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TOPIC PAPER

Sexual dysfunction in chronic prostatitis/chronic pelvic pain syndrome

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Abstract Chronic prostatitis/chronic pelvic pain syndrome (CP/CPPS), or NIH category III prostatitis, is a common clinical syndrome characterized by genital/pelvic pain and lower urinary tract symptoms in the absence of urinary tract infection. There is also growing recognition of the association of sexual dysfunction with CP/CPPS including erectile dysfunction, ejaculatory pain, and premature ejaculation. In this review, we discuss the association between CP/CPPS and sexual dysfunction, potential mechanisms for sexual dysfunction, and treatment strategies for erectile dysfunction in CP/CPPS.

Keywords Prostatitis · Erectile dysfunction · Pelvic pain

Introduction

Chronic prostatitis/chronic pelvic pain syndrome (CP/CPPS), or NIH category III prostatitis, is a common clinical syndrome affecting up to 15 % of all men [1]. It is characterized by pain or discomfort localized to the abdomen, pelvis, and genitals, as well as irritative and obstructive lower urinary tract symptoms (LUTS) in the absence of urinary tract infection. These symptoms are associated with significant morbidity and have a detrimental impact on quality of life and healthcare costs [2]. The past decade has seen a renewed interest in this clinical entity. With the development of more rigorous classification systems and standardized symptomatic assessment tools, there is a growing appreciation of the association of sexual dysfunction with CP/CPPS. In particular, men with CP/CPPS were significantly more likely to experience erectile dysfunction (ED), ejaculatory pain, and premature ejaculation (PE) compared to the general population. In this article, we aim to evaluate the association between CP/CPPS and sexual dysfunction, discuss potential mechanisms by which CP/CPPS can lead to ED, and review treatment strategies for ED in CP/CPPS (Fig. 1).

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Prevalence of ED and sexual dysfunction in CP/CPPS

Chronic prostatitis/chronic pelvic pain syndrome is a complex entity with unclear etiology. Until recently, its relationship with sexual dysfunction has often been overlooked. However, a growing body of literature suggests a high prevalence of sexual dysfunction in men with CP/CPPS. Men with CP/CPPS have reported problems including pain at ejaculation, pain during or after sexual intercourse, partial or complete erectile dysfunction, decreased sexual desire, and premature ejaculation [3].

In the general population, ejaculatory pain is rare (1 % in one study) [4]. However, ejaculatory pain is recognized as a common feature of men with CP/CPPS, and in some men, ejaculatory pain may be the only manifestation of prostatitis [5]. In fact, ejaculatory pain has its own question on the NIH Chronic Prostatitis Symptom Index (NIH-CPSI), question 2b, which asks, "In the last week, have you experienced pain or discomfort during or after sexual climax (ejaculation)?" During the creation of the NIH-CPSI, it was noted that ejaculatory pain was present in 58 % of patients with prostatitis compared to 17 % of patients with benign prostatic hyperplasia and 4 % of controls [6]. More recently, the National Institute of Health Chronic Prostatitis Cohort Study investigated a group of 486 men who had

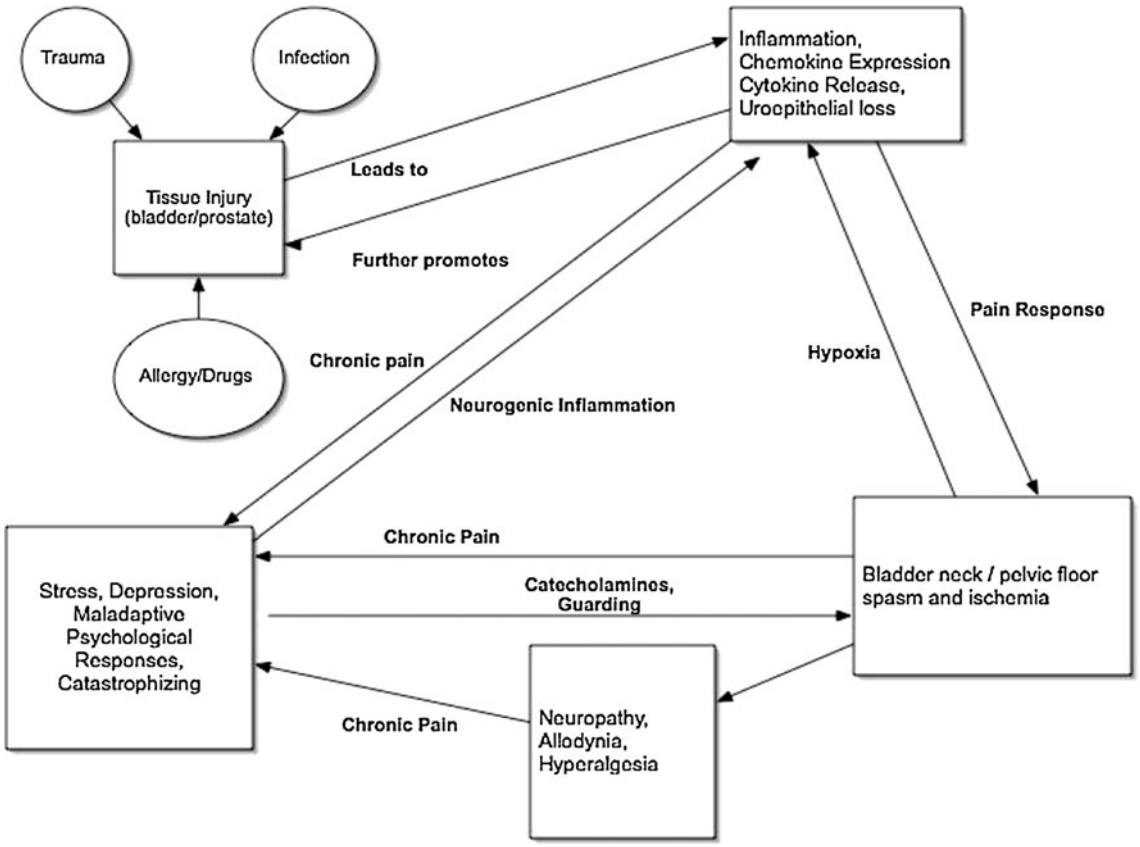

Fig. 1 Multifactorial etiology of chronic pelvic pain syndrome

experienced pelvic pain or discomfort for at least 3 months during the 6 months prior to their initial screening visit, and who were followed at 3 monthly follow-up visits [4]. In this study, 24 % of men had regular ejaculatory pain, 50 % had it intermittently, and only 26 % of men with CP/CPPS never experienced ejaculatory pain. Additionally, the study showed a correlation between increasing overall NIH-CPSI scores and intermittency of ejaculatory pain, with men who experienced ejaculatory pain every time scoring significantly higher on the NIH-CPSI assessment. Furthermore, patients who experienced persistent ejaculatory pain were less likely to have an improvement in their NIH-CPSI at 1-year follow-up. All studies also demonstrated that men with ejaculatory pain had worse quality of life overall compared to men with CP/CPPS and without ejaculatory pain [3, 4, 7]. While ejaculatory pain is a common feature of CP/CPPS, it must be noted that it may be present in up to 20 % of men with benign prostatic hyperplasia (BPH) alone as well [8]. However, a study comparing incidence of post-ejaculatory pain showed significantly higher rates of ejaculatory pain in men with CP/CPPS than those with either BPH or ED alone [9].

Premature ejaculation is a common condition that has been associated with CP/CPPS, prostatic inflammation, and chronic bacterial prostatitis [10]. A cohort study of 153 Egyptian men with premature ejaculation found a statistically significant association with CP/CPPS in 64 % of patients and with chronic bacterial prostatitis in 52 % of patients [11]. An Italian study similarly found that there was an association with prostatic inflammation in 56.5 % and chronic bacterial prostatitis in 47.8 % of men with PE [12]. A Chinese cohort study found prostatic inflammation in 46.2 % and CBP in 34.7 % [13]. In a Turkish study of 66 patients with CP/CPPS, PE was seen in 77 % and the combination of PE and ED in an additional 15 % [14].

Erectile dysfunction, defined as the inability to obtain or maintain an erection sufficient for adequate sexual performance, is a highly prevalent complaint among patients with CP/CPPS. Recent literature has reported a prevalence of ED in patients with CP/CPPS of 15.0–40.5 % [13, 15, 16]. A 2008 study by Lee et al. [3] investigated the prevalence of sexual dysfunction (self-reported erectile dysfunction, ejaculatory difficulty, or both) among a population of 296 Malaysian men presenting to general urology clinics with CP/CPPS. Participants scoring 21 or less on the International Index of Erectile Function (IIEF) were defined as having ED. Ejaculatory difficulty was defined as including one or more of the following symptoms: ejaculatory pain,

premature ejaculation, lack of interest in sexual activity, or difficulty reaching ejaculation. According to the above definitions, 72.3 % of participants had self-reported sexual dysfunction. Of the patients with sexual dysfunction, 25.0 % complained of ED only, 33.4 % had ejaculatory difficulties only, while 41.6 % experienced both. Moreover, men reporting any element of sexual dysfunction reported worse CP/CPPS symptoms and worse quality of life than men without sexual dysfunction. A 2002 cross-sectional survey conducted in Singapore also reported that men with CP/CPPS had worse erectile function as measured with the IIEF assessment tool and worse quality of life than men without prostatitis [17]. A recent case–control study looking at a population of 3,194 Taiwanese males with ED by Chung et al. [18] found that men with ED were more likely to have had a previous diagnosis of CP/CPPS (OR 3.62, 95 % CI) after adjusting for various demographic factors than compared with control patients.

Mechanism of erectile dysfunction in CP/CPPS

While there is substantial evidence suggesting a link between CP/CPPS and ED, there is scant literature addressing the potential mechanisms underlying these two conditions [19]. ED usually has a multifactorial etiology, and organic, physiologic, endocrine, and psychogenic factors are all involved in the ability to achieve and maintain an erection. Here, we review possible associations between CP/CPPS and these basic etiologies of ED. The following relationships also necessarily depend upon patient age because of the increasing prevalence of ED in older populations. Naturally, interest in the mechanisms of ED in the CP/CPPS population would be focused on younger men who may be more likely to benefit from therapies directed at ED.

Vasculogenic arterial insufficiency and veno-occlusive disease

A majority of men with arteriogenic ED have impaired penile perfusion in the setting of systemic atherosclerotic disease. While common risk factors associated with arterial insufficiency such as hypertension, hyperlipidemia, and diabetes mellitus are less likely to be present in the young man with CP/CPPS, studies have shown that this population may still suffer from arterial inflow problems resulting in sexual dysfunction. A case–control study involving men with CP/CPPS demonstrated that this group was more likely to have evidence of arterial stiffness associated with nitric oxide-mediated vascular endothelial dysfunction compared to asymptomatic controls [20]. Decreased arterial inflow may also be related to extrinsic compression from pelvic floor spasm. Up to 50 % of patients with CP/CPPS have signs of pelvic floor spasm on physical exam [21]. Pelvic floor physical therapy with myofascial release has been shown to significantly improve pelvic pain, urinary symptoms, and sexual dysfunction in these men [22].

Veno-occlusive dysfunction is another important cause of vasculogenic impotence and is related to degenerative changes related to aging or traumatic injury. Thus far, no evidence has demonstrated a link between venogenic ED and CP/CPPS, and it is unlikely to be a prominent contributor to sexual dysfunction in the young male with CP/CPPS. However, it is possible that Doppler sonographic parameters in a patient with adrenergic vasospasm in the setting of high anxiety could lead to the incorrect diagnosis of veno-occlusive disease [23, 24].

Endocrine

Hypogonadism is a common finding in men with ED. It has been postulated that sex hormones may also be an important factor in the development of prostatitis [25]. Thus far, evidence of a link between CP/CPPS and ED remains to be determined. Recent findings regarding the genetics of patients with CPPS suggest that an underlying problem with androgen regulation that may contribute to the development of prostatitis. Patients with CPPS have been found to have a different frequency of alleles near the phosphoglycerate kinase one gene, a region that is associated with familial prostate cancer, hypospadias, and androgen insensitivity [26]. Interestingly, another gene in the same region is the androgen receptor, thus raising the possibility of androgen insensitivity or dysfunction in the pathogenesis of CPPS. In one small case–control study, CP/CPPS patients were found to have higher serum levels of androstenedione and testosterone and lower levels of cortisol as compared to controls [27]. The finding of increased concentrations of proximal adrenocortical hormones with a corresponding decrease in hormones that were more distal on the steroidal synthetic pathway suggested that some men with CP/CPPS may have a defect in 21-hydroxylase. Finally, while few CP/CPPS patients require long-term management with opioid medications, the use of these drugs is associated with acquired hypogonadism [28].

Neurogenic

It is estimated that 10–19 % of ED is neurogenic in etiology. Because erection is a neurovascular event, any pathology affecting the brain, spinal cord, and cavernous/pudendal nerves may lead to dysfunction. Several mechanisms have been postulated regarding the neurologic basis of CP/CPPS that may also overlap with well-recognized neurologic causes of ED. Patients with CP/CPPS are

almost five times more likely than controls to have a history of neurologic disease [25]. Men with CP/CPPS have also been found to have abnormalities in the afferent and efferent autonomic nervous systems resulting in a neuropathic pain related to central nervous system sensitization. Interestingly, at a molecular levels, several of the inflammatory markers and growth factors postulated to play a role in the neurologic basis CP/CPPS have also been found to be associated with erectile function/dysfunction although a clear mechanism linking the two conditions has yet to be defined [26, 29].

Psychogenic

In addition to the contribution of vasculogenic, endocrine, and neurogenic factors, psychological factors may also play a key role in the pathogenesis of ED in CP/CPPS. As is commonly seen with other pain conditions, CP/CPPS has a well-recognized association with stress, anxiety, and maladaptive responses to stressful situations ("catastrophizing") [19]. Results from a 2008 case–control study show that, in addition to pain symptoms, a number of other psychological factors influence the sexual lives of men with CP/CPPS [30]. A statistically significant decline in erectile function was observed not only with increasing pain symptoms but also in men with worse stress appraisal. Additionally, frequency of sexual activity declined with increasing depression, and orgasm and pleasure/satisfaction from a sexual encounter declined with worse stress appraisal and a greater non-belief in the relationship between emotions and pain. Studies have also demonstrated that CPPS subjects tended to have lower mental health scores compared to the general population and also tended to present with psychological adaptation problems related to depression, anxiety, hysteria, hypochondriasis, and somatization disorders [31]. The use of psychotropic medications in the subset of patients with both CPPS and the above psychological co-morbidities may also be a significant contributing factor to ED in this population.

ED and phenotyping in CP/CPPS

Clinicians seeking an evidence-based approach to the management of men with CP/CPPS are often frustrated. Many promising therapies that appear to work in clinical practice have failed to demonstrate efficacy when subjected to the gold standard of the randomized placebo-controlled clinical trial. Only in the past several years has it been recognized that the CP/CPPS population is not a homogeneous group of patients with similar etiologic mechanisms and symptomatology but, rather, a diverse group of individuals with differing phenotypes requiring different therapies. The UPOINT system was developed in recognition of the need for individualized therapy [32, 33]. It is a classification system that is used to categorize the phenotype of patients with CP/CPPS using six clinical domains: urinary, psychosocial, organ-specific, infection, neurologic/systemic, and tenderness of muscles. Recent awareness of the prevalence of sexual dysfunction in men with CP/CPPS led to the proposal of the addition of a seventh domain to the UPOINT system: "S" for sexual dysfunction. A 2009 Swedish study found good correlation between the number of positive UPOINT domains and NIH-CPSI scores; however, the study was critical of the lack of correlation between the number of positive domains and the presence of sexual dysfunction [34]. An Italian cohort study later demonstrated that UPOINT-guided therapy significantly improved correlation with CP/CPPS symptoms; however, a similar German cohort study found strong correlation only after a separate ED domain was included [35]. The inclusion of an erectile domain was later rigorously tested in a 2011 study [36]. The S domain was found to be positive in 28 % of the 100 patients with CP/CPPS included in this study. However, the S domain did not independently affect either CPPS symptom severity as measured by the NIH-CPSI or quality of life. Nonetheless, the prevalence of sexual dysfunction in this and numerous other studies highlights the importance of assessing for and appropriately treating for ED in the CP/CPPS patient population.

ED and therapy in CP/CPPS

There are very few studies that specifically address the response of sexual dysfunction in CP/CPPS to treatment. Future avenues of investigation should focus on whether treatments for CP/CPPS also improve sexual dysfunction, and, conversely, whether treatment for ED may also improve the symptoms of CP/CPPS.

The only studies that address the efficacy of CP/CPPS therapies on ED involve alpha blockers and pelvic floor physical therapy. A 6-month open-label study suggested that alfuzosin 10 mg once daily significantly improved LUTS, quality of life, and sexual function in men with CP/CPPS [37]. Another study similarly showed that doxazosin improved both ED and LUTS symptoms in both men with and without CP/CPPS [38]. A study of 146 men with refractory CPPS who underwent one month of pelvic floor physical therapy demonstrated a greater than 50 % improvement in sexual symptoms as assessed by the pelvic pain symptom survey [22]. Quercetin, an herbal anti-inflammatory and anti-oxidant supplement with proven benefit in CP/CPPS, showed improvement in ED in an animal model [39].

The role of oral phosphodiesterase-5 (PDE-5) inhibitors in CP/CPPS is not clearly defined and has never been

specifically studied. However, it is hypothesized the PDE-5 inhibitors may reduce prostatic inflammation and subsequent prostatic symptoms by PDE-5 inhibitor-mediated washout of prostatic reflux products [40]. Additionally, the beneficial effect of PDE-5 inhibitors on LUTS suggests a role in improving at least the urinary symptoms in patients with CP/CPPS [41]. In a small study assessing the effectiveness of sildenafil on a group of 36 men with LUTS, sildenafil was associated with an improvement in ED with no effect on LUTS when the cases were divided into two groups with and without CP/CPPS [42]. However, the mean age of the study population (59 years) and small population make it difficult to draw significant conclusions from these results.

Finally, the strong relation between psychological factors and sexual dysfunction in men with CPPS reinforces the need for a comprehensive approach to managing CPPS [30]. In addition to medical therapies, such an approach should also integrate interventions to address pain-related beliefs, emotional coping strategies, and stress management.

Conclusion

Sexual dysfunction in CP/CPPS encompasses a diverse spectrum of symptoms including erectile dysfunction, painful ejaculation, and premature ejaculation. The exact mechanism of sexual dysfunction in CP/CPPS remains to be elucidated; however, recent research suggests a multifactorial association with vascular, neuromuscular, endocrine, and psychogenic etiologies. The literature regarding therapies for ED in CP/CPPS is scarce and future work in this area would have significant impact on a clinical phenotype that is increasingly recognized as an important feature of men with CP/CPPS.

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