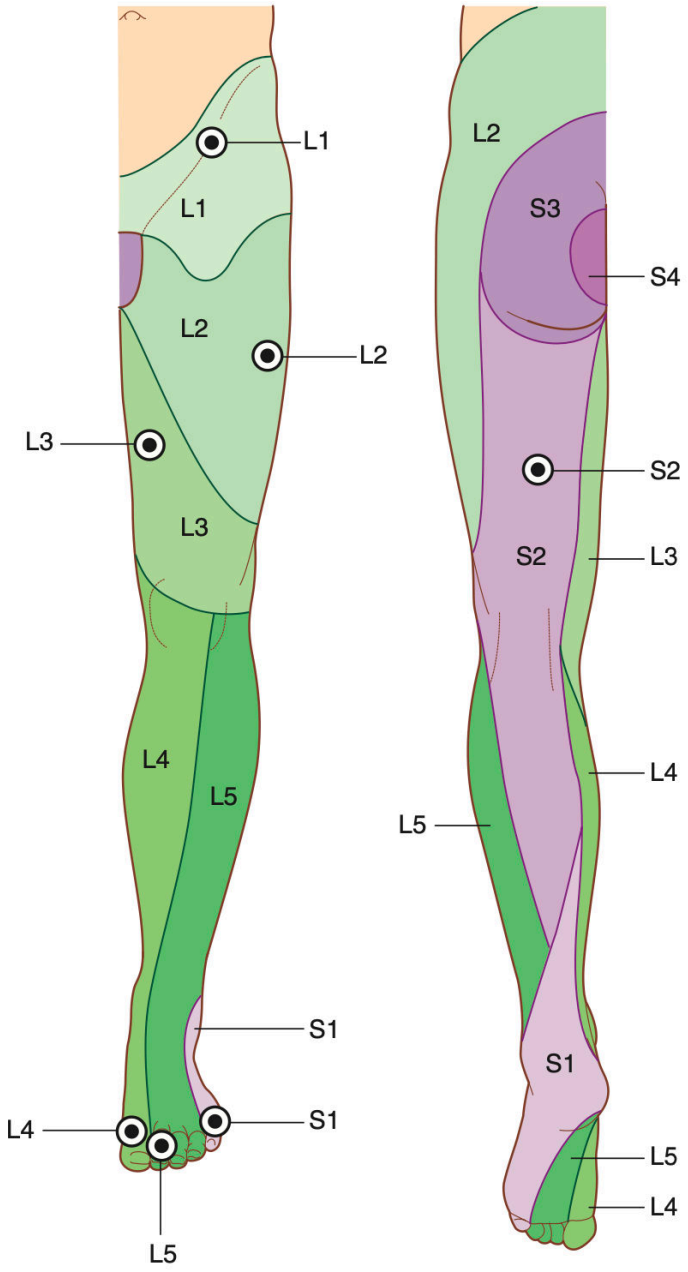


8.8D: Cutaneous and Nerve Distribution of the Male Pelvis and Lower LimB



Note. Figure 8.8C and D Adapted from *Gray's Anatomy for Students* (4th ed., p. 428 and 541), by R. L. Drake, A. W. Vogl, & A. W. M. Mitchell, 2019, Elsevier. Copyright 2019 by Elsevier.

8.8D: Dermatomes of the lower limb. Dots indicate autonomous zones (i.e., with minimal overlap).



Note. Adapted from *Gray's Anatomy for Students* (4th ed., p. 539), by R. L. Drake, A. W. Vogl, & A. W. M. Mitchell, 2019, Elsevier. Copyright 2019 by Elsevier.

8.9 Vascularisation of the Male Pelvis

The vascular system ensures the delivery of oxygen and nutrients to tissues and the removal of metabolic by-products. Arteries transport oxygenated blood from the heart to peripheral organs, while veins return deoxygenated blood to the heart for gas exchange in the lungs. In the male pelvis, vascularisation is fundamental to organ perfusion, erectile physiology, thermoregulation (notably through venous pampiniform plexuses), and efficient venous return (Drake et *al*., 2019).

1. Arterial Supply

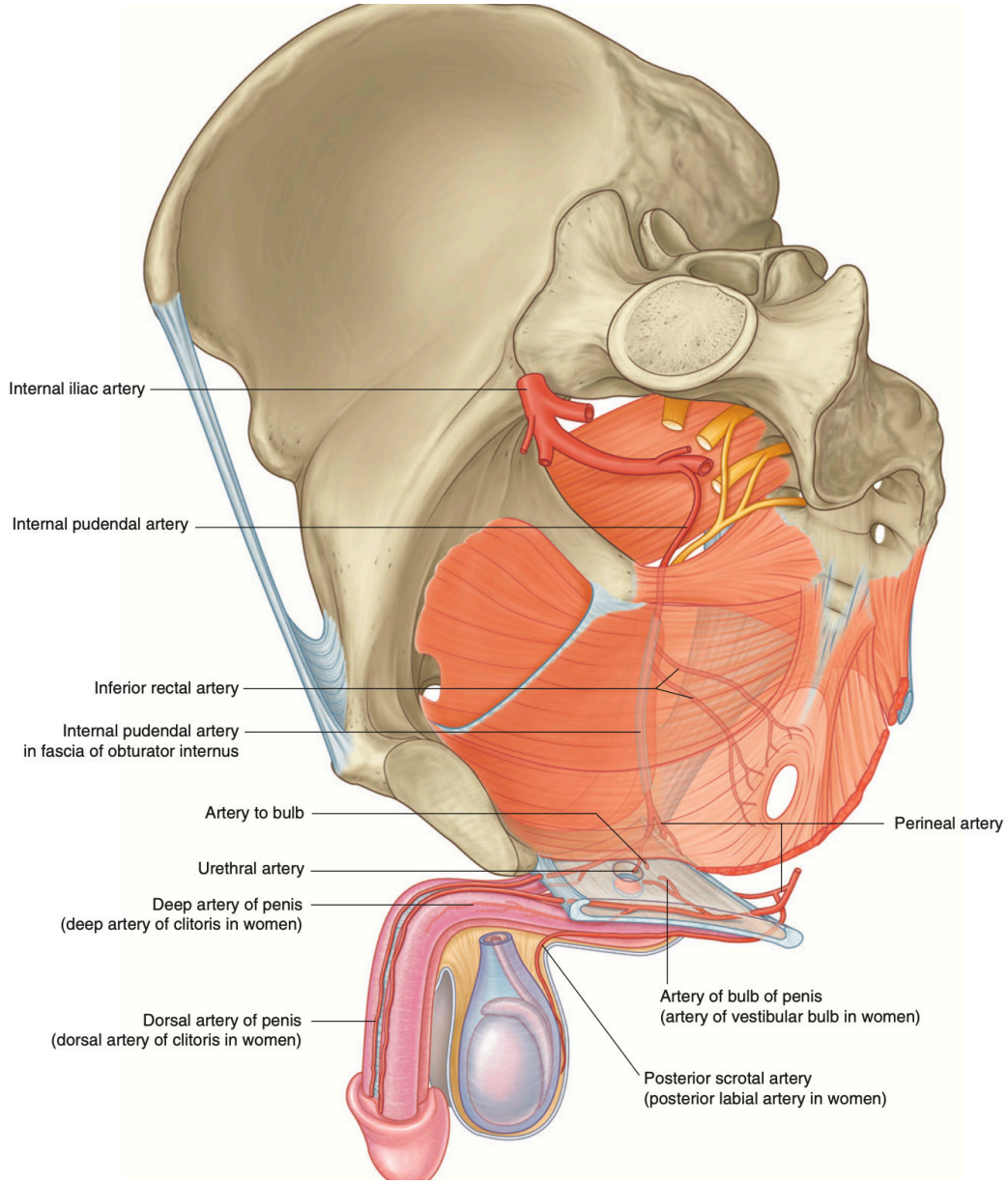
The primary arterial supply of the pelvis derives from the internal iliac artery, a branch of the common iliac artery at the L5-S1 level. The internal iliac descends along the lateral pelvic wall and divides into anterior and posterior trunks near the greater sciatic foramen:

- **Posterior trunk:** gives rise to the *iliolumbar, lateral sacral, and superior gluteal arteries*, which vascularise the posterior pelvic wall, sacrum, and gluteal region.
- **Anterior trunk:** issues both visceral branches (umbilical artery with its *superior vesical arteries*, *inferior vesical artery*, and *middle rectal artery*) and parietal branches (*obturator, internal pudendal,* and *inferior gluteal arteries*).

The internal pudendal artery is of particular importance in male pelvic anatomy. It constitutes the principal arterial supply of the perineum and erectile tissues, following a characteristic course: it exits the pelvis via the greater sciatic foramen, curves around the ischial spine, and re-enters the perineum through the lesser sciatic foramen to reach the urogenital diaphragm and penis (Drake et *al*., 2019).

Figure 8.9A illustrates the arterial supply of the male pelvis and perineum, highlighting the bifurcation of the common iliac artery into its internal and external branches and the subsequent division of the internal iliac into anterior and posterior trunks (Drake et *al*., 2019).

8.9A: Arterial Supply of the Pelvis and Perineum in Males



Note. Adapted from *Gray's Anatomy for Students* (4th ed., p. 512), by R. L. Drake, A. W. Vogl, & A. W. M. Mitchell, 2019, Elsevier. Copyright 2019 by Elsevier.

2. Venous Drainage

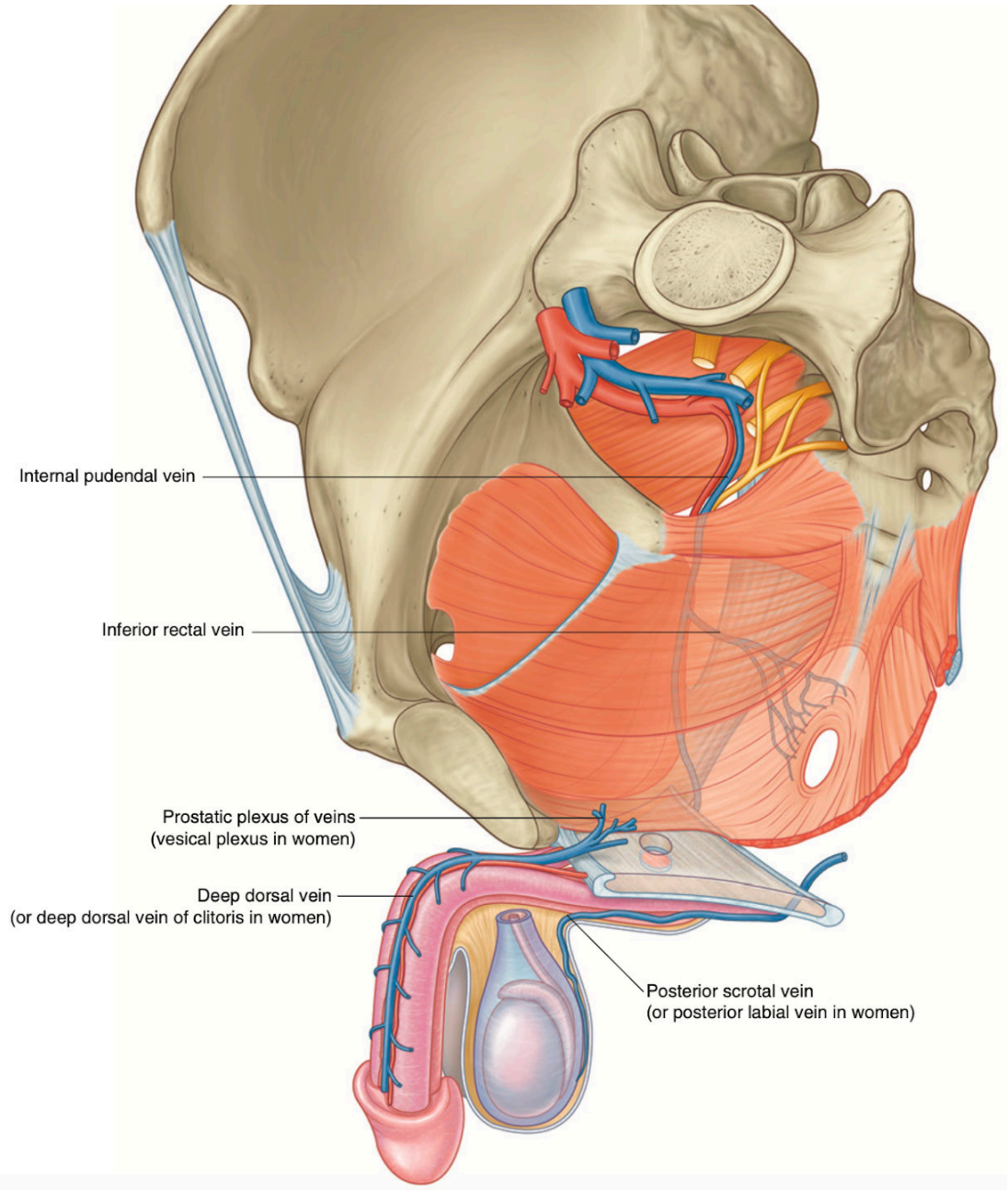
Venous return in the male pelvis largely parallels the arterial distribution, converging toward the internal iliac vein, but with significant contributions from interconnected venous plexuses. A plexus is a dense, reticulated network of veins surrounding an organ, providing collateral circulation and efficient drainage (Drake et *al*., 2019). Figure 8.9B illustrates the venous drainage of the pelvis and perineum, emphasizing the arrangement of the vesical, prostatic, and rectal plexuses that surround pelvic viscera and provide collateral routes for drainage

1. **Pelvic venous plexuses:** Surround the bladder (vesical plexus), prostate (prostatic plexus), and rectum (rectal plexus). The rectal plexus is divided into *internal* and *external* components, with dual drainage:
    - *Superior rectal vein → inferior mesenteric vein → portal circulation*
    - *Middle and inferior rectal veins → internal iliac vein → systemic circulation*

This dual connection explains the formation of portosystemic anastomoses relevant in conditions such as hemorrhoids (Drake et *al*., 2019).

1. **Genital drainage:**
    - The deep dorsal vein of the penis traverses beneath Buck's fascia to empty into the prostatic plexus.
    - The superficial dorsal veins of the penile and scrotal skin drain into the *external pudendal veins*, tributaries of the *great saphenous vein*.
2. **Additional venous return:**
    - The median sacral vein empties into the left common iliac vein or directly into the inferior vena cava (IVC).
    - The testicular veins are asymmetric: the *right testicular vein* drains into the IVC, whereas the *left testicular vein* drains into the left renal vein, a relationship clinically relevant for the higher prevalence of left-sided varicoceles.

8.9B: Venous drainage of the Pelvis and Perineum in Males



Note. Adapted from *Gray's Anatomy for Students* (4th ed., p. 513), by R. L. Drake, A. W. Vogl, & A. W. M. Mitchell, 2019, Elsevier. Copyright 2019 by Elsevier.

Summary

The vascular organisation of the male pelvis integrates segmental arterial branches with a complex network of venous plexuses. This arrangement provides robust perfusion to pelvic viscera and erectile tissues, facilitates thermoregulation of the testes, and ensures multiple venous return pathways within a compact anatomical region. Beyond its circulatory role, pelvic vascularisation also interacts with biomechanics: blood flow contributes to tissue elasticity, muscular endurance, and erectile hemodynamics, while venous stasis or increased intra-abdominal pressure can alter mechanical loading patterns on pelvic structures. The next section on biomechanics will therefore explore how these vascular dynamics integrate with musculoskeletal, fascial, and visceral forces to maintain pelvic stability and function.

8.10 Biomechanics of the Male Pelvis

Biomechanics refers to the study of forces, movements, and structural interactions that determine the functional behavior of living systems. In the male pelvis, biomechanics encompasses the interplay between bones, joints, ligaments, muscles, fasciae, vascular, and neural systems. This complex integration ensures stability, mobility, load transfer, and visceral support, while enabling vital functions such as locomotion, continence, defecation, urination, and sexual activity (Kapandji, 2019; Standring, 2021).

The pelvis plays critical roles in absorbing forces, protecting visceral structures, and facilitating movement between the trunk and lower limbs. It distributes stresses originating from both the spine and lower limbs, functioning as a shock absorber. Structurally, it protects digestive, urinary, and reproductive organs while maintaining postural alignment and equilibrium through static stability. It also allows functional adaptations for walking, lifting, and - in the female pelvis - childbirth (Dufour, 2017).

1. Prerequisites of Morphological Anatomy

- **Osteo-articular configuration:**
    - The **fifth lumbar vertebra (L5)** is wedge-shaped, inclined ~30°-35° anteriorly/inferiorly, with frontalized articular processes (Dufour, 2017).
    - The **sacral plateau** is inclined ~40°- 45°, providing the keystone surface for lumbosacral load transfer (Dufour, 2017).
- **Morpho-architectural parameters** (sacral slope (SS), pelvic tilt (PT), and pelvic incidence (PI)) directly influence sagittal alignment and lumbar curvature (Dufour, 2017).
- **Ligamentous reinforcement:** The iliolumbar ligament and posterior sacroiliac ligaments prevent anterior displacement of L5 on the sacrum (Dufour, 2017).
- **Muscular influence:** Predominantly aponeurotic insertions (thoracolumbar fascia, abdominal wall) emphasize stability over mobility (Dufour, 2017).

2. Mobility (Dufour, 2017)

Despite its stable design, the pelvis exhibits subtle three-dimensional mobility essential for adapting to mechanical stresses.

- At the **sacroiliac joints**:
    - **Nutation and counternutation** = forward/backward tilting of the sacrum relative to the ilia.
    - **Anteriorization/posteriorization** = forward/backward tilting of the ilia relative to a fixed sacrum.
- At the **lumbosacral and hip joints**, small translational and rotational adjustments dissipate forces during gait and posture changes.
- During **childbirth**, pelvic diameters increase dynamically through these movements .

Figure 8.10A: Minimal displacements can occur as linear (vertical/horizontal) (a), angular (b), or symmetric/asymmetric (c) movements, which together form a three-dimensional mobility system (d, d').

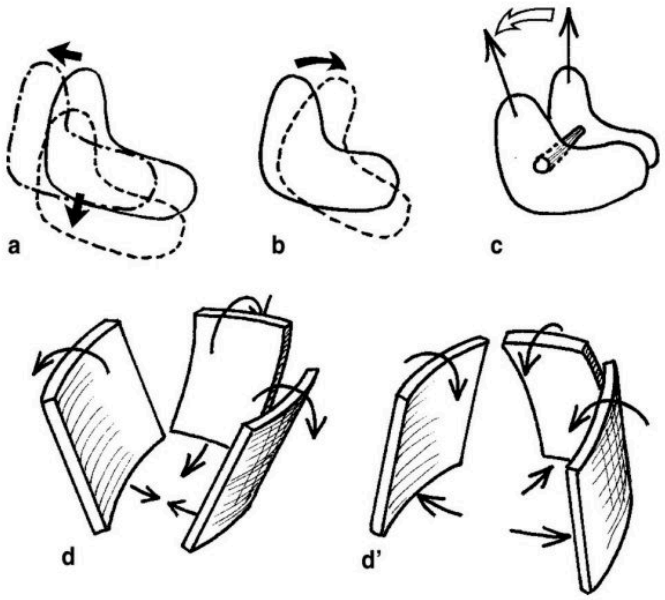


Figure reproduced from: Dufour, M., Pillu, M., Langlois, K., & Del Valle Acedo, S. (2017). Biomécanique fonctionnelle : Membres - Tête - Tronc (2e éd.). Paris, France: Elsevier Masson.

3. Stability

3.1 Static stability (Dufour, 2017)

Pelvic stability is a dominant characteristic. The sacrum is firmly wedged between the iliac bones, creating joint congruency reinforced by dense posterior ligaments (sacroiliac, sacrotuberous, sacrospinous, and iliolumbar) as well as fascial continuities and muscular attachments. These ligaments form a fan-shaped arrangement that mirrors the distribution of load-bearing forces across the sacral plateau. The wedging of the sacrum increases tension in the sacroiliac fibrous system, generating stability proportional to the applied load.

Figure 8.10B: (A) Interweaving of aponeurotic stabilizers: latissimus dorsi (1), gluteus maximus (2), quadratus lumborum + iliolumbar ligaments (3), and dorsal sacroiliac ligaments (4). (B) Fan-shaped ligament arrangement counteracts decomposed forces acting on the sacrum.

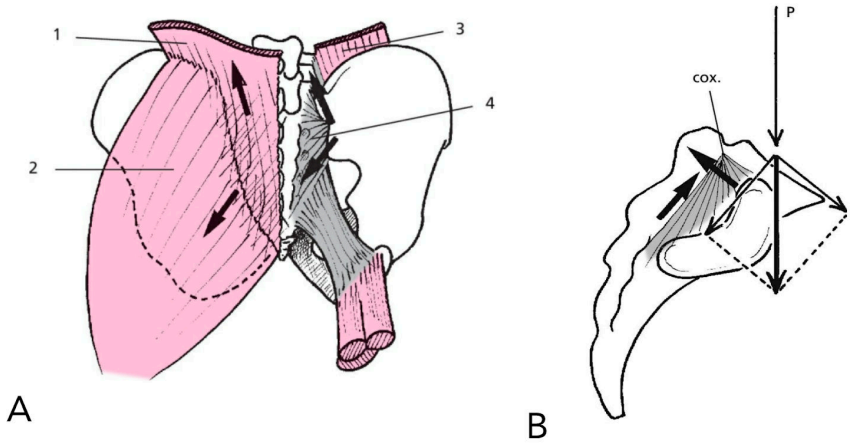


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3.2 Dynamic stability (Dufour, 2017)

Beyond static form closure, the pelvis functions as a shear joint in three-dimensional space, absorbing mechanical stress through micromovements rather than large excursions. This enhances resistance to shear and rotational forces.

Figure 8.10C: Shear force absorption across the frontal plane (a), sagittal plane (b), and transverse plane (c).

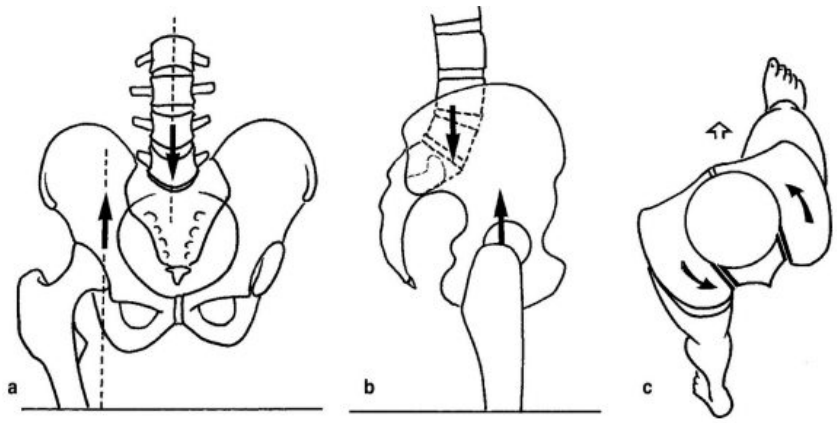


Figure reproduced from: Dufour, M., Pillu, M., Langlois, K., & Del Valle Acedo, S. (2017). Biomécanique fonctionnelle : Membres - Tête - Tronc (2e éd.). Paris, France: Elsevier Masson.

4. Constraints and Load Transfer (Dufour, 2017)

The pelvis transmits forces from the axial skeleton to the lower limbs, absorbing axial loading from the trunk, head, and upper extremities:

- ~80% of stresses are transmitted laterally through the pelvic ring to the acetabula.
- The wedge-shaped sacrum redirects vertical forces into lateral vectors, amplifying stability and reducing vertical displacement.

Figure 8.10D: Load transfer mechanics: (a) Flat surface = 100% vertical transmission; (b) At 120° = 50% vertical, 50% lateral; (c) At 15° (sacroiliac configuration) = 20% vertical, 80% lateral → demonstrating the sacroiliac joint's critical role.

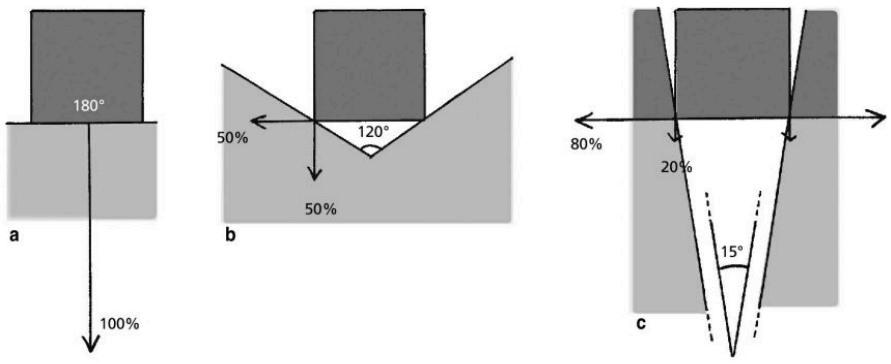


Figure reproduced from: Dufour, M., Pillu, M., Langlois, K., & Del Valle Acedo, S. (2017). Biomécanique fonctionnelle : Membres - Tête - Tronc (2ᵉ éd.). Paris, France: Elsevier Masson.

5. Integration with Other Systems

Pelvic biomechanics are inseparable from visceral and vascular physiology:

- **Erectile function** depends on hemodynamic pressure and pelvic floor coordination.
- **Venous return** and pelvic congestion are influenced by diaphragmatic/pelvic floor dynamics.
- **Visceral mobility** (bladder filling, rectal distension) imposes cyclical stress absorbed by connective and muscular supports.

6. Clinical Relevance

Pathological changes in biomechanics may arise from trauma, surgery, muscular imbalance, ligament laxity, or chronic postural adaptations. These alter stress distribution, increasing risk of chronic pelvic pain, pelvic floor dysfunction, nerve entrapment, and low back disorders. Recognizing the static, dynamic, and constraint-based mechanisms of pelvic

biomechanics is essential for clinical evaluation and therapeutic interventions in osteopathy, physiotherapy, and rehabilitation (Vleeming et *al*., 2012).

Table 8.10

Biomechanics

Joint	Movement	Definition and Axis	Amplitude	Prime Movers	Limiting Structures
Sacroiliac Joint	**Nutation**	Forward rotation of sacrum around a transverse axis	0-12°	Passive (no active movers)	Sacroiliac ligaments, joint capsule, pelvic floor
	Counternutation	Backward rotation of sacrum around a transverse axis	0-12°	Passive	Anterior/posterior ligaments, pelvic muscles
	Anteriorization (Iliac)	Forward rotation of iliac bones around a transverse axis	Minimal	Passive	Posterior ligaments, iliolumbar ligament
	Posteriorization (Iliac)	Backward rotation of iliac bones around a transverse axis	Minimal	Passive	Anterior ligaments, pelvic fascia
Lumbosacral Joint	**Flexion**	Anterior bending of lumbar spine on sacrum around transverse axis	~60°	Rectus abdominis, obliques	Posterior longitudinal ligament, facet joints
	Extension	Posterior bending of lumbar spine on sacrum around transverse axis	~25°	Erector spinae, multifidus	Anterior longitudinal ligament, facet joints
	Lateral flexion	Side bending of lumbar spine around anteroposterior axis	~25°	Quadratus lumborum, obliques	Intertransverse ligaments, facet joints
	Rotation	Axial rotation of lumbar spine around a vertical axis	~5°	Obliques, multifidus	Facet joints, annulus fibrosus
Hip Joint	**Flexion**	Bringing thigh toward torso around a transverse axis	120-130°	Iliopsoas, rectus femoris	Posterior joint capsule, hamstrings

Extension	Moving thigh posteriorly around a transverse axis	20-30°	Gluteus maximus, hamstrings	Anterior joint capsule, iliofemoral ligament
Abduction	Moving thigh away from body midline around a sagittal axis	40-45°	Gluteus medius/minimus, TFL	Inferior joint capsule, adductor muscles
Adduction	Bringing thigh towards body midline around a sagittal axis	20-30°	Adductor muscles	Superior joint capsule, abductors
Internal Rotation	Rotating thigh inward around a vertical axis	30-40°	Gluteus medius/minimus, TFL	External rotators, posterior joint capsule
External Rotation	Rotating thigh outward around a vertical axis	40-60°	Piriformis, quadratus femoris	Internal rotators, anterior joint capsule

Source: Adapted from Dufour et al. (2017); Bouisset (1998); & Kapandji (2012).