

Urologic Myofascial Pain Syndromes

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Treatment of pain of urogenital origin, chronic pelvic pain syndrome, can be frustrating for patients and physicians. The usual approaches do not always produce the desired results. Visceral pain from pelvic organs and myofascial pain from muscle trigger points share common characteristics. Referred pain from myofascial trigger points can mimic visceral pain syndromes and visceral pain syndromes can induce trigger point development and myofascial pain and dysfunction. The referred pain syndrome can long outlast the initial event, making diagnosis difficult.

Introduction

Treatment of pain of urogenital origin, chronic pelvic pain, painful bladder syndrome/interstitial cystitis, chronic prostatitis, prostatodynia, and irritative voiding and bowel symptoms can be frustrating for patients and physicians. The usual approaches do not always produce the desired results. Acute insults may develop into chronic pain states with alterations of the central nervous system and autonomic functions [1].

In many ways, current medical practice still follows a traditional Cartesian view of a mind-body dichotomy. Symptoms are seen as being physical (real) or mental, which is outside the understanding of many physicians. This view implies that a person's pain experience is proportional to the amount of physical damage—the more damage, the more pain. If there is no obvious illness but the patient complaints of pain and dysfunction are intense, the search for the cause of the pain often culminates in surgery [2]. Unfortunately, lasting pain relief can be expected only if the surgery indeed has alleviated an underlying physical problem and if this dysfunction actually was the main cause of the patient's pain complaint. Many patients who are not helped by surgery are declared as drug-addicted and psychotic. At this point, patients are angry and feel betrayed and humiliated. They continue the search for a cure elsewhere.

Clinical studies including large numbers of patients show that chronic painful states of obscure causes often depend on feedback cycles from myofascial trigger points and their pain

reference zones [3]. Symptoms outlast initiating and precipitating events because of vicious cyclic neuroreflex patterns and continuing mechanical stresses on the affected somatic structures. Most tissues heal when injured, but skeletal muscles "learn;" they readily develop habits of guarding that limit movement, impair circulation, and result in chronic pain, stiffness, and dysfunction of muscles [4].

Myofascial pain and dysfunction has been suggested as a cause of pain of urogenital origin [5]. The tissues overlaying the lower abdomen, pelvis, and low back are innervated by T10 (umbilicus) through T12 (pubis) anteriorly and L1 through S5 posteriorly onto the anus and perineum. The pudendal nerve (S2, S3, S4) provides the main sensory innervation from the clitoris and vulva [6••]. All of the pelvic organs and pelvic floor musculature share the same innervation and the same neurologic reflexes and coordination. Dysfunction of one pelvic organ may affect others through a reflex mechanism. Bladder filling and emptying is regulated similarly by neural circuitry in the brain and spinal cord and requires coordination of activity in the various smooth and striated muscles of the pelvis. The central regulation of voiding is complex because reflex pathways that mediate vesicourethral function are under involuntary and voluntary control. This control is dependent on learned behavior [7]. Control of the sphincters and pelvic floor muscles is learned only with postnatal maturation of the central nervous system. If this voiding pattern is learned in an abnormal fashion or some event interrupts or disturbs its normal development, voiding dysfunction ensues and is thought to result in hypersensitivity and spasticity of the urethral sphincter mechanism and bladder. This can culminate over time into pelvic floor dysfunction and dyssynergic voiding patterns [5].

Painful Bladder Syndrome/Interstitial Cystitis

Interstitial cystitis is a painful bladder syndrome characterized by urinary urgency, frequency, dysuria, dyspareunia, and chronic pelvic pain. It often is associated with a number of other conditions including irritable bowel syndrome, endometriosis, fibromyalgia, chronic fatigue syndrome, and upper and lower torso musculoskeletal dysfunction.

In 1914, Hunner [8] described interstitial cystitis as a diagnosis made with cystoscopy characterized by the presence of discrete, red, bleeding areas on the bladder wall—the pathognomonic Hunner's ulcers [8]. Nearly 60 years ago, Dr. T. Leon Howard educated students regarding the stressful condition of these patients [9].

Today, painful bladder syndrome/interstitial cystitis is still an enigma and is a frustrating condition for the treating physician and for the patient who suffers from the disease. Its etiology and pathophysiology are incompletely understood and thus it is without a universally successful therapy. The resurgence of interest and research in the field of painful bladder syndrome has brought new understanding and hope to this condition.

Chronic Prostatitis/ Chronic Pelvic Pain Syndrome

Men with pain in the genitourinary tract, which is a common problem, generally are given a descriptive diagnosis such as orchialgia, chronic prostatitis, prostatodynia, or chronic pelvic pain syndrome (Table 1).

More than 90% of the symptomatic patients have type-III chronic prostatitis/chronic pelvic pain syndrome. This term “chronic pelvic pain syndrome” recognizes the limited understanding of the etiology of this syndrome and the possibility that organs and structures other than the prostate gland may be involved in the cause. Patients with the inflammatory subtype of chronic prostatitis/chronic pelvic pain syndrome have leukocytes in their expressed prostatic secretions, postprostate massage urine, or semen. In contrast, patients with the noninflammatory subtype have no evidence of inflammation [10•].

This definition and classification of prostatitis syndromes reflects a new interest in these disorders by researchers and hopefully will result in improved approaches to clinical diagnosis and patient management.

Irritable Bowel Syndrome

Irritable bowel syndrome (IBS) is a functional disorder characterized by abdominal pain and altered bowel habits. This syndrome may begin in young adulthood and can be associated with significant disability. IBS is characterized by chronic relapsing patterns of bloating and cramping pain with alterations in stool frequency or constitution. Pain often is relieved by defecation and it is present in 50% to 80% of these patients with any form of chronic pelvic pain [11]. IBS may present with a range and overlay of symptoms. However, abdominal pain and altered bowel habits remain the primary features. Abdominal discomfort often is described as cramping in nature and located in the left lower quadrant, although the severity and location can differ greatly. Patients may report diarrhea, constipation, or alternating episodes of diarrhea and constipation. Diarrheal symptoms typically are described as small-volume, loose stools, and stools that sometimes are accompanied by mucus discharge. Patients also may report bloating, fecal urgency, incomplete evacuation, and abdominal distention. Upper gastrointestinal symptoms, such as gastroesophageal reflux, dyspepsia, or nausea, also may be present [12].

Table 1. The National Institutes of Health consensus classification of prostatitis syndromes

I	Acute bacterial prostatitis
II	Chronic bacterial prostatitis
III	Chronic prostatitis/chronic pelvic pain syndrome <ol style="list-style-type: none"> a. Inflammatory b. Noninflammatory
IV	Asymptomatic inflammatory prostatitis

Visceral Pain and Myofascial Pain

Visceral pain from pelvic organs and myofascial pain from muscle trigger points share common characteristics [13]. Visceral and myofascial pain generally are diffuse and poorly localized. In both conditions, chronic pain sensitizes the peripheral and central nervous system, causing lowering of nociceptive thresholds. The nociceptive dorsal horn neuron receptive fields enlarge because of neurologic wind-up and result in hypersensitivity and allodynia. Referred pain can be from visceral organs to the muscles or from myofascial trigger points to visceral organs. Referred pain from myofascial trigger points can mimic visceral pain syndromes, just as visceral pain syndromes can induce trigger point development and myofascial pain and dysfunction. Painful bladder syndrome/interstitial cystitis, chronic prostatitis, and IBS often are associated with abdominal wall and pelvic floor muscle trigger point syndromes (Fig. 1). In both cases, the referred pain syndrome can long outlast the initiating event, making diagnosis more difficult [14•].

Etiology of Urologic Myofascial Pain Syndromes

Development of active trigger points can be associated with mechanical, physical, systemic, and psychologic stressors (Fig. 1). Mechanical and physical stressors such as traumatic overstretching and direct insult as in injury (eg, motor vehicle accident) are of sudden onset. Gradual onset follows overuse, repetitive strains, motion injury, or abnormal assumed postures [4] (Table 2).

Activation of trigger points can result from a fall, automobile accident, or surgery in the pelvic region. However, very often, no injury can be identified. Sitting in a slumped or slouched posture for prolonged periods also can be responsible. Dysfunction of the sacroiliac joints and sacrococcygeal articulation may be aggravating sources of trigger points. Discrepancy in length of the legs as little as 0.5 cm can cause back pain, trigger points, and pelvic distortion. A head-forward kyphotic posture may perpetuate trigger points in gluteus muscles. Position at the work desk (especially computer work stations), sleeping patterns, shoes, and posture need to be evaluated [4] (Table 3).

Some physicians have implicated voiding dysfunction in the pediatric population as the beginning of a long process

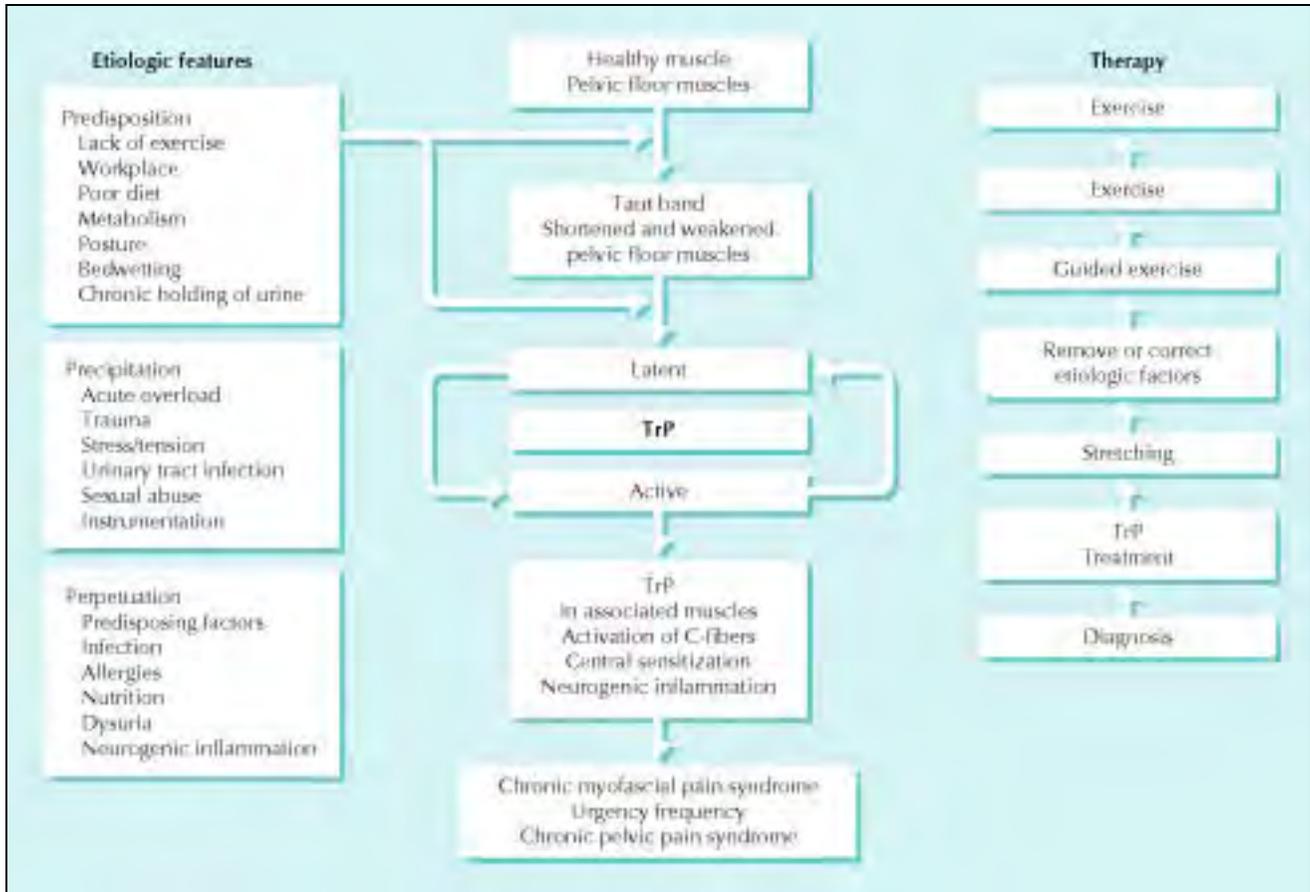


Figure 1. Trigger point (TrP) and chronic pelvic pain syndrome development.

Table 2. Referred myofascial pain sources

Referred pain	Muscle source
Abdominal pain	Rectus abdominis, obliquus externus abdominis, iliocostalis thoracis, multifidi, quadratus lumborum, pyramidalis
Buttock pain	Gluteus medius, gluteus maximus, quadratus lumborum, iliocostalis lumborum, longissimus thoracis, semitendinosus, semimembranosus, piriformis, gluteus minimus, rectus abdominus, soleus
Iliosacral pain	Levator ani, coccygeus, gluteus medius, quadratus lumborum, gluteus maximus, multifidi, soleus, rectus abdominis
Lumbar pain	Gluteus medius, multifidi, iliopsoas, longissimus thoracis, rectus abdominis, iliocostalis thoracis, iliocostalis lumborum
Pelvic pain	Coccygeus, levator ani, obturator internus, abductor magnus, piriformis, obliquus internus abdominis

Table 3. Pelvic anatomy and function

Anatomy
Bony pelvis: ischium, ilium (innominate), pubis
These three bones are fused, but have mobile articulations: the sacroiliac joints, the pubic symphysis, and the sacrococcygeal articulation
Additional articulations: acetabulum-femoral head, fifth lumbar-sacrum articulation
Function
Transfer weight-bearing between trunk and lower extremities (weight-bearing: hips/sacroiliac joint/lumbar spine)
Support and protect pelvic viscera
Provide muscular and ligamentous attachments
Reproductive functions (birth canal, support fetus)

that results in pelvic floor dysfunction in adults [5]. It has been suggested and observed that chronic pelvic floor and voiding dysfunction leads to bladder irritation and inflam-

matory changes damaging the bladder and causing a chronic pelvic pain complex (Fig. 1). In our experience, we have seen that more than 50% of patients with interstitial cystitis report voiding dysfunction in childhood (eg, enuresis, urgency/frequency syndrome, or recurrent urinary tract infections). A significant number of these patients referenced previously in our experience also report a history of sexual or physical abuse at a young age, which also may be a contributing factor to their pelvic floor disorder (unpublished data).

All of the pelvic organs and pelvic floor musculature share the same innervation and the same neurologic reflexes and their coordination. Dysfunction of one pelvic organ may affect others through the reflex mechanism. Pelvic anatomy and function are presented in Table 3.

A particularly deceptive feature of trigger points is that their presence may not be known until a series of muscle stresses exceeds the limit of trauma for that muscle. A spine or hip problem, poor posture, or abnormal holding patterns may weaken the pelvic floor muscles. At a much later time, bladder or vaginal infections, trauma, or surgery may add to the already stressed muscle and cause acute pain or abnormal functioning. In other words, a trigger point may become active as a result of a seemingly inconsequential event [4].

Visceral diseases tend to increase activity of myofascial trigger points. Examples are herpes viruses and urinary tract infections. Chronic allergies and impaired sleep also can make muscles more painful [4]. Yoshimura [15] demonstrated that chronic bladder inflammation induces C-fiber bladder afferent hyperexcitability. Injury to nerves in the distal urethra and pelvic floor also can induce hyperexcitability of C-fiber afferent neurons. Similar changes in bladder and urethral afferent pathways may contribute to painful symptoms in interstitial cystitis.

Subclinical hypothyroidism [16] and nutritional inadequacies can be causative and perpetuating factors in hyperirritable muscles and myofascial pain syndrome. Proper nutrition needs to be discussed with the patient if lasting relief from pain is to be achieved.

Psychologic factors contribute to perpetuating myofascial trigger points. Physicians must be careful not to assume that psychologic factors are primary. This wrong assumption can be, and often is, frightfully devastating to the patient [4]. Depression and chronic pain are closely associated, especially if patients are not obtaining understanding or relief from their symptoms.

Diagnosis

An in-depth history and physical examination are the most important aspects of the diagnostic work-up. This includes questions regarding potty training, sexual habits and eventually abuse, and bowel habits. Detailed review of systems is essential, including prior surgeries (hysterectomies, laparoscopies, cystoscopies with possible urethral dilations, or even urethrotomies) and the events leading to the interventions.

Urinary urgency, frequency, nocturia, dyspareunia, constipation or diarrhea, and pelvic pain are cardinal symptoms of these crippling disorders. Patients often report urinary or bowel frequency as their attempt to relieve pelvic or lower abdominal pain, not just because of fear of incontinence.

The location of the pain, type of pain, precipitation factors, and alleviating factors need to be investigated.

To better evaluate bladder function, a voiding diary is a necessity. Patients with interstitial cystitis typically void more frequently than those with overactive bladder. Some patients report urinating up to 50 times daily. A diary also provides useful information regarding voiding patterns and maximal functional bladder capacity [17•].

A urinalysis is recommended to rule out urinary tract infection. Patients with interstitial cystitis commonly have sterile pyuria and, in some cases, microscopic hematuria. Every patient with hematuria should be evaluated further with cystoscopy and renal radiographs to exclude other genitourinary pathologies. Urine cytology may be useful in select patients.

A pelvic pain and urgency/frequency questionnaire (PUF) has been developed recently to help diagnose patients with chronic pelvic pain syndrome [18] (Fig. 2). The PUF score evaluates the severity of the patient's frequency, urgency and pain, and incidence in reduction of quality of life. A score higher than 10 is highly suggestive of a diagnosis of painful bladder syndrome/interstitial cystitis or chronic prostatitis and may help physicians screen patients for the disorder.

Examination of the Patient

The patient needs to be evaluated for posture, gait, pattern of sitting, and pelvic alignment. Patients with pelvic pain often walk slowly and sit on one side and put the leg under the buttock to avoid pressure on the pelvic floor muscles by correction of pelvic asymmetry.

During physical examination, patients with interstitial cystitis typically demonstrate abdominal and pelvic floor tenderness in the absence of other local pathology. Inability to isolate and contract their pelvic floor musculature is common because the muscles already are chronically in spasm [17•]. Patients need to be evaluated for myofascial pain syndromes.

Myofascial pain syndrome is a neuromuscular condition resulting from mechanical failure associated with causative and perpetuating factors. Repetitive motion injury, trauma, and illness cause trigger points, which can occur in any and every muscle of the body. It affects as many men as it does women. The pain is in specific spots rather than generalized as with fibromyalgia; it is not just a central nervous system disorder.

Myofascial trigger points are identifiable by physical examination and specifically by palpation.

During examination, objective and subjective signs are investigated. Various palpation techniques were used to isolate active myofascial trigger points in the muscles of four patients. Physical evaluation included musculoskeletal and posture assessment and analysis of gate and active range of motion and strength. Overall muscle tone, tissue sensation location of tenderness and trigger points, and perineal movement were evaluated. Vaginal or rectal pelvic examination assessed tenderness, contraction, strength, and coordination of the pelvic floor muscles [19].

Pelvic Pain and Urgency/Frequency Patient Symptom Scale							
Please circle the answer that best describes how you feel for each question							
	0	1	2	3	4	Symptom score	Bother score
1. How many times do you go to the bathroom during the day?	3-6	7-10	11-14	15-19	20+		
2a. How many times do you go to the bathroom at night?	0	1	2	3	4+		
b. If you get up at night to go to the bathroom, does it bother you?	Never	Occasionally	Usually	Always			
3. Are you currently sexually active? YES ___ NO ___							
4a. IF YOU ARE SEXUALLY ACTIVE, do you now or have you ever had pain or symptoms during or after sexual intercourse?	Never	Occasionally	Usually	Always			
b. If you have pain, does it make you avoid sexual intercourse?	Never	Occasionally	Usually	Always			
5. Do you have pain associated with your bladder or in your pelvis (vagina, labia, lower abdomen, urethra, perineum, testes, or scrotum)?	Never	Occasionally	Usually	Always			
6. Do you still have urgency after you go to the bathroom?	Never	Occasionally	Usually	Always			
7a. If you have pain, is it usually		Mild	Moderate	Severe			
b. Does your pain bother you?	Never	Occasionally	Usually	Always			
8a. If you have urgency, is it usually		Mild	Moderate	Severe			
b. Does your urgency bother you?	Never	Occasionally	Usually	Always			
Symptom score [1, 2a, 4a, 5, 6, 7a, 8a]							
Bother score [2b, 4b, 7b, 8b]							
Total score [Symptom score + Bother score] =							

Figure 2. Pelvic Pain and Urgency/Frequency Patient Symptom Scale.

No specific laboratory test or imaging technique has been established to diagnose myofascial pain syndrome. However, surface electromyography and ultrasonography have potential for clinical application in the diagnosis and treatment of myofascial pain syndrome. Certain blood tests can be helpful in looking for predisposing conditions, such as hypothyroidism, hypoglycemia, and vitamin insufficiency. Specific tests that may be helpful include complete blood count, chemistry profile, erythrocyte sedimentation rate, and levels of vitamins C, B-1, B-6, B-12, and folic acid. A complete thyroid assay may be helpful even if subclinical features of thyroid disease are present [4].

Treatment

Effective treatment needs to be directed to the visceral and myofascial component. The treatment of myofascial trigger points consists of myofascial release that may be achieved by compression or by injection of minimal amounts of local anesthetics (never use steroids or adrenaline), followed by lengthening (stretching) and strengthening (physical therapy) of the involved muscles [4].

Therapy is based on lengthening and strengthening of the dysfunctioning muscle unit. Dry needling and injection of active trigger points with local anesthetics using a 25-G 1-1/2-inch needle or dry needling with a 30-G dry needle (50 mm; Seirin, Weymouth, MA). A 25-G 3-1/2-

inch spinal needle is used to reach trigger points in the deepest muscles, such as gluteus minimus and quadratum lumborum. For every type of trigger point therapy, the goal is to restore normal resting muscle length and a full range of motion, which is achieved first by passive stretching and then by active effort under a light load. Visual twitch responses at the skin surface and in the muscles are used to verify successful needle piercing of a trigger point.

The trigger point is identified by palpation as a spot of exquisite tenderness in the palpable band. Because some patients are very afraid of the skin pain caused by needle penetration, a distracting stimulus of stretching or pinching the skin or the use of cold spray as the needle is inserted may be helpful [4]. When the active trigger point is pierced by the needle, the patient usually can describe the exact distribution of the referred pain. Therefore, the patient is warned that successful needle contact with a trigger point may produce a flash of distant pain and may cause the muscle to twitch. Multiple trigger points frequently are present in more than one region of the muscle. All of the tender spots in one region should be eliminated. After each probing movement, the needle must be withdrawn to subcutaneous tissue and redirected before the next movement. In each trigger point, a very small amount (0.1 mL) of local anesthetic is injected. Using a dry needling technique or injection, the twitch response is observed. Dry needling is very helpful in a region that presents with several trigger points. After injection of local anesthetics, the dry needle is used to eliminate the remaining tender spots.

Stretching after the trigger point injection is the most integral part of the treatment. Not stretching after injection or needling is the same as receiving no treatment at all. Relief usually is long-lasting, but only when mechanical and systemic perpetuating factors are corrected [20]. Intravaginal or intrarectal trigger points are treated with biofeedback as described by Doggweiler-Wiygul and Sellhorn [21].

All of the patients are counseled regarding nutrition; they should avoid foods that favor interstitial cystitis symptoms and should add supplements such as minerals, vitamins, and essential fatty acids.

Conclusions

More than 50 years ago, Travell reported the phenomenon of referred pain and referred motor activity caused by trigger points in skeletal muscles, now known as myofascial pain and dysfunction. These substantiate the need for myofascial evaluation before considering more invasive treatments for chronic pelvic pain syndrome. Myofascial evaluation can be aided by showing patients with symptoms pictures of referred pain patterns to localize the trigger points. Patients frequently point to one or more pictures stating "this is my pain." This approach may help physicians and patients focus on underlining problems of these chronic pain syndromes.

The activation of a trigger point usually is associated with some degree of mechanical abuse of the muscle in the form of overload, which may be acute, sustained, or repetitive. Leaving the muscle in a shortened position can convert a latent trigger point to an active trigger point; this process is greatly aggravated if the muscle is contracted while in a shortened position. The patient often is aware of pain caused by an active trigger point, but may not be aware of the underlying muscle dysfunction. The intensity and extent of the referred pain pattern depends on the degree of irritability of the trigger point, not on the size of the muscle. Myofascial trigger points in small muscles can be as troublesome to the patient as trigger points in large muscles. Trigger point injection and dry needling have been shown to be the most effective treatment modalities to inactivate trigger points and provide prompt relief of symptoms [4]. If trigger points are found, treatment is directed toward their inactivation, correcting underlying perpetuating factors, and restoring the normal relationships among the affected muscles.

This report must not be construed as saying that painful bladder syndrome/interstitial cystitis, chronic prostatitis, and IBS are always caused by myofascial trigger points, but the possibility needs to be considered before planning more invasive approaches. Referred motor activity to the pelvic floor muscles (sphincters) and to the pelvic organs as a result of trigger points can be the sole or concomitant cause of these debilitating pain syndromes and certainly needs further investigation.

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