Management of Chronic Pelvic Pain

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Abstract Chronic pelvic pain is a complex condition that requires evaluation of the reproductive, gastrointestinal, urologic, musculoskeletal, psychological, and neurological systems. Usually, diagnosis and management entail identifying a network of disorders rather than a single cause of pain with a definitive cure. Only disorders that we commonly encounter in our practice will be discussed in this review.

Keywords Chronic pelvic pain · Management · Irritable bowel syndrome · Gastrointestinal dysfunction · Diet · Interstitial cystitis · Endometriosis · Ovarian remnant syndrome · Uterine retroversion · Adhesive disease · Pelvic congestion syndrome · Myofascial pain syndrome · Pelvic floor tension myalgia · Neurectomy · Hysterectomy · Trigger points · Pelvic floor tension myalgia

Introduction

Chronic pelvic pain (CPP) refers to noncyclical pain of 6-month duration that occurs below the umbilicus and is severe enough to cause functional disability or require treatment. It is a condition that afflicts women of all age groups, with the mean age around 30 years. CPP accounts for about 10% of all ambulatory referrals to a gynecologist, 20% of all hysterectomies performed for benign disease, and 40% of all gynecologic laparoscopies performed annually in the United States [1]. Direct and indirect health care costs total over $2 billion per year [2].

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CPP often is a complex condition with coexisting gynecologic and nongynecologic causes of pain. For example, at least one third of women with endometriosis also have interstitial cystitis (IC) or irritable bowel syndrome (IBS) [3, 4]. In our CPP clinic, only 18% of patients with endometriosis had a diagnosis of only endometriosis [5•]. Thus, even after medical and/or surgical management for endometriosis-associated pelvic pain, patients may experience only partial improvement in their symptoms if urologic and gastrointestinal factors are missed and not treated appropriately. In addition, musculoskeletal dysfunction of the abdominal wall or pelvic floor can significantly contribute to CPP. Psychosocial factors must be considered when evaluating and treating all CPP disorders.

For these reasons, the initial diagnostic approach to CPP involves obtaining a comprehensive history. The physical examination should be performed in a systematic manner to correlate the history with areas of pain and try to differentiate between somatic and visceral types of pain. The components of the history and physical evaluation have been described in detail elsewhere and will be addressed in this article only as they relate to the specific conditions discussed.

Irritable Bowel Syndrome

In general practice, IBS is the most common diagnosis in women with chronic abdominopelvic pain syndrome. The most recent modification of the Rome criteria for the diagnosis of IBS defines the condition as recurrent abdominal pain or discomfort at least 3 days a month for the past 3 months, associated with two of the following: improvement with defecation, onset associated with a

change in frequency of stool, or onset associated with a change in form of stool. Other symptoms of gastrointestinal dysfunction are used to direct treatment, but are not used as criteria for the diagnosis of IBS.

IBS is a clinical diagnosis. A thorough history regarding gastrointestinal symptoms and stool characteristics should be obtained. Physical examination is usually normal, except for anorectal tenderness. Similarly, laboratory and imaging studies, although not always necessary, should be normal when they are indicated as part of the diagnostic evaluation. Symptoms and signs that warrant thorough evaluation by a gastroenterologist are summarized in Table 1. In the absence of these findings, routine colonoscopy is not indicated. The largest prospective controlled study regarding the yield of colonoscopy in patients with IBS demonstrated no difference in the presence of polyps, malignancy, angiodysplasia, diverticulosis, hemorrhage, and anal fissures compared to control patients [6•].

The etiology of IBS is multifactorial. It is regarded as a functional disorder, which implies there are no structural or anatomic explanations. Several proposed pathophysiologic mechanisms include visceral hypersensitivity leading to disproportionate pain with intestinal distension, dysregulation of gastrointestinal motility, and endocrine effects by way of a stress response through the hypothalamic–pituitary axis.

There are various medical management options for IBS depending on the primary symptom. Treatment of abdominal pain, gas, and bloating may be initiated with dietary adjustments of carbohydrates and fat intake. Antispasmodic agents such as dicyclomine and hyoscyamine can lead to an improvement in these symptoms but may not be tolerated for long-term use due to anticholinergic side effects. Fiber and laxatives are routinely prescribed for chronic constipation. However, data on their efficacy in the setting of IBS is limited. Bulking agents and stimulant laxatives may, in fact, aggravate

Table 1 Worrisome or "red flag" symptoms and signs that mandate further evaluation before making a diagnosis of irritable bowel syndrome

1. Anemia
2. Narrow, pencil-thin stools
3. Rectal bleeding or blood in stool
4. Unexplained weight loss
5. Anorexia or early satiety
6. Abdominal guarding & rebound tenderness
7. Persistent watery diarrhea with stool volumes >200 mL/d
8. Bloody diarrhea
9. Nausea & vomiting
10. Fever
11. Non-GI symptoms

GI gastrointestinal tract

other IBS symptoms such as cramping and flatulence. In several studies, tegaserod, a 5-hydroxytryptamine receptor 4 (HT4) agonist, has demonstrated efficacy to improve symptoms related to constipation-predominant IBS [7, 8]. However, this medication has been associated with an increase in cardiovascular events, and its availability is now limited for emergency use only with the approval of the U.S. Food and Drug Administration (FDA). Loperamide is the first-line treatment of IBS-related diarrhea. Alosetron, a 5-HT3 antagonist, is also useful as an antidiarrheal. Selective serotonin reuptake inhibitors have been demonstrated to improve the quality of life for patients with IBS and provide a global benefit without significantly altering bowel symptoms or decreasing pain. Their usefulness in this setting may be secondary to an underlying somatization disorder, a characteristic that has been attributed to both IBS and CPP patients [9]

In our practice, we screen for IBS by the Rome III criteria. We initiate treatment with dietary modifications and/or first-line medications depending on the character and severity of symptoms. If any of the above alarm signs and symptoms is present, we consult with a gastroenterologist for further evaluation and treatment.

Interstitial Cystitis

Interstitial cystitis (IC), or bladder pain syndrome, is a pelvic pain, pressure, or discomfort related to the bladder, associated with the persistent urge to void or urinary frequency, in the absence of urinary infection or other pathology. These symptoms may be present in other urologic and nonurologic disease states, which should be excluded carefully. Currently, there is no gold standard for diagnosis. There are mixed reviews on the utility of cystoscopic findings (glomerulations and Hunner's ulcers) and the potassium sensitivity test [10–13]. Pain relief with bladder instillation of local anesthetic agents also has been suggested as a diagnostic test [14]. None of these tests are mandatory to make a diagnosis.

The etiology of IC is not known. The leading theory is that there is a defect in the glycosaminoglycans (GAG) layer of the bladder wall, resulting in a hyperpermeable epithelium. Noxious urine solutes in turn are absorbed through this "leaky" surface and provoke the irritative symptoms. Other theories include an autoimmune mechanism or a neurogenic inflammatory reaction involving mast cell activation and histamine release.

IC should be considered in any woman presenting with CPP, even if another diagnosis is confirmed. IC has been estimated to coexist with endometriosis in over 60% of cases [3]. Therefore, treatment of endometriosis may result in only partial improvement of pain if IC is also present and not treated. To further confuse the picture, women with IC

may present with symptoms that mimic gynecologic etiologies of pain, such as dyspareunia and dysmenorrhea. Similarly, women with IBS also may experience pain exacerbations during menses. Multi-system involvement in CPP may be partially explained by the concept of viscero-visceral hyperalgesia [15•, 16]. An overlap of innervations between abdominopelvic organs may allow visceral pain related to one organ (eg, bladder or bowel) to provoke or enhance a pain response from another (eg, uterus), and vice versa.

Medical management with oral regimens or intravesical instillations is available. Currently, there are two FDA-approved treatments, pentosan polysulfate sodium (PPS) and direct bladder therapy with dimethyl sulfoxide (DMSO). PPS is typically considered the first-line treatment of IC/PBS. This oral heparin analogue, which is thought to work by replenishing the GAG layer, has been demonstrated to improve pain and other symptoms related to IC/PBS at a dose of 300 mg per day in a number of randomized controlled trials (RCTs) [17]. Amitriptyline, a tricyclic antidepressant, is commonly used for a number of CPP conditions. One mechanism of its action is inhibition of serotonin reuptake and modulation of neuropathic pain. Two RCTs evaluating the efficacy of amitriptyline to treat IC report somewhat mixed results [18, 19]. One study demonstrates a significant improvement in symptoms after 4 months of treatment [18]. Subjects self-titrated their dose from 25 mg to 100 mg on a weekly basis until they experienced a satisfactory relief of symptoms. The other study demonstrated effectiveness only for those patients taking 50 mg daily (patients were titrated from 10 to 75 mg) by the end of the 12-week study period [19]. Unlike PPS, there may be a dose effect with amitriptyline. Cimetidine and hydroxyzine are other oral medications that have been used to treat IC/PBS with varying success.

Treatments with oral regimens often take effect after a few weeks. Bladder instillations can be performed during this time and continued if beneficial. The data on the efficacy of this treatment modality with DMSO, bacilli Calmette-Guerin, botulinum toxin A, or a heparin/anesthetic combination are limited, with mixed reviews [20]. Non-pharmacologic treatment options include dietary restriction of trigger foods and myofascial physical therapy.

In our practice, we primarily make the diagnosis of IC based on history and symptoms and do not routinely perform a cystoscopy or potassium sensitivity test. Medical therapy with PPS is usually the first-line treatment. We find that amitriptyline given at bedtime can serve a dual purpose: treat pain and reduce the frequency of nocturia due to its sedating effect. We also frequently perform bladder instillations with a preference for a heparin/anesthetic combination. If intravesical therapy is found to be effective, patients are taught to perform self-instillations.

Endometriosis

Endometriosis is defined as the presence of endometrial glands and stroma outside of the uterus. It is the most common reproductive tract cause of CPP. Endometriosis requires a histological diagnosis. CPP, dysmenorrhea, and dyspareunia are not unique to endometriosis and often are present in other gynecologic as well as nongynecologic conditions. Therefore, surgical excision with confirmation of endometriotic tissue is necessary for diagnosis. Visualization of suspicious lesions during a diagnostic laparoscopy alone is not adequate to make a diagnosis. There is great variation in the shape, consistency, and color of endometriotic implants. A prospective study by Walter et al. [21] evaluating the accuracy of a visual diagnosis demonstrated a positive predictive value of only 45%.

Endometriosis-related pelvic pain can be treated medically or surgically. The approach is often complex and dependent on several factors such as previous treatment failures, the patient's desire for fertility, and attitude toward surgery and/or hormonal suppression. The most commonly used medical therapies include cyclic or continuous oral contraceptives, gonadotropin-releasing hormone (GnRH) agonists, danazol, progesterone-only regimens such as medroxyprogesterone acetate (MPA) or norethindrone acetate, and, more recently, aromatase inhibitors and the levonorgestrel-releasing intrauterine device (IUD; Mirena: Bayer, Leverkusen, Germany). The data to date do not show consistent efficacy of one regimen over the others. Danazol, progestins, and GnRH analogues have demonstrated reduction in pain levels in 80% to 90% of patients [22–24]. However, adverse side effects may limit the prolonged use of some of these medical regimens. For example, compliance with danazol, a 17-ethinyl-testosterone derivative, is poor due to significant androgenic/anabolic side effects. Long-term use with GnRH agonists and MPA is limited secondary to loss of bone density, a consequence of their hypoestrogenic mechanism, unless add-back therapy is used. In an RCT, the levonorgestrel IUD was demonstrated to be as effective as a GnRH analogue for the treatment of endometriosis-related CPP, and thus, may be another alternative [25]. Breakthrough bleeding can occur with any of these treatments.

Pain associated with endometriosis generally recurs after discontinuation of medical treatment, and subsequently, surgical options should be considered. A laparoscopic approach is the standard for diagnosis and surgical treatment of endometriosis. A Cochrane review of four RCTs comparing laparoscopic surgery versus diagnostic laparoscopy revealed significant pain improvement with operative laparoscopy at 6- and 12-month follow-up (OR 5.72 and 7.72, respectively) [26]. Endometriosis lesions can be removed by ablation or excision. Presently, there are

limited data comparing these two approaches, and the two randomized studies that exist fail to demonstrate any significant difference between these methods [27, 28•]. In contrast, there is evidence that excision of endometriomas have more favorable outcomes than drainage and ablation with respect to recurrence, pain symptoms, and spontaneous pregnancy [29, 30].

Nerve ablation techniques have been evaluated for relief of endometriosis-related CPP. Two types have been described, presacral neurectomy (resection of the superior hypogastric plexus) and uterosacral neurectomy. The latter has been largely abandoned due to a lack of benefit over resection of endometriosis alone [31]. Presacral neurectomy has been demonstrated to improve midline dysmenorrhea by up to 80% or more in women with endometriosis [32].

Women with persistent or recurrent disease after medical and surgical therapies ultimately may benefit from a hysterectomy with or without ovarian preservation. A long-term retrospective study by Shakiba et al. [33] demonstrated a significant difference in reoperation-free rates in women who underwent local excision with ovarian preservation versus hysterectomy with ovarian preservation. The rates at 2, 5, and 7 years for the local excision group were 79.4%, 53.3%, and 44.6%, respectively, compared to 95.7%, 86.6%, and 77%, respectively, in the hysterectomy with ovarian preservation group. There was no statistical difference in rates comparing hysterectomy with complete ovarian preservation and unilateral or bilateral oophorectomy [33]. In contrast, an earlier study by Namnoum et al. [34] demonstrated that ovarian conservation was associated with a 6.1 times–greater risk for developing recurrent pain and 8.1 times–greater risk of reoperation. Although large randomized studies may help to elucidate the role of hysterectomy or bilateral oophorectomy for endometriosis treatment, there are obvious difficulties with committing a largely reproductive-aged population to these surgeries. Therefore, the decision to perform a hysterectomy, with or without ovarian conservation, should be individualized. The patient's age and desire for future fertility must be taken into consideration, and extensive counseling regarding the risks of bilateral oophorectomy and maintenance on hormonal therapy in premenopausal women is necessary.

Currently, there is no evidence that hormonal suppression before or after surgical management of endometriosis improves outcomes with respect to pain, disease recurrence, or pregnancy rates [35].

Ovarian Remnant Syndrome

Ovarian remnant syndrome occurs when ovarian tissue is inadvertently left during oophorectomy. The greatest risk factor is adhesive disease that makes oophorectomy

difficult to perform, and thus, increases the risk of incomplete removal. This appears to occur especially when the ovary is adherent to the ureter or large intestine. Most women with ovarian remnant syndrome have a history of conditions that predispose to adhesion formation such as endometriosis, pelvic inflammatory disease, or an extensive surgical history.

Since it was first described in 1970, ovarian remnant syndrome has been well recognized as a cause of CPP. However, it is still considered a rare event with a difficult to establish incidence. The literature on this topic has been limited by small sample sizes, with the largest case series, by Magtibay et al. [36], involving 186 women. One reason for an ill-defined incidence may be delayed or missed diagnosis, with physicians less suspicious of a gynecologic etiology in women presenting with lower abdominal pain who have had a hysterectomy and bilateral salpingo-oophorectomy (BSO).

Symptoms of ovarian remnant syndrome besides CPP include absence of menopausal symptoms in a woman with a history of bilateral oophorectomy and dyspareunia. Laboratory evaluation often shows premenopausal levels of follicle-stimulating hormone and estradiol in the absence of hormonal replacement therapy. Ultrasound shows an adnexal mass in most women.

The mainstay of prevention for ovarian remnant syndrome is meticulous surgical technique during the initial extirpation. If adhesions are present, attention should focus on restoration of the anatomy and complete visualization of the ovarian boundaries and areas of adherence to adjacent tissue. If operating laparoscopically, it may be helpful to use a bag retrieval device to remove the ovary, followed by copious irrigation and suction to remove any remaining fragments. There is a case report of an ovarian remnant at a laparoscopic port site after an oophorectomy was performed for an endometrioma [37].

Despite these efforts, minute ovarian tissue still may be left behind in the cavity. Once an ovarian remnant is suspected, surgical excision of the remnant is necessary for definitive diagnosis and treatment. Reports of successful outcomes with hormonal suppression are limited. The surgical procedure often is a tedious procedure involving dissection of dense adhesions. With up to a 15% recurrence rate, an aggressive surgical approach is necessary. In most patients, the remnant ovary lies on the pelvic sidewall peritoneum near the angle of the vaginal vault. For this reason, extensive stripping of the sidewall peritoneum and adequate exposure of the retroperitoneal space to allow dissection along the course of the ureter are techniques that typically lead to the remnant and removal of any residual ovarian tissue.

Although the procedure can be performed by laparoscopy or laparotomy, the latter has been used far more often because

of the potential difficulties associated with this type of procedure. Bowel and urological injuries are not uncommon, and sometimes injury and repair of these structures is necessary to ensure complete removal. However, there is an increasing number of reports of successful removal by skilled laparoscopic surgeons [38, 39].

Histological confirmation is necessary after specimen removal. Common findings in histology include normal ovarian tissue, corpus lutea, and endometriosis. Unfortunately, ovarian malignancies, including mucinous cystadenocarcinoma and endometrioid adenocarcinoma, have been documented as well [39]. This risk, although small, is important to keep in mind when considering nonsurgical management.

Uterine Retroversion

A retroverted or retroflexed uterus can be found in up to 30% of women. Several studies have suggested that this type of uterus is associated with dyspareunia, dysmenorrhea, and independently with CPP [40]. An observational study by Fauconnier et al. [41] found a significantly higher prevalence of dyspareunia (66.7% vs 42.1%, $P=0.03$) and severe dysmenorrhea (66.7% vs 42.9%, $P=0.03$) in women with a retroverted uterus. The authors hypothesize that these symptoms may be secondary to collision, ligament stretch, impedance of menses, and possible pelvic congestion syndrome. Conclusions from this paper and other observational studies on this topic must be interpreted with caution because they lack strict exclusion criteria for other causes of pelvic pain symptoms (eg, endometriosis). The one prospective study with a control group on retroversion and associated pelvic pain symptoms evaluated pain outcomes in women with a retroverted uterus who experienced deep dyspareunia, dysmenorrhea, and bladder and rectal pressure and underwent either a corrective surgical procedure with uterine suspension or diagnostic laparoscopy alone [42]. The authors found that 85.7% of patients with symptomatic uterine retroversion experienced relief after the suspension procedure. However, the results from this study are based on a small sample size (40% of patients initially enrolled were excluded from the analysis) and a "pseudo-randomization" protocol that did not ensure blinding to the treatment selection.

With the limited existing data on retroversion, we reserve surgical procedures for retroversion primarily for the treatment of "collision" dyspareunia. This type of dyspareunia is thought to be caused by the penis hitting the corpus of a retroverted uterus or a low cervix. Women typically describe their pain due to the penis "hitting something" with deep thrusting. Many uterine suspension procedures have been described and there is no clear evidence that any technique is best.

Adhesive Disease

Abdominopelvic adhesions typically occur after a surgical procedure or secondary to inflammatory conditions from pelvic infections, abscesses, ruptured cysts, and endometriosis. Adhesions may form after a laparotomy or laparoscopic procedure, though the rate of de novo formation after the latter is significantly less (12% vs 51%, respectively) [43, 44]. Adhesions are known to cause intestinal obstruction and infertility. Its role as a cause of CPP is less clear. Adhesions are commonly found in women with CPP. A study by Howard et al. [45] reported on the outcomes of laparoscopic pain mapping in 50 women with CPP. Adhesions were present in 27 of 50 patients (54%). In six patients, adhesions were the direct cause of failed conscious pain mapping. Of the remaining 21 cases, 15 were mapped successfully, and one or more adhesions were mapped as painful in 7 (47%) of these patients. These findings suggest that adhesions may be a cause of pelvic pain in some but not all women. The density or location of the adhesions also may variably lead to pain [46].

If adhesions have the potential to cause pelvic pain, can adhesiolysis relieve the pain? This is the question that remains. The problem with surgical adhesiolysis for CPP is that no study, even with the use of adhesion-barrier products, has been able to show more than a 10% to 30% reduction in reformation of adhesions. To the best of our knowledge, there are two RCTs concerning the effect of adhesiolysis on pain. One study failed to show any significant improvement in pain symptoms after lysis of adhesions by laparotomy. Only a subgroup analysis of 15 women with severe, stage IV adhesions showed any detectable improvement in pain that could be attributed to adhesiolysis [47]. The other study assessed abdominal pain (not just pelvic pain) after adhesiolysis by laparoscopy and also failed to demonstrate a significant improvement [48].

Our approach to adhesions and treatment of them is individualized. For example, in the case of surgical exploration for endometriosis, adhesiolysis often is necessary to restore pelvic anatomy and clearly visualize the entire abdominopelvic cavity for suspicious lesions. It is important to keep in mind that disease may be present within the adhesive tissue itself. Based on the limited data available, women with CPP and severe adhesive disease also may be surgical candidates for adhesiolysis.

Pelvic Congestion Syndrome

Pelvic congestion syndrome (PCS) is a condition that is neither fully understood nor universally accepted as a cause of CPP. The etiology of pain is unclear, but is thought to involve valvular incompetence and venous stasis, similar to

pain experienced with varicosities and venous congestion in the lower extremities. Data from earlier studies demonstrating success with ovarian suppression suggest a possible role of hormone influence, specifically estrogen.

Patients with PCS typically present in their reproductive years with complaints of dull, aching pain and occasional acute exacerbation. Deep dyspareunia and dysmenorrhea are common. They also may report positional pain that is likely due to changes in gravity and vascular engorgement, migrating pain from side to side, and pain that gradually worsens throughout the day.

A clinical diagnosis based on history may be difficult to make because symptoms are somewhat vague. Currently, pelvic venography is the only means of diagnosis. Venographic findings suggestive of PCS are increased ovarian vein diameter (> 4 mm), prolonged contrast clearance time, increased tortuosity of vessels, and reversal of pelvic venous flow [49]. It should be noted that ovarian varices demonstrating retrograde flow in an incompetent vein is estimated to occur in 10% of the general population and may not be associated with pelvic pain symptoms in up to 40% of women with these findings [50].

Treatment options for PCS include hormonal suppression, vascular embolization, and surgery with hysterectomy (with or without unilateral or bilateral oophorectomy) or ovarian vein ligation. A limited number of small RCTs have demonstrated improvement in pain scores after treatment with MPA, etonogestrel, and goserelin (GnRH agonist) [51]. A trial by Farquhar et al. [52] showed that psychotherapy in conjunction with medical treatment with MPA prolonged clinical response after discontinuation of treatment when compared to MPA alone. Psychotherapy alone was not more effective than placebo.

The data regarding embolotherapy and various surgical approaches for the treatment of PCS are mostly from a limited number of small observational studies with mixed findings. Embolization of the ovarian veins typically is done with stainless-steel coils, though sclerosing agents and glue have been used. The largest embolization study, by Kim et al. [53], assessed pain outcomes after bilateral ovarian vein embolotherapy with a sclerosant solution followed by internal iliac vein embolotherapy to disrupt residual anastomoses [53]. After a mean follow-up period of 45 months, pelvic pain levels improved from 7.6±1.8 at baseline to 2.9±2.8 after embolotherapy ($P<0.0001$). The authors also analyzed the outcomes for a subgroup of patients who underwent a hysterectomy before embolotherapy and again demonstrated a significant improvement in pain levels after embolization. The role of hysterectomy with or without oophorectomy for the treatment of PCS is unclear. A study by Beard et al. [54] examining the efficacy of hysterectomy-BSO plus hormone therapy reported that nearly 100% of their patients experienced either complete

or partial relief after the procedure. In contrast, a study by Chung et al. [55] reported a significant improvement in pain in women with PCS only after treatment with ovarian vein coil embolotherapy versus treatment with hysterectomy-BSO and hormone therapy or with hysterectomy and affected unilateral oophorectomy [55]. Ovarian vein ligation is another surgical approach that has been described for the treatment of PCS and has demonstrated an improvement in pain symptoms in the range of 50% to 70% [56, 57].

Most studies related to PCS are limited by heterogeneous diagnostic criteria, small sample size, and uncontrolled designs. These limitations need to be addressed before making any conclusions regarding the optimal therapeutic approach to this disorder. In our practice, we diagnose PCS by venography using Beard's criteria and prefer treatment with coil embolization with or without hormone therapy depending on response. Aggressive surgical options are carefully considered after treatment failure and are based on the patients' age and desire for future fertility.

Myofascial Pain Syndrome and Pelvic Floor Tension Myalgia

These two conditions are common musculoskeletal causes of CPP that often are unrecognized and misdiagnosed. Myofascial pain syndrome refers to musculoskeletal pain that originates from trigger points (TrPs) in the muscle or muscle fascia. These are discrete, hyperirritable points of tenderness in a taut band of skeletal muscle. The pathophysiologic mechanism of TrPs is not fully understood, but is thought to involve dysfunctional electrical activity at the motor end plate and/or an aberration in nociception. Pelvic floor tension myalgia refers to myofascial pain of the pelvic floor muscles.

The prevalence of musculoskeletal pain is estimated to be as high as 75% in a pelvic pain clinic [58]. There are multiple risk factors for myofascial pain that should be assessed with a careful history and focused physical exam. Poor posture, orthopedic pathology, direct trauma, repetitive strain injury, visceral pain, and psychosocial stressors all may trigger myofascial pain in the abdominal wall and pelvic floor. Patients may present with poorly localized pain symptoms that often do not clearly suggest a musculoskeletal pathology. Patients with CPP often have multiple diagnoses and failure to identify and treat myofascial disorders may exacerbate pain symptoms related to coexisting conditions, either by referral or direct influence. For example, pelvic floor dysfunction can contribute to the urgency and frequency of IC [59].

The physical examination can help to differentiate somatic and visceral sources of pain. The Carnett's test is a useful exercise to assess abdominal myofascial involvement. A positive sign is when tenderness is increased when the abdominal muscles are tensed. Palpation of the different muscle

groups of the abdominal and pelvic floor can detect the presence of hypertonicity and reproduce pain symptoms. TrPs can be identified by applying pressure with a fingertip along the muscles to elicit point tenderness and a local twitch response.

There are several approaches to managing myofascial pain of the abdominal wall and pelvic floor. TrP injection is one of the primary treatments. Numerous studies evaluating various agents (eg, lidocaine, bupivacaine, and botulinum toxin A) for needling therapy have demonstrated an improvement in pain outcomes [60, 61]. There also is some evidence that dry needling may be of benefit, suggesting that the therapeutic effect of needling is a mechanical disruption of the TrP that is independent of the substance injected [62]. However, well-designed nonobservational studies are necessary to assess whether the therapeutic response from dry needling is more than a placebo effect. Other pharmacologic agents used for myofascial pain include tricyclic antidepressants, anticonvulsants, muscle relaxants, and benzodiazepine vaginal suppositories. Physical therapy with "spray and stretch" techniques, muscle contraction–relaxation exercises, and deep pressure massage maneuvers can help to lengthen contracted muscles. Cutaneous and neuromuscular electrical stimulation devices have been described with some success.

Conclusions

CPP can be a debilitating disorder that is challenging to diagnose and treat. There are multiple possibilities for the pain with varying degrees of causality. It is paramount for providers to understand that even with a clear diagnosis, treatment may not be curative and recurrence of disease and pain is not uncommon. Awareness of the potential contributions by both reproductive and nonreproductive systems can assist in formulating a differential diagnosis and initiating appropriate treatment strategies.

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