



Published in final edited form as:

J Obstet Gynecol Neonatal Nurs. 2012 September ; 41(5): 680–691. doi:10.1111/j.1552-6909.2012.01404.x.

Recognizing Myofascial Pelvic Pain in the Female Patient with Chronic Pelvic Pain

Elizabeth Anne Pastore, PT, MA, COMT and Wendy B. Katzman, PT, DPTSc, OCS

owner of Lizanne, Pastore Physical Therapy, San Francisco, CA.

associate professor in the Department of Physical Therapy and Rehabilitation Science, University of California, San Francisco, San Francisco, CA.

Abstract

Myofascial pelvic pain (MFPP) is a major component of chronic pelvic pain (CPP) and often is not properly identified by healthcare providers. The hallmark diagnostic indicator of MFPP is myofascial trigger points in the pelvic floor musculature that refer pain to adjacent sites. Effective treatments are available to reduce MFPP, including myofascial trigger point release,

Keywords

myofascial pelvic pain; chronic pelvic pain; myofascial trigger points

Myofascial pelvic pain (MFPP) is a frequently unrecognized and untreated component of chronic pelvic pain (CPP). Prevalence estimates range from as low as 14%-23% of women with CPP have myofascial pelvic pain (Tu, As-Sanie, & Steege, 2006) to as high as 78% among women with interstitial cystitis (Bassaly 2010; Doggweiler-Wiygul, 2004; Itza et al., et al., 2010). In a recent review, researchers found that very few providers actually perform a vaginal digital palpation of pelvic floor muscles during routine gynecological exams to examine for the presence of myofascial pelvic pain and trigger points (Kavvadias, Baessler, & Schuessler, 2011). An estimated 10%-15% of women's gynecologic consultations are secondary to CPP, and 40% of gynecologic laparoscopies are performed to determine a cause of CPP (Paulson & Delgado, 2005). Pelvic pain patients often attend numerous visits to different health care providers before being properly diagnosed. Identification and treatment of the myofascial component of CPP is needed in order to effectively manage this complex, often multi-faceted problem.

Myofascial pelvic pain, sometimes called myofascial pelvic pain syndrome, refers to pain found in the pelvic floor musculature and connecting fascia. This syndrome exists alone with no concomitant medical pathology, or it may exist as either a precursor or sequela to urological, gynecological, and colorectal medical conditions or other musculo-skeletal-

Corresponding Information: Elizabeth Anne Pastore PT, MA, COMT, Lizanne Pastore Physical Therapy, 1824 Noriega St. Ste. 7, San Francisco, CA 94122, lizanne@lizanepastore.com.

Disclosure

The authors report no conflict of interest or relevant financial relationships.

neural issues. The hallmark diagnostic indicator of MFPP is the presence of myofascial trigger points (MTrPs) in the muscles of the pelvic floor and remotely. A number of recent studies in the CPP literature have demonstrated the existence of MTrPs or hypertonic pelvic floor muscles in a variety of medical conditions of distinctly different origins (Bassaly et al., 2010; Bendana et al., 2009; Chiarioni, Nardo, Vantini, Romito, & Whitehead, 2010; Doggweiler-Wiygul & Wiygul, 2002; Gentilcore-Saulnier, McLean, Goldfinger, Pukall, & Chamberlain, 2010). For instance, myofascial pain is often overlooked by first line healthcare providers as either a primary or contributing source of pain for conditions such as urgency/frequency, irritable bowel syndrome (IBS), interstitial cystitis/painful bladder syndrome (IC/PBS), urge incontinence, constipation, dyspareunia, endometriosis, vulvodynia, coccygodynia, pudendal neuralgia, proctalgia fugax, or post-surgical or birthing pelvic pain (Apte et al., 2011; Butrick, 2009; Doggweiler-Wiygul, 2004; Neville, 2010). Our goal with this article is to educate obstetric and gynecologic nurses about MFPP as a critical component of CPP, provide an overview of how to screen women with CPP for suspected MFPP, and describe current evidence-based physical therapy treatments and appropriate use of referrals.

CALLOUT 1

Overview of Myofascial Pelvic Pain

Myofascial Trigger Points—Myofascial pain syndrome, a recognized medical diagnosis among pain specialists, is characterized by adverse symptoms caused by tender points and MTrPs in skeletal muscles (Harden, Bruehl, Gass, Niemiec, & Barbick, 2000; Itza et al., 2010; Simons, Travell, & Simons, 1999a; Simons, Travell, & Simons, 1999b). Myofascial trigger points are localized, often extremely painful lumps or nodules in the muscles or associated connective tissue known as fascia and are classified as either active or latent. Active MTrPs produce local or referred pain or sensory disturbances, while latent MTrPs will not trigger symptoms unless activated by an exacerbating physical, emotional, or other associated stressor (Dommerholt, 2005). The pain is often reproduced when the muscle is compressed or stretched. A MTrP is found within a taut band in the muscle and typically refers pain in a predictable pattern when palpated. Often women with MTrPs will respond with an increased sensitivity to pain, known as hyperalgesia. In addition, women report pain from stimuli that are not normally painful, defined as allodynia (Vecchiet, 1994, 1998; Vecchiet et al., 1990). Muscles with trigger points are often weak, stiff, and have restricted range of motion (Lucas, 2004; Weissmann, 2000). Frequently, impaired circulation in tissues surrounding trigger points, and autonomic disturbances, such as lacrimation and piloerection (goose bumps) may be present (Dommerholt, 2005; Ge, Madeleine, Cairns, & Arendt-Nielsen, 2006; Lidbeck, 2002; Munglani, 2000; Simons et al., 1999a).

Myofascial trigger points can develop in any of the pelvic floor muscles, and these trigger points usually refer sensation or pain to adjacent sites. These referral patterns do not present in classic nerve or dermatomal regions, although characteristic referral patterns for pelvic MTrPs have been well documented (see Table 1). The perineum, vagina, urethra, and rectum are common referral sites for the pelvic floor muscles, but women may complain of pain in the abdomen, back, thorax, hip/buttocks, and lower leg (Simons et al., 1999b). The lower

abdominal region is a very common referral site for levator ani trigger points, making it possible to confuse gynecologic, gastrointestinal, and myofascial symptoms.

Etiology of Myofascial Trigger Points—The development and perpetuation of MFPP and MTrPs can be explained by a variety of mechanical, nutritional, metabolic, and psychological factors that affect muscular strain, circulation and pain. Mechanical factors such as direct trauma, chronic poor posture or body mechanics, ergonomic stressors, joint hypermobility, leg length discrepancy, scoliosis and pelvic torsion can increase muscular strain (Fernandez-de-Las-Penas, Alonso-Blanco, & Miangolarra, 2006; Friction, Auvinen, Dykstra, & Schiffman, 1985; Simons et al., 1999b; Treaster, Marras, Burr, Sheedy, & Hart, 2006). In the woman experiencing CPP, these mechanical factors may occur from prior surgeries, birthing trauma, childhood falls, injuries, accidents, illnesses, physical or sexual abuse, and repetitive movement patterns. Such events can be the pre-existing trauma that leads to future myofascial dysfunction (Doggweiler-Wiygul, 2004; Montenegro, Vasconcelos, Candido Dos Reis, Nogueira, & Poli-Neto, 2008; Simons et al., 1999b). Women with CPP have reported more musculoskeletal impairments than women without CPP (Kavvadias, 2011; Tu, Holt, Gonzales, & Fitzgerald, 2008), and one group of researchers reported 85% of CPP patients had musculoskeletal dysfunction and postural changes that contributed to their CPP (Montenegro et al., 2008). A commonly accepted hypothesis is that these musculoskeletal impairments cause muscular strain due to low level static exertion of the muscle during prolonged motor tasks, or result from mechanical factors creating muscle pain and injury (Henneman, Somjen, & Carpenter, 1965). Muscular strain can also cause decreased circulation, localized hypoxia, and ischemia (Armstrong, 1990; Hagg, 2003; Otten, 1988). These conditions can all result in the formation of MTrPs (Sjogaard, Jorgensen, Ekner, & Sogaard, 2000; Sjogaard & Sogaard, 1998). Once established, MTrPs can continue to be an ongoing source of peripheral pain contributing to central sensitization, a priming of the nervous system, making it more sensitive to painful stimuli (Dommerholt, 2005; Lidbeck, 2002; Munglani, 2000).

Myofascial trigger points can remain latent for years, so identifying the original etiology is often challenging. Healthy tissues are designed to sustain a certain degree of physical stress, but a muscle with latent MTrPs can be affected by even a seemingly insignificant stressor (Doggweiler-Wiygul, 2004). Sometimes an emotional stressor is “the straw that breaks the camel’s back” after a series of other incidents.

Nutritional deficiencies and metabolic disorders are not uncommon among women with MFPP but may be overlooked by medical practitioners as an underlying contributor to CPP. Deficiencies of vitamins B1, B6, and B12, folic acid, vitamin C and D, iron, magnesium and zinc have all been associated with chronic MTrPs (Dommerholt, Bron & Franssen 2006). In people with chronic MTrPs, 16% have insufficient B12 levels, while 90% lack proper vitamin D. Months of treatment may be required before levels become normal (Dommerholt et al.).

Psychological stress may also activate underlying MTrPs. Both mental and emotional stress have been shown to increase the electromyographic activity in MTrPs, while neighboring muscle without trigger points remains electrically unchanged (Dommerholt et al. 2006).

Diagnosis of Myofascial Trigger Points—A detailed history, examination of movement patterns, and knowledge of referred pain patterns direct the clinician's investigation of MTrPs, but a manual examination is essential to determine their presence. No laboratory or imaging test is available that confirms the presence of a MTrP, however reliable clinical criteria have been developed to detect a trigger point including the following: a) a palpable taut band; b) an exquisitely tender nodule in the taut band; c) reproduction of the woman's pain with pressure on the tender nodule; and d) painful limit to stretch or full range of motion (Gerwin, Shannon, Hong, Hubbard, & Gevirtz, 1997; Sciotti et al., 2001; Simons et al., 1999a). An additional sign of a trigger point is a palpable, visible local twitch response, also referred to as "jump sign" when a trigger point is palpated (Gerwin et al.; Hong, 1994; Sciotti et al.). The best method to detect a trigger point is to palpate perpendicular to the muscle fiber attempting to find the taut band and tender nodule. In the abdomen, pelvis and perineum, a flat approach, using the finger pads is preferred.

CALLOUT 2

Myofascial Pelvic Pain Presentation and Symptoms—Women presenting with MFPP may describe symptoms in any area of the pelvis and pelvic floor as well as distal areas in the abdomen, back, or legs. Pain may be constant or intermittent. Resting symptoms may come and go but are often triggered by a specific aggravating factor such as menses, a long walk, prolonged sitting, defecation or intercourse (Butrick, 2009). Pain may be described as vague and generalized or sharp and specific. Many women with MFPP describe an "achy," "heavy," or "deep" quality to their pain (Butrick; Dommerholt et al., 2006), while rectal and clitoral pain is often sharp and piercing. Vaginal introital pain often is described as burning. Pain and symptoms in regions other than the pelvic floor are often reported and may confound the practitioner not familiar with myofascial referred pain, which is typified by pain perception at a location other than the site of the painful stimulus.

Myofascial Pelvic Pain Associated Complaints—Myofascial pelvic pain rarely exists in isolation, and medical pathology must always be ruled out and treated when managing these patients (Abercrombie & Learman, 2012). Women with MFPP often present with urological, gynecological, and/or colorectal complaints that should be assessed and treated, along with myofascial pain. Sometimes these complaints have a muscular rather than medical etiology. A detailed medical history aids the practitioner in differentiating medical versus mechanical causes of symptoms, as they often coexist.

Pain with vaginal penetration, also known as dyspareunia, is frequently observed in women with MFPP and can be attributed to a variety of medical causes. Pain can arise with initial vaginal penetration when the vaginal mucosal tissue is compromised from lack of estrogen, perineal scarring from medical procedures or childbirth, and vulvodynia or provoked vestibulitis, a condition marked by allodynia of the vestibule or vulva. Dyspareunia can also occur with ordinary muscle tension or MTrPs in the external genital muscles or levator ani due to mechanical reasons, such as habitual gripping of the muscles or chronic postural abnormalities. Deep dyspareunia, or pain with deep thrusting, and post-coital pain may suggest involvement in the posterior levator ani or obturator internus muscles. This particular pain can result from gripping due to longstanding back pain, or even emotional

stress. However, MFPP and deep dyspareunia may also be secondary to endometriosis or other serious medical conditions that must be ruled out (Abercrombie & Learman, 2012).

Urinary urgency, urinary frequency, and sometimes dysuria (pain with urination) are common symptoms of interstitial cystitis/painful bladder syndrome and overactive bladder syndrome. Urinary frequency, urgency, and pain may also be referred sensations with a skeletal rather than smooth muscle etiology. Spasm of the intermediate layer muscles of the pelvic floor, sphincter urethrae and compressor urethrae may create the sensation of urgency, while MTrPs in the levator muscles, obturator internus, and even rectus abdominis may also create urgency as a referred sensation (Simons et al., 1999b).

Some women may present with suprapubic pain or discomfort in the left or right lower abdominal quadrants, suggestive of a gastrointestinal disease process, such as irritable bowel syndrome. However, hypertonic or painful levator ani muscles may refer pain to the abdomen and contribute to these sensations (Simons et al., 1999b). Women with MFPP may complain of constipation, pain before, during, or after defecation, as well as sensations of incomplete evacuation of bowel or bladder. These complaints may be due to a shortened puborectalis muscle, which slings around the rectum, and may create an ano-rectal angle that is too acute making bowel evacuation difficult or painful.

While the pelvic floor muscles are common sites for MTrPs, muscle groups in the hips, legs, and torso must also be considered as potential sources or contributors to pelvic pain symptoms (see Table 2). Myofascial trigger points in the abdomen, hip, and thigh may refer pain to the pelvic region (Simons et al., 1999b). Furthermore, treating MTrPs in the pelvic floor and distally in the gluteus, piriformis, and as far away as the supraspinatus/infraspinatus, has been associated with resolution of chronic pelvic pain, interstitial cystitis and voiding dysfunction (Doggweiler-Wiygul & Wiygul, 2002).

Myofascial Pelvic Pain: Clinical Assessment

Primary care providers and specialists of all kinds may find women with CPP in their offices. Whether obstetrics and gynecology, urology, colorectal, general practice, or internal medicine, these health care practitioners will assess for illness or pathology according to their practice guidelines (American College of Obstetricians & Gynecologists, 2004; Fall et al., 2010). However, many practitioners responsible for caring for women with CPP may not have sufficient training in physical or musculoskeletal examinations to accurately identify and diagnosis musculoskeletal or MFPP (Haywood, Porter, & Grana, 2006; Neville, 2010; Tu et al., 2008). Medical doctors and nurse practitioners may have been taught musculoskeletal examination, but are rarely trained in the assessment and treatment of MFPP. Physiatrists are board-certified in physical medicine and rehabilitation and are expert in musculoskeletal examination, but concomitant specialization in CPP is rare.

Performing a simple musculoskeletal screen along with a pelvic muscle exam takes just a few minutes and adds valuable information to the medical assessment. If MFPP is suspected or if the musculoskeletal screening and pelvic floor muscle assessment reproduces familiar symptoms or pain, then referral to a physical therapist (PT) trained in this specialty is indicated. Physical therapists can help practitioners in the diagnosis and treatment of MFPP.

The timing and integration of a PT referral depends upon the treatment goals and priorities established with the woman.

Myofascial Pelvic Pain Subjective History—The subjective history is an essential part of the examination and begins the important process of establishing rapport. A thorough subjective examination ensures the woman's complaints are understood. Active listening will help the practitioner avoid misinterpretation of the woman's description of her symptoms. Equally vital is questioning the woman to refine her history (Maitland, Hengeveld, Banks, & English, 2001) specifically regarding the nature, progression, and stability of the pain and related urinary, gastrointestinal, or sexual symptoms.

The clinical history for the woman experiencing CPP/MFPP should be comprehensive and establish present and past history of treatments for all her symptoms. Of particular importance is the gynecologic and obstetric history with specific information about pregnancy stressors, detailed birthing history, and menstrual history. Past trauma, especially pelvic trauma or history of physical abuse, potty training, sexual abuse, sexual concerns, and bladder and bowel habits need to be documented. Other musculoskeletal complaints, psychological diagnoses, and treatments should be noted. Identify specific events or factors from the recent or distant past that may contribute to her current complaints. Obtain a list of medications and supplements. Job responsibilities, daily activities, hobbies, and current or past lifestyle will provide clues about the possible source of the presenting symptoms.

A variety of CPP and urogynecologic questionnaires and intake forms are available to aid the practitioner in proper diagnosis, and are described in this In-Focus series (Abercrombie & Learman, 2012), however, none of the commonly used intake questionnaires correlate specifically with the presence of MFPP (Bassaly et al., 2010). In contrast, self-reported suprapubic, back, anal, and vulvar pain are the best methods to begin to identify MFPP when acquiring the woman's history (Bassaly et al.). The International Pelvic Pain Society has developed a detailed patient intake form that is available free online (International Pelvic Pain Society, 2011). This multi-page questionnaire is for patient and provider use. The tool allows patients to describe their pain and symptoms, and practitioners to document muscular and sensory symptoms found in the physical examination. On-line pain diaries are available to help determine patterns of pain over time and are free online from the American Pain Foundation (American Pain Foundation, 2011). Another reliable pain rating scale is the Numeric Rating Scale that is particularly useful for quantifying the severity of the patient's pain (Hartrick, Kovan, & Shapiro, 2003).

Myofascial Pelvic Pain Physical Examination

After the subjective history, a hypothesis can be made about the primary and potentially many contributing generators of pain. The goals of the physical exam are to determine the primary and contributing pain generators, establish baseline status using objective measures including functional activities for future reassessment and to initiate an appropriate plan of care (Apte et al., 2011; Maitland et al., 2001). Women's health care providers who suspect a MFPP component in their patient with CPP should perform a musculoskeletal screening exam followed by a pelvic floor muscle exam in an attempt to replicate the person's

symptoms or pain. A “functional test,” which is any common movement, such as bending, sitting, sit to stand, walking, or activity of daily living that may affect her pain is useful for the provider to reproduce the pain to assist in assessment and diagnosis.

Musculoskeletal Screening Exam—To assess for musculoskeletal dysfunction, begin with the observation of the woman’s posture, gait, and demeanor as she enters the office (Montenegro et al., 2008). Perform a musculoskeletal screening exam to identify obvious structural abnormalities, which may cause pain in specific regions, such as the hip or back or which reproduce the patient’s symptoms. Postural faults or dysfunction found in a screening exam may not be causative factors, but they may contribute to the woman’s pain and symptoms and warrant further assessment.

Assessments are performed in standing, sitting, and supine positions. A standing position is used to check for postural imbalances including excessive lumbar lordosis, presenting as an overly arched back, an excessive flattened low back, and a mid-thoracic kyphosis with a forward head and knee hyperextension. These musculoskeletal imbalances have been reported in many women with CPP (Hartmann, 2010; Montenegro et al., 2008; Neville, 2010). To assess for end range movement limitations of the back and abdomen, check for a painful limit in forward and backward bending. Using a sitting position, observe if the symptoms improve or worsen. Watch for overly slumped, poor posture that could indicate weakness in the muscles that stabilize the spine requiring overuse of the pelvic floor muscles (Neville, 2010; Tu et al., 2008). Using a supine position, instruct the woman to actively flex her knees onto her chest and check for painful limitation of range of motion in the hip (Neville). Hamstring length asymmetry, tested with a passive straight leg raise, was found to be more common in women with CPP. Surgical scars, especially in the abdomen, can create local and diffuse myofascial tightness, while trophic abnormalities such as skin or nail bed changes might indicate autonomic nervous system dysfunction. Palpate muscle groups in the trunk and thighs suspected of harboring trigger points (see Table 2). The Carnett test is used to assess abdominal muscle involvement and is positive when the woman’s pain increases as she lifts her head to contract the abdominal muscles while the examiner palpates the tender abdominal spot (Montenegro et al.).

External Pelvic Muscle Assessment—A pelvic floor muscle examination is an essential component of a thorough pelvic assessment for the woman experiencing CPP (Fall et al., 2010). Pelvic floor muscles can be palpated both externally and internally for the presence of MTrPs. While muscle pain elicited during an intra-vaginal assessment might be enough to establish the presence of MFPP, the recommendation is to begin with an external muscle assessment. This provides detailed information about which pelvic floor muscles are involved, and helps prepare the woman for the internal exam that follows. If exquisite tenderness is found during the external examination, or if the woman has severe anxiety about an internal examination, which may occur in women with primary vaginismus, the internal exam is avoided initially.

The woman is supine with legs in a hook-lying position or propped over pillows, and finger palpation alone is used to determine muscle tension and MFPP. Because of the reported comorbid features of anxiety, fear, and depression in the woman experiencing chronic pain

(described in depth in this In-Focus series by Abercrombie and Learman, 2012), offer a full description of the examination pre-procedure, provide encouragement and support during the entire examination process, and respect the woman's wishes to slow down or cease altogether. During the initial visual inspection, observe the position of the perineal body; normal position is slightly cephalic to the ischial tuberosities, however, when pelvic floor muscle laxity is present, the perineal body will extend below these bony landmarks, and when severe muscle tension is present, the perineal body will be very elevated superior to the ischial tuberosities. Perineal scars should be noted. The Q-tip test can be used to identify superficial pain, allodynia, or hyperalgesia, which can be associated with MFPP and is useful in diagnosing vulvodynia (Hartmann, 2010).

After visual inspection, evaluate a pelvic floor muscle contraction. Observe the woman contract and relax her pelvic floor muscles. While repeated, sustained pelvic floor muscle contractions, commonly called Kegels, may be useful for women with pelvic muscle weakness, they are contraindicated for women with trigger points, as they can increase muscle tone, tension, and pain. However, performing a single contraction can be helpful in determining possible myofascial pain or hypertonicity (Bendana et al., 2009; Butrick, 2009; Doggweiler-Wiygul, 2004; Montenegro et al., 2008). With MFPP or hypertonicity, relaxation or descent of the muscles is either absent or extremely uncoordinated, and in some instances, pelvic floor muscle contraction itself is painful or difficult.

Palpate the pelvic floor muscles externally over the perineum around the imaginary numbers of a clock, known as the "around-the-clock" technique (see Figure 1). The 12 o'clock position aligns with the pubic symphysis, clitoris, and urethra; the three and nine o'clock positions align with the woman's right and left ischial tuberosities; and the six o'clock position aligns with the coccyx. Palpation, using one digit of a gloved hand, begins at the 12 o'clock position over the pubic symphysis. The one o'clock and 11 o'clock positions, lateral to the clitoral prepuce, are associated with the location of the left and right ischiocavernosus muscles. The two o'clock and ten o'clock positions are associated with the location of the left and right bulbocavernosus muscles. The three o'clock and nine o'clock positions found lateral to the perineal body, are associated with the location of the superficial transverse perineal muscles. Posteriorly, the four and eight o'clock and five and seven o'clock positions are the anterior and posterior levator ani muscle groups respectively (Apte et al., 2011). Examine for taut bands, possible trigger points, local or referred pain or other familiar symptoms. Palpate the mobility of the perineal body in all directions. If the woman describes rectal pain, palpating around the circular external anal sphincter muscle is indicated, being careful to avoid vaginal contamination after such palpation.

Internal Pelvic Muscle Assessment—To proceed with the intra-vaginal exam, change gloves to avoid any contamination from the external exam. Palpating the right hand side of a woman's pelvic floor is easiest using the right hand and visa versa to palpate the left side by using the left hand. Initial entry into the vaginal vault may itself be painful or anxiety provoking. Prepare the woman with what to expect and maintain eye contact throughout the exam. Proceed slowly and use plenty of lubricant to ease a woman's discomfort. Techniques such as gently depressing the tissues lateral to the clitoris using a pincer grasp with thumb and index finger to widen the introitus, or asking the woman to bulge or bear down gently

during finger insertion, as if “blowing bubbles with the vagina” helps to slacken the superficial muscles and prevent muscle gripping during the intra-vaginal exam. The practitioner may ask the woman to “let go” to ensure she is not guarding during the exam, and imagery such as “let your muscles be heavy” or “let your muscles relax like you would let your shoulders drop,” may also be helpful.

First, specific muscle layers are identified by landmarks corresponding to the index or middle finger used during the examination. Using the hymenal ring as the reference point, layer 1 corresponds to depth of the nail bed or first knuckle of the finger that is associated with the location of the bulbocavernosus, ischiocavernosus, superficial transverse perineal, and external anal sphincter muscles. Middle knuckle depth corresponds to layer 2 that is associated with the location of the urethra muscles superiorly and deep transverse perineal muscles inferiorly. Beyond the middle knuckle and up to the length of the examining finger is the deepest layer 3 musculature that is associated with the location of the levator ani, coccygeus, piriformis and laterally the obturator internus muscles (Wallace & Herman, 2009).

Next, pelvic floor muscle tone, trigger points and pain are assessed. Although surface electromyography is the gold standard for objectively measuring pelvic floor muscle activity, digital examination can be very useful in detecting increased muscle tone. In women with moderate to severe hypertonicity, the examiner immediately notices introital tightness around the examining finger and tension or resistance in the muscles. The same “around-the-clock” method that was used for the external palpation is used for the internal exam, and the flat palpation is employed. Palpate superficial, intermediate, and deep layer muscles according to depth of finger in relation to the hymenal ring. Gauge the force used so it is acceptable to the woman. Tender or trigger points may be found anywhere in the muscle bellies but may especially be present laterally along the insertion points at the arcus tendineus levator ani (Butrick, 2009). Often the examiner will reproduce the woman’s referred symptoms, such as suprapubic pain, urinary urgency, or even her rectal or clitoral pain.

Physical Therapy Treatment for Myofascial Pelvic Pain

Once MFPP and associated MTrPs have been identified, referral of the woman to a physical therapist (PT) specializing in women’s health is needed. Physical therapists are experts in assessing and treating musculoskeletal disorders, trained in anatomy, physiology, neurophysiology of urogenital and colorectal function, as well as many types of manual, orthopedic, neurologic, and “mind-body” treatment techniques. Resources for locating PTs are available on line, and certification programs for PTs are available from the American Physical Therapy Association’s Section on Women’s Health, the American Board of Physical Therapy Specialists, and the Herman and Wallace Pelvic Rehabilitation Institute.

Physical therapy treatment of MFPP includes specific treatment to trigger points and taut bands using myofascial release techniques. These treatments involve skillful hands-on techniques based on the physiology of each specific tissue. For example, to facilitate elongation of a contracted muscle, a PT might employ a contract/relax technique followed by a prolonged stretch. For releasing fascia, a myofascial release technique using gentle,

slow, sustained pressures and a flat palpation is often used (Schleip, 2003). Other techniques may include deep tissue release, connective tissue release, visceral fascial mobilization, joint mobilization, and craniosacral therapy. Women are often taught self-care techniques such as leg, trunk, and pelvic floor muscle stretching, along with trigger point release using dilators, trigger point wands, or their own finger; even partners can be trained to assist in self-care at home. Foam rollers and physioballs are useful for self-stretching and self-myofascial release. Treatment is often combined with education in diet strategies for bowel or bladder issues, pain management including heat and ice, resting poses for muscle relaxation and edema control, guided imagery and breathing techniques to calm the nervous system, and relaxation techniques for stress management.

CALLOUT 3

Investigators have reported that myofascial pelvic pain syndromes can be effectively treated with a variety of physical therapy techniques including manual therapy, biofeedback, electrical stimulation and other modalities (Chiarioni et al., 2010; FitzGerald et al., 2009; FitzGerald et al., 2012). Numerous uncontrolled trials and case studies report the effectiveness of myofascial trigger point release, Thiele massage, dilators or trigger point wands, biofeedback, electrical stimulation, pelvic muscle relaxation, and general relaxation training in reducing myofascial pelvic pain syndromes (Anderson, Wise, Sawyer, & Chan, 2005; Anderson, Wise, Sawyer, & Nathanson, 2011; Fitzwater, Kuehl, & Schrier, 2003; Gentilcore-Saulnier et al., 2010; Montenegro et al., 2010; Oyama et al., 2004; Weiss, 2001). Many investigators combined interventions, thus making single intervention recommendations difficult, therefore, a multi-modal approach may be most effective in treating these women.

The Multi-Disciplinary Team

Utilizing a multi-disciplinary team knowledgeable in treating the complex issues of CPP and MFPP is the best approach to take when working with this population. In addition to physical therapists, other team members may include a psychologist to help manage emotional issues, a clinical sexologist or sex therapist to assist with sexual concerns, an orthopedist, neurologist or pain specialist to treat serious orthopedic or neurological pathology such as a herniated disc or nerve entrapment. Certainly, urologists, urogynecologists, gastroenterologists, and other specialists should be utilized as appropriate. Growing evidence suggests that Traditional Chinese Medicine, such as acupuncture and herbal medicine, helps in the treatment of chronic pain, and women experiencing CPP are seeking alternative care with good results (Suh & Lowe, 2011). The interdisciplinary team can be as varied as necessary, but adequate communication between members is essential.

Nurses play a critical role in caring for women with CPP/MFPP and are important members of the interdisciplinary team. They understand the importance of providing holistic care to, which is vital for this population. Nurse practitioners and certified nurse-midwives are often responsible for the assessment, diagnosis, treatment, and appropriate referrals for these women. Once MFPP is identified, nurses can act as educators, patient advocates, and case managers. For example, nurses can train women in techniques such as diaphragmatic breathing, which promotes relaxation and improves parasympathetic activity, bowel health

and constipation management, and bladder retraining. Education regarding pain management techniques is critical and includes: teaching appropriate resting postures for perineal or vulvar pain control, such as elevating the pelvis with pillows or supporting the legs over a chair; using ice and heat following the basic principles that ice is helpful for hot, burning pain associated with swelling, while heat is helpful for relaxing muscle spasms. Nurses can teach stress reduction techniques using guided imagery or meditation. Also, nurses who are trained in biofeedback could pursue specialized training in the treatment of pelvic floor conditions using this modality. As case manager or patient advocate, nurses can help the woman locate appropriate services and provide much needed psychosocial support, which is often missing in this era of managed care.

Conclusion

Myofascial pelvic pain is a major component of CPP in women that is often not properly identified by health care providers. Attempting to reproduce symptoms in the woman who is experiencing CPP by performing a brief musculoskeletal screen and pelvic floor muscle assessment during the medical examination can help establish if a myofascial pain component exists. Chronic pelvic pain affects women of all ages and every socioeconomic class, and occurs amidst a myriad of physical and psychological conditions making a cure challenging. However, successfully treating the MFPP component of CPP is feasible with a comprehensive approach. In addition to addressing the medical, psychological, and sexual concerns, the women's health practitioner should refer women to a pelvic floor physical therapist who can provide effective treatments, such as skillful manual therapy, biofeedback, and training in self-care strategies to reduce MFPP and improve associated complaints. An interdisciplinary team in which nurses play a critical role is essential for identifying and successfully treating MFPP in women with CPP.

Acknowledgement

Funded by a grant from UCSF-Kaiser Building, Interdisciplinary Research Careers in Women's Health (BIRCWH) and co-funded by the National Institute of Child Health and Human Development (NICHD) and the Office of Research on Women's Health (ORWH) 5 K12 HD052163.

References

- Abercrombie P, Learman L. Providing holistic care for women with chronic pelvic pain. *Journal of Obstetric, Gynecologic, & Neonatal Nursing*. 2012; X(x):xxx. this issue.
- American College of Obstetricians and Gynecologists. Practice bulletin no. 51. Chronic pelvic pain. *Obstetrics & Gynecology*. 2004; 103(3):589–605. [PubMed: 14990428]
- American Pain Foundation. Target chronic pain notebook. 2012. Retrieved from <http://www.painfoundation.org/learn/publications/target-notebook.html>
- Anderson R, Wise D, Sawyer T, Chan C. Integration of myofascial trigger point release and paradoxical relaxation training treatment of chronic pelvic pain in men. *The Journal of Urology*. 2005; 174(1):155–160. doi: 10.1097/01.ju.0000161609.31185.d5. [PubMed: 15947608]
- Anderson R, Wise D, Sawyer T, Glowe P, Orenberg EK. 6-day intensive treatment protocol for refractory chronic prostatitis/chronic pelvic pain syndrome using myofascial release and paradoxical relaxation training. *The Journal of Urology*. 2011; 185(4):1294–1299. doi: 10.1016/j.juro.2010.11.076. [PubMed: 21334027]

- Anderson R, Wise D, Sawyer T, Nathanson BH. Safety and effectiveness of an internal pelvic myofascial trigger point wand for urologic chronic pelvic pain syndrome. *The Clinical Journal of Pain*. 2011; 27(9):764–768. doi: 10.1097/AJP.0b013e31821dbd76. [PubMed: 21613956]
- Apte G, Nelson P, Brismee JM, Dedrick G, Justiz R 3rd, Sizer PS Jr. Chronic female pelvic pain-part 1: Clinical pathoanatomy and examination of the pelvic region. *Pain Practice: The Official Journal of World Institute of Pain*. 2011; 12(2):88–110. doi: 10.1111/j.1533-2500.2011.00465.x. [PubMed: 21615678]
- Armstrong RB. Initial events in exercise-induced muscular injury. *Medicine and Science in Sports and Exercise*. 1990; 22(4):429–435. [PubMed: 2205778]
- Bassaly R, Tidwell N, Bertolino S, Hoyte L, Downes K, Hart S. Myofascial pain and pelvic floor dysfunction in patients with interstitial cystitis. *International Urogynecology Journal*. 2010; 22(4): 413–418. doi: 10.1007/s00192-010-1301-3. [PubMed: 20976441]
- Bendana EE, Belarmino JM, Dinh JH, Cook CL, Murray BP, Feustel PJ. Efficacy of transvaginal biofeedback and electrical stimulation in women with urinary urgency and frequency and associated pelvic floor muscle spasm. *Urologic Nursing*. 2009; 29(3):171–176. [PubMed: 19579410]
- Butrick CW. Pelvic floor hypertonic disorders: Identification and management. *Obstetrics and Gynecology Clinics of North America*. 2009; 36(3):707–722. doi: 10.1016/j.ogc.2009.08.011. [PubMed: 19932423]
- Chiarioni G, Nardo A, Vantini I, Romito A, Whitehead WE. Biofeedback is superior to electrogalvanic stimulation and massage for treatment of levator ani syndrome. *Gastroenterology*. 2010; 138(4): 1321–1329. doi:10.1053/j.gastro.2009.12.040. [PubMed: 20044997]
- Clemens JQ, Nadler RB, Schaeffer AJ, Belani J, Albaugh J, Bushman W. Biofeedback, pelvic floor re-education, and bladder training for male chronic pelvic pain syndrome. *Urology*. 2000; 56(6):951–955. doi: 10.1016/S0090-4295(00)00796-2 [pii]. [PubMed: 11113739]
- Doggweiler-Wiygul R. Urologic myofascial pain syndromes. *Current Pain and Headache Reports*. 2004; 8(6):445–451. [PubMed: 15509457]
- Doggweiler-Wiygul R, Wiygul JP. Interstitial cystitis, pelvic pain, and the relationship to myofascial pain and dysfunction: A report on four patients. *World Journal of Urology*. 2002; 20(5):310–314. doi: 10.1007/s00345-002-0298-8. [PubMed: 12522588]
- Dommerholt J. Persistent myalgia following whiplash. *Current Pain and Headache Reports*. 2005; 9(5):326–330. Review. doi: 10.1007/s11916-005-0008-5. [PubMed: 16157061]
- Dommerholt J, Bron C, Franssen J. Myofascial trigger points: An evidence informed review. *Journal of Manual and Manipulative Therapy*. 2006; 14(4):203–221. Retrieved from http://www.dgs.eu.com/uploads/media/MTrP_an_evidence_informed_review_02.pdf.
- Fall M, Baranowski AP, Elneil S, Engeler D, Hughes J, Messelink E, J...de C Williams AC. EAU guidelines on chronic pelvic pain. *European Urology*. 2010; 57(1):35–48. doi:10.1016/j.eururo.2009.08.020. [PubMed: 19733958]
- Fernandez-de-Las-Penas C, Alonso-Blanco C, Miangolarra JC. Myofascial trigger points in subjects presenting with mechanical neck pain: A blinded, controlled study. *Manual Therapy*. 2006; 12(1): 29–33. doi:10.1016/j.math.2006.02.002. [PubMed: 21882489]
- FitzGerald MP, Anderson RU, Potts J, Payne CK, Peters KM, Clemens J, ...Nyberg L. Randomized multicenter feasibility trial of myofascial physical therapy for the treatment of urological chronic pelvic pain syndromes. *The Journal of Urology*. 2009; 182(2):570–580. doi: 10.1016/j.juro.2009.04.022. [PubMed: 19535099]
- FitzGerald MP, Payne CK, Lukacz ES, Yang CC, Peters KM, Chai TC, ...Nyberg LM. Randomized multicenter clinical trial of myofascial physical therapy in women with interstitial cystitis/painful bladder syndrome and pelvic floor tenderness. *The Journal of Urology*. 2012 Epub ahead of print. doi: 10.1016/j.juro.2012.01.123.
- Fitzwater JB, Kuehl TJ, Schrier JJ. Electrical stimulation in the treatment of pelvic pain due to levator ani spasm. *The Journal of Reproductive Medicine*. 2003; 48(8):573–577. [PubMed: 12971135]
- Fricton JR, Auvinen MD, Dykstra D, Schiffman E. Myofascial pain syndrome: electromyographic changes associated with local twitch response. *Archives of Physical Medicine and Rehabilitation*. 1985; 66(5):314–317. [PubMed: 3859255]

- Ge HY, Madeleine P, Cairns BE, Arendt-Nielsen L. Hypoalgesia in the referred pain areas after bilateral injections of hypertonic saline into the trapezius muscles of men and women: a potential experimental model of gender-specific differences. *The Clinical Journal of Pain*. 2006; 22(1):37–44. [PubMed: 16340592]
- Gentilcore-Saulnier E, McLean L, Goldfinger C, Pukall CF, Chamberlain S. Pelvic floor muscle assessment outcomes in women with and without provoked vestibulodynia and the impact of a physical therapy program. *The Journal of Sexual Medicine*. 2010; 7(2 Pt 2):1003–1022. doi: 10.1111/j.1743-6109.2009.01642.x. [PubMed: 20059663]
- Gerwin RD, Shannon S, Hong CZ, Hubbard D, Gevirtz R. Interrater reliability in myofascial trigger point examination. *Pain*. 1997; 69(1-2):65–73. Retrieved from <http://www.gemtinio.com.au/files/page/articles/Gerwin.pdf>. [PubMed: 9060014]
- Hagg GM. Corporate initiatives in ergonomics. *Applied Ergonomics*. 2003; 34(1):1. [PubMed: 12523797]
- Harden RN, Bruehl SP, Gass S, Niemiec C, Barbick B. Signs and symptoms of the myofascial pain syndrome: a national survey of pain management providers. *The Clinical Journal of Pain*. 2000; 16(1):64–72. [PubMed: 10741820]
- Hartmann D. Chronic vulvar pain from a physical therapy perspective. *Dermatologic Therapy*. 2010; 23(5):505–513. doi: 10.1111/j.1529-8019.2010.01353.x. [PubMed: 20868404]
- Hartrick CT, Kovan JP, Shapiro S. The numeric rating scale for clinical pain measurement: a ratio measure? *Pain Practice*. 2003; 3(4):310–316. doi: 10.1111/j.1530-7085.2003.03034.x. [PubMed: 17166126]
- Haywood BL, Porter SL, Grana WA. Assessment of musculoskeletal knowledge in primary care residents. *American Journal of Orthopedics*. 2006; 35(6):273–275. [PubMed: 16841789]
- Henneman E, Somjen G, Carpenter DO. Excitability and inhibability of motoneurons of different sizes. *Journal of Neurophysiology*. 1965; 28(3):599–620. [PubMed: 5835487]
- Holzberg A, Kellog-Spadt S, Lukban J, Whitmore K. Evaluation of transvaginal Thiele massage as a therapeutic intervention for women with interstitial cystitis. *Urology*. 2001; 57(6 Suppl 1):120. Retrieved from http://prostatitis.hostei.com/docs/ic_in_males.pdf. [PubMed: 11378103]
- Hong CZ. Electrophysiological characteristics of localized twitch responses in responsive taut bands of rabbit skeletal muscle. *Journal of Musculoskeletal Pain*. 1994; 2(2):17–43.
- International Pelvic Pain Society. Pelvic pain assessment form. 2008. Retrieved from <http://www.pelvicpain.org/resources/handpform.aspx>
- Itza F, Zarza D, Serra L, Gomez-Sancha F, Salinas J, Allona-Almagro A. Myofascial pain syndrome in the pelvic floor: a common urological condition. *Actas Urologicas Espanolas*. 2010; 34(4):318–326. [PubMed: 20470693]
- Kavvadias T, Baessler K, Schuessler B. Pelvic pain in urogynaecology. Part I: evaluation, definitions and diagnoses. *International Urogynecology Journal*. 2011; 22(4):385–393. doi: 10.1007/s00192-010-1218-x. [PubMed: 20645076]
- Lidbeck J. Central hyperexcitability in chronic musculoskeletal pain: a conceptual breakthrough with multiple clinical implications. *Pain Research & Management: The Journal of the Canadian Pain Society*. 2002; 7(2):81–92.
- Lucas KR. Latent myofascial trigger points: Their effect on muscle activation and movement efficiency. *Journal of Bodywork and Movement Therapies*. 2004; 8(3):160–166. doi: 10.1016/j.jbmt.2003.12.002.
- Maitland, G.; Hengeveld, E.; Banks, K.; English, K. Maitland's vertebral manipulation. 7th ed.. Butterworth-Heinemann; London: 2001.
- Montenegro ML, Mateus-Vasconcelos EC, Candido dos Reis FJ, Rosa e Silva JC, Nogueira AA, Poli Neto OB. Thiele massage as a therapeutic option for women with chronic pelvic pain caused by tenderness of pelvic floor muscles. *Journal of Evaluation in Clinical Practice*. 2010; 16(5):981–982. doi: 10.1111/j.1365-2753.2009.01202.x. [PubMed: 20590980]
- Montenegro ML, Vasconcelos EC, Candido Dos Reis FJ, Nogueira AA, Poli-Neto OB. Physical therapy in the management of women with chronic pelvic pain. *The International Journal of Clinical Practice*. 2008; 62(2):263–269. doi: 10.1111/j.1742-1241.2007.01530.x.

- Munglani R. Neurobiological mechanisms underlying chronic whiplash associated pain: The peripheral maintenance of central sensitization. *Journal of Musculoskeletal Pain*. 2000; 8(1-2): 169–178.
- Neville C. Comparison of PT and MD findings of physical examination of patients with and without chronic pelvic pain. *Journal of Women's Health Physical Therapy*. 2010; 33(1):16. Retrieved from <http://www.nursingcenter.com/pdf.asp?AID=1223425>.
- Otten E. Concepts and models of functional architecture in skeletal muscle. *Exercise & Sport Sciences Reviews*. 1988; 16(1):89–137. [PubMed: 3292268]
- Oyama IA, Rejba A, Lukban JC, Fletcher E, Kellogg-Spadt S, Holzberg AS, Whitmore K. Modified Thiele massage as therapeutic intervention for female patients with interstitial cystitis and high-tone pelvic floor dysfunction. *Urology*. 2004; 64(5):862–865. doi: 10.1016/j.urology.2004.06.065. [PubMed: 15533464]
- Paulson JD, Delgado M. Chronic pelvic pain: The occurrence of interstitial cystitis in a gynecological population. *Journal of the Society of Laparoendoscopic Surgeons*. 2005; 9(4):426–430. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3015651/?tool=pubmed>. [PubMed: 16381360]
- Schleip R. Fascial plasticity-A new neurobiological explanation: Part 1. *Journal of Bodywork and Movement Therapies*. 2003; 7(1):11–19.
- Sciotti VM, Mittak VL, DiMarco L, Ford LM, Plezbert J, Santipadri E, ...Ball K. Clinical precision of myofascial trigger point location in the trapezius muscle. *Pain*. 2001; 93(3):259–266. [PubMed: 11514085]
- Simons, DG.; Travell, JG.; Simons, LS. Travell and Simons' myofascial pain and dysfunction: The trigger point manual. 2nd ed.. Vol. 1. Williams and Wilkins; Baltimore, MD: 1999a.
- Simons, DG.; Travell, JG.; Simons, LS. Travell and Simon' myofascial pain and dysfunction: The trigger point manual. 2nd ed.. Vol. 2. Williams and Wilkins; London: 1999b.
- Sjogaard G, Jorgensen LV, Ekner D, Sogaard K. Muscle involvement during intermittent contraction patterns with different target force feedback modes. *Clinical Biomechanics*. 2000; 15(Suppl 1):S25–29. doi: 10.1016/S0268-0033(00)00056-5. [PubMed: 11078902]
- Sjogaard G, Sogaard K. Muscle injury in repetitive motion disorders. *Clinical Orthopaedics & Related Research*. 1998; (351):21–31. Review. [PubMed: 9646743]
- Suh LK, Lowe FC. Alternative therapies for the treatment of chronic prostatitis. *Current Urology Reports*. 2011; 12(4):284–287. doi: 10.1007/s11934-011-0188-y. [PubMed: 21448730]
- Treaster D, Marras WS, Burr D, Sheedy JE, Hart D. Myofascial trigger point development from visual and postural stressors during computer work. *Journal of Electromyography and Kinesiology*. 2006; 16(2):115–124. doi: 10.1016/j.jelekin.2005.06.016. [PubMed: 16146699]
- Tu FF, As-Sanie S, Steege JF. Prevalence of pelvic musculoskeletal disorders in a female chronic pelvic pain clinic. *The Journal of Reproductive Medicine*. 2006; 51(3):185–189. [PubMed: 16674013]
- Tu FF, Holt J, Gonzales J, Fitzgerald CM. Physical therapy evaluation of patients with chronic pelvic pain: a controlled study. *American Journal of Obstetrics & Gynecology*. 2008; 198(3):272, e271–277. doi: 10.1016/j.ajog.2007.09.002. [PubMed: 18313447]
- Vecchiet L. Comparative sensory evaluation of parietal tissues in painful and non painful areas in fibromyalgia and myofascial pain syndrome. In: Gebhart, GF.; Hammond, DL.; Jensen, TS., editors. *Proceedings of the 7th World Congress on Pain*; Seattle, WA: IASP Press. 1994; p. 177-185.
- Vecchiet L. Differentiation of sensitivity in different tissues and its clinical significance. *Journal of Musculoskeletal Pain*. 1998; 6(1):33–45. doi: 10.1300/J094v06n01_03.
- Vecchiet L, Di Lisa F, Pieralisi G, Ripari P, Menabo R, Giamberardino MA, Siliprandi N. Influence of L-carnitine administration on maximal physical exercise. *European Journal of Applied Physiology and Occupational Physiology*. 1990; 61(5-6):486–490. [PubMed: 2127744]
- Wallace K, Herman H. Female pelvic floor: Function, dysfunction, and treatment. 2009 June 15-17, 2006 Boston MA Instructors: Hollis Herman DPT, MS, PT, OCS, BCIA601 PMDB and Kathe Wallace PT, BICA-PMDB, Course notes.

- Weiss JM. Pelvic floor myofascial trigger points: Manual therapy for interstitial cystitis and the urgency-frequency syndrome. *The Journal of Urology*. 2001; 166(6):2226–2231. doi: S0022-5347(05)65539-5 [pii]. [PubMed: 11696740]
- Weissmann RD. Considerations with regard to biomechanics related to myofascial trigger point therapy (Translated from German). *Physiotherapie*. 2000; 35(10):13–21.
- Wise, D.; Anderson, R. *A headache in the pelvis: a new understanding and treatment for chronic pelvic pain syndromes*. 5th ed.. National Center for Pelvic Pain; Occidental, CA: 2010.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Callouts

1. Myofascial pelvic pain is a frequently unrecognized and untreated component of chronic pelvic pain.
2. Women presenting with myofascial pelvic pain describe symptoms in the pelvis, pelvic floor, and distally in the abdomen, back, and legs.
3. Myofascial pelvic pain can be effectively treated with a variety of physical therapy techniques, including manual therapy, biofeedback, relaxation training, electrical stimulation, and self-care modalities.

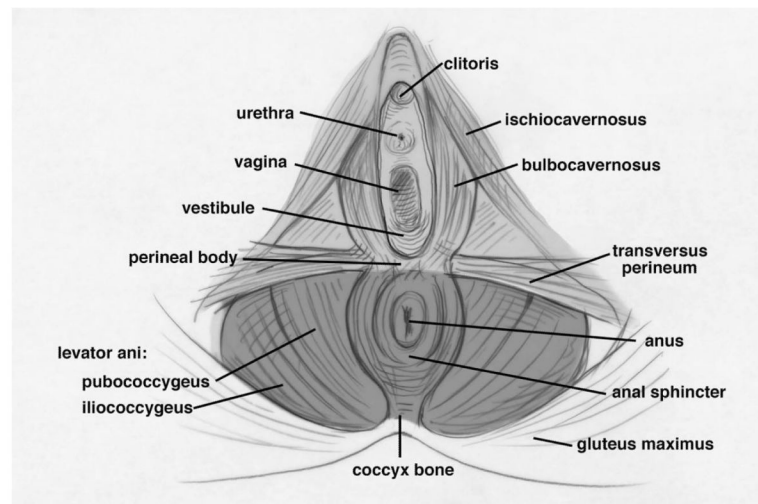


Figure 1. Pelvic Floor and Perineal Muscles. From Stein, A. (2008). *Heal Pelvic Pain: The Proven Stretching, Strengthening, and Nutrition Program for Relieving Pain, Incontinence, IBS and Other Symptoms Without Surgery*. New York, NY: McGraw-Hill. Used with permission.

Table 1

Referred Pain Patterns: Pelvic Floor Muscles

Pelvic Floor Muscle	Referral Pattern	Possible Patient Complaint
Superficial Muscle Layer		
Bulbocavernosus	Perineal pain, urogenital structures	Dyspareunia, pain with orgasm, clitoral pain
Ischiocavernosus	Perineal pain, urogenital structures	Dyspareunia, pain with orgasm, clitoral pain
Transverses perineum (Superficial transverse perineal)	None documented	Dyspareunia
Anal sphincter (Sphincter ani externus)	Posterior pelvic floor, anus/rectum, pubic pain	Burning or tingling in anus/rectum, pain before/during/ after defecation
Deep Muscle Layer		
Levator ani anterior: Pubococcygeus/puborectalis	Suprapubic region, urethra, bladder, perineum, pain/symptoms	Increased urinary urgency & frequency, Painful urination after intercourse, dyspareunia
Levator ani posterior: Iliococcygeus	Sacrococcygeal, deep vaginal, rectal, perineal, anal pain	Pain before/ during/after defecation, dyspareunia, thrusting pain
Other Deep Pelvic Floor Muscles		
Coccygeous	Sacrococcygeal, buttock pain	Pain with sitting, during defecation, intestinal fullness, anal pressure/pain
Obturator internus	Anal, coccyx, vulvar, urethral, vaginal, or posterior thigh pain	Generalized pelvic pain, often burning or aching
Piriformis	Sacroiliac region, lateral over ipsilateral buttock, posterior over	Buttock, leg pain if sciatic nerve affected
	ipsilateral hip, proximal 2/3 of posterior thigh	

Note. For more information about referred pain patterns in the pelvic floor muscles see Itza et al., 2010; Simons et al., 1999a; Simons et al., 1999b; Wise & Anderson, 2010.

Table 2

Referred Pain Patterns: Trunk and Thigh Muscles

Muscle	Referral Pattern	Patient Complaint
Rectus abdominis	Bilateral symptoms across upper or lower back, precordial pain/fullness, nausea/vomiting	Urinary urgency/ frequency, bladder pain, perineum pain, buttock pain, iliosacral, back pain
External abdominal oblique	“Heartburn” symptoms, Groin, genital pain	Belly pain
Internal abdominal oblique	Groin, genital pain, lower quadrant abdominal pain	Pelvic pain
Transversus abdominis	Groin, genital pain, lower quadrant abdominal pain	Belly pain, pelvic pain
Pyramidalis	Pain bladder, urethra, pubic bone, SIJ, buttock, hip	SIJ, buttock, hip pain especially with sitting and standing
Iliopsoas	Ipsilateral spine from thoracic region to sacroiliac/upper buttock; anterior thigh/groin	Inguinal pain
Quadratus lumborum	SIJ, lower buttock, iliac crest anteriorly; lower abdomen, groin, greater trochanter	Belly pain, back pain, buttock pain
Gluteus maximus	Local to buttock, superior to sacrum, inferior to uppermost ipsi posterior thigh	Sitting bone pain, perineum pain, iliosacral pain
Gluteus medius	Posterior crest ipsi ilium, sacrum, post/lat ipsi buttock and upper thigh	Pain with walking or supine lying, ipsilateral sidelying, slumped sitting, SIJ/back pain
Gluteus minimus	Lower lateral buttock, lateral aspect thigh, knee into ankle or see similar pattern more posteriorly	Sit to stand
Hip adductors: adductor longus, adductor brevis, adductor magnus, gracilis	Deep pelvic pain, groin, medial thigh, knee, & shin pain	Tenderness in any of the referred pain zones, pelvic pain
Hamstrings: biceps femoris, semitendinosus, semimembranosus	Lower buttock, ischial tuberosity, posterior/medial or posterior/lateral thigh to posterior knee to calf	Pain after prolonged sitting or walking, possible sleep disruption, “pseudo” sciatica

Note. For more information about referred pain patterns in the thigh and trunk muscles see Itza et al., 2010; Simons & Travell, 1999b; Wise & Anderson, 2010.