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Frequent ejaculation associated free radical and lactic acid accumulation cause noninfectious inflammation and muscle dysfunction: A potential mechanism for symptoms in Chronic Prostatitis/Chronic Pelvic Pain Syndrome

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SUMMARY

Background: The prevalence of prostatitis is extremely high, with vast majority belongs to National Institutes of Health Category III: Chronic Prostatitis (CP)/Chronic Pelvic Pain Syndromes (CPPS). The etiology of CP/CPPS is noninfectious, with no precise mechanisms has been elucidated to date.
Hypothesis: During male ejaculation, the pelvic muscles undergo coordinated intense contraction to expel the semen out of the male genital tract, a process associated with locally increased levels of lactic acid and free radicals as byproducts. In this regards, repetitive sexual activities with frequent ejaculation would impede the drainage and cause accumulation of these byproducts in the pelvic region, triggering consequent local pathophysiological changes such as edema, venous dilation and muscular malfunction, which further leads to common complaints in CP/CPPS patients such as lower urinary tract symptoms, pelvic discomfort and pain.
Rationale: Large cohort studies have revealed that frequent ejaculation is associated with higher risk of prostatitis, especially in young men. Also, clear evidences from sports medical research has shown that intense muscular contraction will lead to locally increased production of free radicals and lactic acid. Therefore, the pelvic muscles during ejaculation would induce substantial increase of these byproducts, which if not cleared effectively, could trigger series of local cellular/tissue damages resulting in inflammation, muscular fatigue and dysfunction. If our hypothesis were validated, it could be suggested that at least in some patients, the treatment of CP/CPPS could be tuned as dealing with post-sports recovery, such as hot bath to promote local blood circulation and free radical scavenger drugs such as vitamin C and E to neutralize free radicals.

Introduction

The National Institutes of Health Category III Chronic Prostatitis/Chronic Pelvic Pain Syndrome (CP/CPPS) continues to pose great challenges to most urologists throughout the world. This kind of so-called prostatitis is the most prevalent and characterized by a constellation of lower urinary tract symptoms such as frequency, urgency, incomplete voiding, pelvic discomfort and pain [1]. To date, bacteria infection has been proved not to be the cause of the symptoms [2]. However, little progress has been made in providing a convincing etiology of this frustrating disease, and no effective diagnosis and treatment has been invented. Now, the most basic question continues, what is prostatitis? Is it really a disease of prostate gland itself? If not, what's the real cause underlining all these symptoms? Indeed, more and more researchers and urologists have begun looking beyond the prostate gland itself for alternative explanations for this disease [2,3].

Hypothesis and rationale

In our belief, a changed inflammatory local environment and pelvic muscular dysfunction could explain most symptoms observed in CP/CPPS patients. Indeed, urodynamic studies have confirmed that most of the lower urinary tract symptoms are highly related to pelvic muscular disorders, which could be associated with local inflammation [4,5]. Thus, when we considering the cause of CP/CPPS symptoms, what is the source of local inflammation and muscular dysfunction? With this question in mind, epidemiological data has provided us clues that frequent ejaculation is associated with higher risk of prostatitis, especially in young men [6]. This conclusion has led us further look into the process and outcome of ejaculation. From a perspective of pathophysiology, frequent sex activities with ejaculations are associated with repetitive intense pelvic muscular contraction and pelvic congestion,

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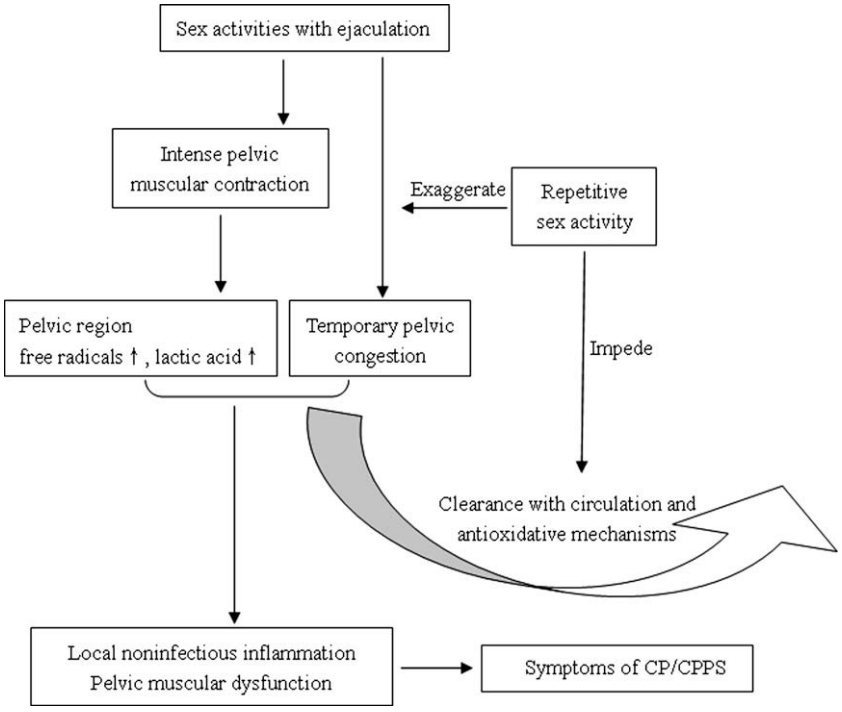

Fig. 1. A diagram explaining the hypothesis.

creating a local environment with high muscular energy metabolism and congested circulation. This situation, in our opinion, is a vital step towards subsequent symptoms in CNP/CPPS patients.

Now let's analyze this situation in a view of sport physiology, long term sports medical research has provided credible evidence indicating that during and after intense muscular contraction, the working muscle cells will generate high levels of free radicals, posing a substantial degree of oxidative stress to the local environment [7]. If the contraction is exerted in an environment with inadequate oxygen delivery, it will also produce high levels of lactic acid as a byproduct of anaerobic energy production [8]. Consequently, if the accumulating free radicals and lactic acid overload the local clearance rate and antioxidative ability, they will trigger series of pathophysiological changes resulting in noninfectious inflammation and initiating delayed-onset muscle soreness, therefore cause pain and decreased muscle performance [9]. When considering the situation of frequent sex activity with ejaculation, one will find that the pelvic environment is somewhat similar with the situation described above. When the pelvic region accumulated excessive lactic acid and free radical, they initiate pathophysiological changes such as edema, venous dilation and muscular malfunction, resulting in symptoms such as discomfort and pain in pelvic region (such as rectum, bladder area and perineum), and ill-controlled urination such as various filling and voiding symptoms (Fig. 1).

Further implications

This hypothesis could be further tested in animal models and well designed clinical trials. If our hypothesis were validated, it could be suggested that at least in some patients (with history of frequent sex activity and ejaculation), the treatment of CNP/CPPS could be tuned as dealing with post-sports recovery, such as hot bath to promote local blood circulation and free radical scavenger drugs such as vitamin C and E to neutralize free radicals.

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