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Title: Acupuncture for Chronic Prostatitis/Chronic Pelvic Pain Syndrome: A Narrative Review of Therapeutic Techniques and Mechanisms

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Clinical Question Box

What is the role of acupuncture and moxibustion in managing CP/CPPS?

Acupuncture and moxibustion provide effective, individualized treatment options for CP/CPPS, particularly for patients unresponsive to conventional therapies. These modalities alleviate symptoms by modulating pain pathways, reducing inflammation, and enhancing pelvic circulation. Advanced techniques such as electroacupuncture and catgut embedding offer enhanced or prolonged effects, supporting their use as integrative therapies in managing CP/CPPS.

Abstract

Chronic prostatitis/chronic pelvic pain syndrome (CP/CPPS) is a prevalent urological condition in men, particularly those under 50 years of age, characterized by persistent pelvic pain often accompanied by urinary and sexual dysfunction. The etiology is multifactorial and poorly understood, involving musculoskeletal, psychological, neurogenic, and inflammatory components. Due to its heterogeneous nature, management strategies must be individualized. While pharmacological treatments, such as alpha-blockers, NSAIDs, and neuropathic pain agents, are commonly employed, they often yield limited results. Nonpharmacologic therapies, including pelvic floor physical therapy, cognitive behavioral therapy, and acupuncture, show promise in alleviating symptoms. Rooted in Traditional Chinese Medicine, acupuncture and moxibustion exert therapeutic effects through neuromodulatory, immunomodulatory, and anti-inflammatory mechanisms. An increasing body of empirical and mechanistic evidence underscores their relevance as integrative treatments for CP/CPPS. Further research is essential to optimize patient selection and refine multimodal treatment protocols.

Keywords: Chronic prostatitis, Chronic pelvic pain syndrome, Acupuncture, Electroacupuncture, Moxibustion, Neuromodulation

Overview of CP/CPPS: Symptoms, Prevalence, and Etiology

Chronic prostatitis/chronic pelvic pain syndrome (CP/CPPS) is a clinical condition in males characterized by persistent pain or discomfort in the pelvic region, often accompanied by urologic symptoms or sexual dysfunction.[1] Despite the term "prostatitis," the exact contribution of the prostate to these symptoms remains uncertain.[2] The National Institutes of Health classifies CP/CPPS as Category III prostatitis, which accounts for over 90% of prostatitis cases presenting with symptoms.[3] Research guidelines define CP/CPPS as chronic pelvic pain lasting at least three of the preceding six months in the absence of other identifiable causes, often associated with urinary symptoms and/or sexual dysfunction.[4] CP/CPPS is sometimes referred to as either inflammatory or noninflammatory; however, this distinction is generally for research purposes only, as there is no evidence that patients in the two subgroups exhibit different symptoms or respond differently to therapy.[5]

CP/CPPS is a common condition, affecting approximately 2 to 10 percent of adult men worldwide.[6] It can occur at any age but is most prevalent in men younger than 50 years, among whom it represents the most common urologic diagnosis.[7] The etiology of CP/CPPS remains unknown. Despite the historic use of the term "prostatitis," evidence suggesting prostate inflammation as a primary cause of the condition is conflicting and nonspecific.[8] Increased tension and difficulty relaxing the pelvic floor are likely etiological factors in many males with CP/CPPS.[9] Psychologic stress and anxiety are also common in males with symptoms of CP/CPPS and may contribute to the condition.[10] Other proposed etiologies include inflammation due to trauma or normal prostate flora, autoimmunity, neurogenic pain, and the interplay of somatic and psychological factors.[11]

The primary symptom of CP/CPPS is pelvic pain, which is typically persistent or recurrent for at least three months.[12] Recent studies indicate that the most common locations of pain include the perineum and suprapubic region, followed by the testicles, inguinal (groin) area, penis, and buttocks.[13] Urinary symptoms such as frequency, urgency (often due to painful bladder filling or a feeling of impending incontinence), and dysuria are frequently reported.[14] Pain with ejaculation is also a common complaint. Sexual dysfunction is highly prevalent, affecting approximately 59% of patients, with about 34% experiencing erectile dysfunction and 35% reporting premature ejaculation.[7] Many individuals with CP/CPPS also have comorbid conditions such as irritable bowel syndrome, fibromyalgia, or migraine headaches, supporting the hypothesis of broader pain sensitization or systemic involvement. Pain duration varies, ranging from intermittent episodes to constant discomfort.

Individualized Management of CP/CPPS

A variety of pharmacologic and nonpharmacologic therapies are available for managing CP/CPPS. Given the condition's heterogeneous nature, no single treatment regimen is universally accepted.[15,16] Management should be individualized based on the patient's predominant symptoms, considering the patient's preference while determining the initial approach. Some patients may benefit from pharmacologic therapy as first-line treatment, while others may respond better to nonpharmacologic interventions.

Pharmacological treatments have limited evidence showing efficacy.[17] Initial pharmacologic treatment commonly involves combination therapy with an alpha-adrenergic receptor blocker and a nonsteroidal anti-inflammatory drug, as this strategy is generally more effective than monotherapy.[18] In patients with voiding dysfunction, particularly older men with presumed benign prostatic hyperplasia, 5-alpha-reductase inhibitors may be added, although these are avoided in younger men due to potential effects on semen volume.[19] For individuals experiencing sexual dysfunction, phosphodiesterase type 5 inhibitors may be beneficial.[20] In patients presenting with diffuse or widespread pain, neuropathic pain agents such as pregabalin are prioritized, as they have demonstrated superior efficacy in this subgroup compared to therapies targeting localized symptoms alone.

Nonpharmacologic therapies encompass physical and psychological strategies that can complement or serve as alternatives to drug therapy. Pelvic floor physical therapy, focused on myofascial trigger point release, is particularly effective for patients with pelvic floor muscle spasm or pain associated with ejaculation and is typically administered by trained physical therapists.[21] Cognitive behavioral therapy may benefit patients with significant psychological

comorbidities by addressing pain perception, urinary symptoms, depressive features, and overall quality of life. However, further research is needed to identify ideal candidates.[22]

Acupuncture has demonstrated promising effects in symptom reduction across multiple studies, including a large randomized trial that reported sustained improvements at 32 weeks.[23] Several meta-analyses have further confirmed its efficacy in alleviating symptoms.[24-26] Additionally, aerobic exercise has been associated with significant improvements in pain, symptom severity, and quality of life compared to non-aerobic interventions.[4] While sitz baths are frequently recommended anecdotally for pain relief, there is limited clinical trial data supporting their long-term efficacy in CP/CPPS.

Acupuncture and Moxibustion Treatment

Acupuncture is a key therapeutic approach in Traditional Chinese Medicine, supported by substantial empirical evidence for the treatment of CP/CPPS. This evidence has led to its recommendation by urologists both in China and internationally.[27,28] Although most mechanistic investigations have been conducted in animal models, evidence indicates that acupuncture exerts significant anti-inflammatory, immunomodulatory, and neuromodulatory effects.[29-31] By stimulating the release of endogenous opioids, modulating the nervous system, and mechanically stimulating the muscle fascia, acupuncture activates both ascending and descending pain inhibition pathways, effectively relieving CP/CPPS.[32] All acupuncture techniques are based on the theoretical framework of meridians and acupoints. Various methods utilize different types of needles or moxibustion tools to stimulate specific acupoints or anatomical regions. These include traditional acupuncture with filiform needles, electroacupuncture, needle-warming moxibustion, and acupoint catgut embedding. Additional therapies such as stick moxibustion, cone moxibustion, and acupoint-sticking therapy are also employed in CP/CPPS treatment (Figure 1).[25] Despite variations in stimulation method, intensity, and duration, these techniques share the common goal of achieving therapeutic efficacy.

Traditional acupuncture utilizing filiform needles remains foundational in Chinese medicine, wherein precise insertion and manipulation at meridian-based acupoints aim to elicit the "Deqi" sensation, thereby facilitating Qi flow and promoting systemic balance.[26] Electroacupuncture, which incorporates electrical stimulation through inserted needles, has been shown to enhance analgesic efficacy and modulate neural activity more effectively.[33] Needle-warming moxibustion combines acupuncture with thermal therapy by burning moxa on the handles of inserted needles,

thereby improving local microcirculation and alleviating symptoms associated with cold-induced pelvic discomfort.[34]

Specialized approaches such as acupoint catgut embedding, in which absorbable surgical threads are implanted into acupoints, provide prolonged stimulation and extended symptom relief.[35] Moxibustion-based techniques, including stick moxibustion and cone moxibustion, apply sustained heat through the combustion of moxa to warm meridians and alleviate chronic pelvic congestion.[36] Furthermore, acupoint-sticking therapy, which entails applying medicated herbal patches to targeted acupoints, delivers continuous pressure and promotes transdermal absorption of herbal compounds, offering a supplementary strategy for long-term symptom management.[37] The Standards for Reporting Interventions in Clinical Trials of Acupuncture (STRICTA) guideline is commonly applied to improve transparency and reproducibility in acupuncture trials for CP/CPPS by ensuring that intervention details are reported with sufficient rigor.[38] However, most available RCTs remain constrained by small sample sizes, heterogeneous study designs, and inconsistencies in acupoint selection, treatment duration, and frequency, thereby limiting the certainty of conclusions. These methodological shortcomings underscore the need for larger, standardized trials to generate more robust and definitive clinical recommendations.[39] Much of the current evidence on acupuncture for CP/CPPS originates from China, which raises concerns about its generalizability across different healthcare systems and patient populations. Variations in cultural context, clinical practice, and study design may influence reported outcomes, highlighting the need for validation in broader settings. Future research should therefore prioritize large-scale, high-quality international trials and mechanistic investigations, with particular emphasis on standardizing acupoint selection, treatment protocols, and outcome measures. Furthermore, the

development of clear regulatory frameworks and structured practitioner training will be essential to ensure safe, consistent, and evidence-based clinical implementation.

Despite differences in stimulation methods and durations, these modalities share a common therapeutic objective: to restore physiological homeostasis and alleviate the symptoms of CP/CPPS. An expanding body of empirical research and growing endorsement in international urological guidelines underscore their clinical relevance and integrative potential.[40] Acupuncture may be particularly suitable for patients who have not achieved adequate symptom relief with conventional therapies or who prefer integrative approaches, provided they meet criteria such as absence of contraindications and willingness to engage in repeated sessions.[41] Importantly, considerations of cost-effectiveness and accessibility are central to clinical implementation; while acupuncture demonstrates promising therapeutic value, broader integration will require attention to insurance coverage, availability of trained practitioners, and healthcare system support to ensure equitable patient access.[42]

Mechanism

Acupuncture, a therapeutic practice originating during China's Warring States Period, has a history spanning over two millennia.[43] In modern clinical contexts, its effectiveness in managing various medical conditions has been increasingly supported by a synthesis of traditional insights and contemporary biomedical research.[44] Although the exact mechanisms through which acupuncture benefits patients with chronic prostatitis/chronic pelvic pain syndrome (CP/CPPS) are still being understood, its positive outcomes are often linked to neuromodulatory, immunomodulatory, and anti-inflammatory actions.

Research categorizes acupuncture's neurological effects into local, intersegmental, extrasegmental, and central mechanisms.[45] Locally, peripheral opioid analgesia is initiated through stimulation of acupoints or fascial sites, activating an axonal reflex.[46] This triggers Aδ and C fibers to release vasoactive substances and pro-inflammatory neuropeptides, such as CGRP, Substance P, neurokinin A, opioids, galanin, somatostatin, and vasoactive intestinal peptide.[47] These mediators induce the release of endorphins and their receptors (μ, δ, κ), particularly in inflamed tissues, thereby dampening pain transmission via peripheral opioid pathways.

At the spinal level, analgesia involves somatic afferents and aligns with the "gate control theory," wherein afferent nerve activation inhibits projection neurons through dorsal interneuron modulation.[48] This interaction attenuates nociceptive signaling and activates intrinsic anti-injury mechanisms within the spinal cord. Electroacupuncture, in particular, enhances sympathetic nerve activity and upregulates intracellular adhesion molecule-1 expression in inflamed vasculature, facilitating leukocyte and monocyte infiltration. These immune cells, rich in β-endorphins and met-enkephalins, contribute to pain suppression via the descending inhibitory pathways.[49]

Acupuncture's anti-inflammatory properties are mediated through multiple pathways. A comprehensive review of animal studies found that approximately two-thirds investigated how stimulation at the Zusanli point modulated inflammation-related markers in bodily fluids. Identified mechanisms include TLR4/NF-κB signaling, macrophage polarization, MAPK pathways, and the cholinergic anti-inflammatory route.[29] These mechanisms frequently operate in concert with analgesic and immunomodulatory processes. Other studies have highlighted the role of key cytokines and immune cells at acupoints, such as IL-6, MCP-1, fibroblasts, and monocyte-macrophages—in mediating inflammatory pain relief. Beyond neuromodulation and immunoregulation, acupuncture also influences endocrine activity, reduces oxidative stress, and modulates prostate adhesion molecules.[50] These effects support the structural integrity of prostate tissue and enhance local microcirculation. Additionally, acupuncture has been associated with increased zinc concentrations in the prostate and improvements in bladder function, suggesting broader benefits for urogenital health.[36]

While these mechanistic insights provide a valuable framework for understanding how acupuncture may influence neuromodulatory, immunomodulatory, and anti-inflammatory pathways, it is important to acknowledge that much of the supporting evidence originates from animal models and preclinical investigations. The direct translation of these findings to human patients with CP/CPPS remains uncertain, as interspecies differences in physiology, immune regulation, and neural circuitry can limit the generalizability of results. Moreover, clinical outcomes are often influenced by additional variables, such as patient heterogeneity, placebo responses, and variations in acupuncture protocols, that are not adequately captured in preclinical settings. Recognizing this translational gap emphasizes the need for cautious interpretation of

mechanistic data and underscores the importance of rigorous clinical trials to validate these biological pathways in human populations.

Conclusion

CP/CPPS presents a complex clinical challenge due to its multifactorial etiology and symptom variability. While pharmacological therapies remain part of the initial treatment, their limited efficacy necessitates the inclusion of individualized nonpharmacologic strategies. Acupuncture and moxibustion have emerged as effective, evidence-based interventions capable of addressing the neuromuscular, inflammatory, and psychosomatic dimensions of CP/CPPS. By modulating pain pathways, immune responses, and the urogenital microenvironment, these therapies provide meaningful symptom relief and improve patient quality of life. Their increasing integration into CP/CPPS management protocols reflects a broader shift toward multimodal, patient-centered care. Future studies should focus on refining indications, optimizing treatment parameters, and identifying biomarkers for response to maximize therapeutic outcomes.

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Figure 1 *Schematic plot of different acupuncture devices*