

# Chronic Pelvic Pain—Part 1: Prevalence, Evaluation, Etiology, and Comorbidities

Lee A. Learman, MD, PhD

## ABSTRACT

**PURPOSE:** To discuss the prevalence, etiology, and evaluation of patients presenting with chronic pelvic pain (CPP); clinical management of this condition and/or its underlying causes will be discussed in Part 2 of this series.

**EPIDEMIOLOGY:** Though estimates vary, CPP is believed to affect at least 4% and in some studies as many as 40% of women who seek primary care, making this symptom at least as common as asthma and back pain. CPP is responsible for 10% of all referrals to gynecologists, 12% of all hysterectomies, and more than 40% of all laparoscopies.

**REVIEW SUMMARY:** CPP in women is a condition that substantially affects quality of life and has an economic impact approaching US \$2 billion annually. For the clinician, CPP represents a formidable diagnostic challenge because its underlying etiology may be multifaceted, including not only gynecologic but also gastrointestinal, urologic, and neuropsychiatric systems. The differential diagnosis can be complex, and a thorough history and physical examination are essential to proper diagnosis and treatment. Though organic causes (most commonly endometriosis, irritable bowel syndrome, and interstitial cystitis) often underlie this condition, muscular maladaptations and emotional factors, such as depression, are common comorbidities.

**TYPE OF AVAILABLE EVIDENCE:** Systematic reviews, randomized-controlled trials, national treatment guidelines.

**GRADE OF AVAILABLE EVIDENCE:** Fair.

**CONCLUSION:** Chronic pelvic pain is a prevalent problem among women, and thus is physically, socially, and financially burdensome for individuals as well as society. Multiple etiologies and associations with conditions arising from several organ systems may be responsible, necessitating extensive evaluation and making a multidisciplinary approach to the problem paramount to determining a treatment plan—the details of which will be addressed in Part 2 of this series.

(*Adv Stud Med.* 2005;5(6):306-315)

Although criteria vary, the most common definition of chronic pelvic pain (CPP) is continuous or episodic (noncyclic) pain located below the umbilicus, lasting at least 6 months in duration, and of sufficient severity to cause interference with activities of daily living and/or to require medical or surgical intervention.<sup>1,2</sup> However, this simple definition falls short of expressing the immense physical and psychological impact the condition

can have on the patient, or the complexity of the diagnostic challenge it presents to the clinician. Indeed, because multifactorial etiologies may be present (eg, gynecologic, urologic, gastrointestinal, musculoskeletal, and neuropsychiatric), a multidisciplinary approach is essential from the onset of the pursuit of the diagnosis to the design of an integrative management plan—which must take into consideration the physical as well as psychological impact of CPP on the individual's quality of life.

Dr Learman is Professor of Obstetrics, Gynecology and Reproductive Sciences, University of California, San Francisco School of Medicine, San Francisco, Calif.

**Conflict of Interest:** Dr Learman reports having no financial or advisory relationship with corporate organizations related to this activity.

**Off-label Product Discussion:** The author of this article does not discuss off-label/unapproved use of products.

Correspondence to: Lee A. Learman, MD, PhD, Chronic Pelvic Pain Practice, UCSF/Mount Zion Women's Health Center, 2356 Sutter St, San Francisco, CA 94115.

### PREVALENCE OF CHRONIC PELVIC PAIN

Variations in definition limit the validity of epidemiologic data for CPP. Furthermore, patient self-selection of care providers leads to a nonsystematic evaluation and a relative inability to know what the most common causes of CPP are among women, as does the lack of studies that attempt to determine various causes of pelvic pain in women. If the same patient makes 3 appointments—with her gynecologist, urologist, and gastroenterologist—she may be diagnosed with more conditions than the patient who sees just 1 of these specialists. Again, this unfortunately may lead to a lack of unbiased data, and is a serious limitation to our understanding of this problem. However, according to a study by Zondervan et al

in 2000, the annual prevalence of CPP in primary care in the United Kingdom was nearly 4% (37 cases per 1000 women) among women aged 15 to 73, making the condition about as common as asthma (37/1000) and back pain (41/1000) and much more common than migraine headache (21/1000).<sup>1,3</sup> Recent studies in the United States reveal it to be an even more pervasive problem, with prevalence rates ranging from 15% in 1 Gallup telephone survey of 5263 women aged 18 to 50 years, to rates approaching 40% in a study of primary care and obstetrical and gynecological practices.<sup>4,5</sup> Moreover, the same Gallup survey revealed that 1 of every 7 women who were queried in 18 000 households reported pelvic pain lasting 6 months or more. The results also indicat-

Table 1. Some of the Diseases That May Be Associated With Chronic Pelvic Pain in Women\*

#### Gynecologic

Extrauterine  
Adhesions  
Adnexal cysts  
Chlamydial endometritis or salpingitis  
Chronic ectopic pregnancy  
Endometriosis  
Endosalpingiosis  
Neoplasia of the genital tract  
Ovarian dystrophy or ovulatory pain  
Ovarian remnant syndrome  
Ovarian retention syndrome (residual ovary syndrome)  
Pelvic congestion syndrome  
Postoperative peritoneal cysts  
Residual accessory ovary  
Subacute salpingo-oophoritis (chronic PID)  
Tuberculous salpingitis  
Uterine  
Adenomyosis  
Atypical dysmenorrheal or ovulatory pain  
Cervical stenosis  
Chronic endometritis  
Endometrial or cervical polyps  
Intrauterine contraceptive device  
Leiomyomata  
Symptomatic pelvic relaxation (genital prolapse)

#### Urological

Bladder neoplasm  
Chronic urinary tract infection  
Interstitial cystitis  
Radiation cystitis  
Recurrent, acute cystitis  
Recurrent, acute urethritis  
Stone/urolithiasis  
Uninhibited bladder contractions (detrusor dyssynergia)  
Urethral caruncle  
Urethral diverticulum  
Urethral syndrome

#### Gastrointestinal

Carcinoma of the colon  
Chronic intermittent bowel obstruction  
Colitis  
Constipation  
Diverticular disease  
Hemias  
Inflammatory bowel disease  
Irritable bowel syndrome

#### Musculoskeletal

Abdominal wall myofascial pain (trigger points)  
Chronic coccygeal pain  
Compression of lumbar vertebrae  
Degenerative joint disease  
Disk herniation or rupture  
Faulty or poor posture  
Fibromyositis  
Hemias: ventral, inguinal, femoral, Spigelian  
Low back pain  
Muscular strains and sprains  
Neoplasia of spinal cord or sacral nerve  
Neuralgia of iliohypogastric, ilioinguinal, and/or genitofemoral nerves  
Pelvic floor myalgia (levator ani spasm)  
Piriformis syndrome  
Rectus tendon strain  
Spondylosis

#### Other

Abdominal cutaneous nerve entrapment in surgical scar  
Abdominal epilepsy  
Abdominal migraine  
Bipolar personality disorders  
Depression  
Familial Mediterranean fever  
Neurologic dysfunction  
Porphyria  
Shingles  
Sleep disturbances  
Somatic referral

PID = pelvic inflammatory disease.

\*Reprinted with permission from Howard FM. Chronic pelvic pain. *Obstet Gynecol.* 2003;101:594-611.<sup>1</sup>

ed that 20% of women who had experienced pelvic pain for more than 3 days had experienced periodic episodes of pelvic pain for more than a year—figures that represent a continual (though intermittent) impact on daily life. Although pain syndromes may begin to occur in adolescence and continue across the life span, a study by Jamieson et al of 581 women determined that CPP is most common among women of reproductive age, and that being African American may be a risk factor.<sup>5</sup>

The economic impact of CPP is significant, with direct medical costs for outpatient visits estimated at \$881.5 million annually and overall costs skyrocketing to more than \$2 billion per year.<sup>14</sup> CPP is responsible for 10% of all referrals to gynecologists, 12% of all hysterectomies, and more than 40% of all laparoscopies.<sup>6</sup> In the Gallup poll described previously, 15% of 548 employed respondents reported time lost from work and 45% reported reduced work productivity due to pelvic pain.<sup>4</sup> The women who reported CPP and/or endometriosis as a cause of their pain also had significantly lower mean scores for general health (70.5 vs 78.8,  $P < .05$ ), and reported the most health distress, dyspareunia, and interference with activities because of their pain. Thus, the “costs” of CPP place a substantial burden not only on the healthcare system, but also on the individual and her family. Women who suffer from this condition experience chronic disability as well as emotional distress and discord in relationships with their spouses and/or significant others.

Despite the fact that CPP is present in nearly 40% of women who seek general primary care and that for half these women the pain has persisted for more than 1 year, more than 61% of women report that the etiology of their symptoms is unknown.<sup>4</sup>

### THE DIAGNOSTIC CHALLENGE

Many diseases have been associated with CPP (Table 1), thus patients frequently endure years of shuffling from one specialist to another and undergoing expensive and invasive diagnostic tests in the hopes of gaining a definitive diagnosis and cure. The initial key to unlocking this enigma is a thorough, careful, and considerate history and physical examination, which may direct the clinician toward the most common etiologies and help avoid unnecessary testing and possibly even surgery. Evidence suggests that CPP may result from various comorbidities commonly found in patients presenting with CPP, including gynecologic and nongynecologic diseases such as irritable bowel syndrome (IBS) and interstitial cystitis (IC). Determining possible causes of CPP is further complicated by complex visceral innervation that arises from common pathways along the sacral plexus and dorsal nerve roots of the thoracolumbar spine.<sup>7,8</sup>

### HISTORY TAKING AS A THERAPEUTIC INTERVENTION

When obtaining the patient's history, it is impor-

tant to determine the onset and duration of the pain in order to differentiate chronic (at least 3 to 6 months in duration) from acute pain, which may have different etiologies beyond the scope of this review. Whereas patients may be able to provide specific details as to the onset, duration, and precipitating events for their CPP, unfortunately, eliciting a precise history may be difficult once a patient has been coping with pain for a prolonged period, and important patterns may become obscured with the passage of time.

### PAIN LOCATION, SEVERITY, AND DURATION

Location as well as quality of the pain may provide a clue as to the underlying origin. For example, visceral pain from the internal organs (eg, uterus, adnexa, intestines) is poorly localized, may be described as diffuse or deep, and may be accompanied by autonomic reflex-related symptoms such as nausea, diaphoresis, and apprehension.<sup>8</sup> More superficial pain or referred pain from cutaneous structures, fascia, or musculature is more localized and superficial, and may be traced to the dermatome of the spinal cord that is innervating the affected organ.<sup>8</sup> Location may be within the anatomic pelvis, abdominal wall, and/or lower back. Pain that radiates down the anterior thigh may be referred from the uterus.

Interestingly, severity of pain may not correlate well with degree of organic pathology. For example, there is no “dose-response” relationship between stage of endometriosis and complexity of pelvic adhesions and severity of pain.<sup>8</sup>

Timing of the symptoms also is key. If a woman reports her pain to be cyclic, a gynecologic etiology is the most likely, although the pain associated with IBS also may be cyclic in nature,<sup>19</sup> as can that of IC.<sup>10</sup>

If pain is worse at the end of the day, is related to certain movements or positions, or is alleviated by rest, it may be of a musculoskeletal origin. A change in menstruation and/or menstrual-related symptoms (such as menorrhagia, or new-onset dysmenorrhea) will signal uterine etiologies, such as leiomyomas, adenomyosis, or primary dysmenorrhea (Table 2).<sup>11</sup> If the patient reports dyspareunia it is important to ascertain whether the discomfort is located at the introitus or whether it is deeper; introital dyspareunia can be associated with CPP due to vulvar vestibulitis, whereas deep dyspareunia may be related to a multitude of conditions, including uterine or adnexal pathology, endometriosis, interstitial cystitis, and myofascial sources in the pelvic floor musculature.<sup>8</sup>

### REVIEW OF SYMPTOMS

A careful review of symptoms should include specific questions about bladder and bowel symptoms as well as dietary habits. For example, IBS may be associated with CPP, and also is associated with intermittent lower abdominal cramping, diarrhea, and/or constipation, gas,

and bloating. Interstitial cystitis, chronic urethritis, or other urologic conditions may be associated with frequency of urination, urgency, a sense of incomplete bladder emptying, and dysuria, along with pelvic pain. A specialized questionnaire designed and administered by Parsons et al, entitled “the Pelvic Pain and Urgency/Frequency Questionnaire,” was found to correlate positively with pelvic pain and IC as diagnosed via positive potassium sensitivity testing in 74% to 91% of patients (depending on how high they scored), and may be helpful in establishing suspected cases of pelvic pain related to this underlying etiology.<sup>12</sup> Marked sensitivity to intravesical potassium was found in 75% of patients with IC as compared with only 4% of controls; neither group reported pain or other urologic symptoms when challenged with water,<sup>13</sup> leading the authors to conclude that potassium sensitivity is a useful diagnostic test for IC and hence useful for validating their questionnaire.

In addition, review of symptoms should include thorough questioning about musculoskeletal conditions (especially pain in the lower back, abdomen, or lower extremities that worsens with standing, walking, or other physical activities).

*MEDICAL AND PSYCHOSOCIAL HISTORY*

Past medical history for patients with CPP may include clues such as a history of prior pelvic inflammatory disease, difficult childbirth, and abdominal or pelvic surgeries (ie, surgery for endometriosis or appendectomy), since adhesions and implants may be causative agents. Psychosocial history is particularly important, not only to elicit a history of sexual or physical abuse, but also to determine how the distress of being in chronic pain has impacted the patient's daily life, work, and relationships. One study by Harrop-Griffiths et al demonstrated that patients with CPP experienced a significantly greater prevalence of lifetime major depression, current major depression, lifetime substance abuse, adult sexual dysfunction, and somatization. They also were significantly more likely than controls to have been a victim of childhood and adult sexual abuse.<sup>14</sup> Thus, it is vital to ask patients with CPP if they feel safe in their home environment and also to ascertain what, if any, family or social support systems they may call upon.<sup>1</sup> Beyond ruling out recent domestic violence or sexual assault as possible causes of CPP, disclosing past episodes is thought to have therapeutic benefit and improve the level of trust between patient and provider. Eliciting this history and offering supportive messages can be done efficiently without opening a Pandora's box of psychosocial issues.

*ESTABLISHING GOALS AND EXPECTATIONS OF CARE*

Stress has been found to play an important role in generating and perpetuating chronic pain; the sensation of

pain involves many complex processes, and women may process pain differently due to differences in levels of sex hormone levels and in the expression of genetic mechanisms that are inherited in a sexually dimorphic fashion.<sup>15</sup> High-yield questions assess the impact of the pain, the patient's view of her condition, and her expectations for care. Assessing the impact of pain creates treatment endpoints that are of greater use than a pain scale alone. The clinician can ask, “What are some things that you would like to be able to do, but cannot do because of the pain?” “What do you think is causing the pain? Do you have any thoughts or concerns about what it might be?” and, “How would you define successful treatment of your pain?”

Because the patient may have lived with pain for long periods of time, the clinician might suggest she keep a symptom diary to assist in pinpointing the answers to some of these key questions about her medical history and the parameters of her pain. An excellent comprehensive history and physical examination form is available at no cost from the International Pelvic Pain Society, and may be accessed at [www.pelvicpain.org](http://www.pelvicpain.org). The form includes a pain map that allows the patient to chart the exact location of her pain, which is helpful because it also assists in identifying other areas of pain that may accompany the CPP, such as headaches. The form includes questions and scales to screen for nearly all conditions potentially causing, or associated with, CPP.

**Table 2. Clues to the Diagnosis of Chronic Pelvic Pain\***

Clinical Clue	Suggested Diagnosis
<b>History</b>	
Cyclic pain associated with menses	Gynecologic origin
New-onset dysmenorrhea	Uterine origin (fibroids, adenomyosis)
Pain referred down anterior thigh	Uterine origin
Irregular uterine bleeding	Fibroids, endometriosis, adenomyosis, functional ovarian neoplasm
Deep dyspareunia	Endometriosis, urethritis, interstitial cystitis, pelvic relaxation, pelvic floor tension myalgia, pelvic adhesions, fixed uterine retroversion, bowel disease, psychiatric disorder
Urethral tenderness, dysuria	Urethral syndrome
Crampy abdominal pain alternating with diarrhea and constipation	Irritable bowel syndrome
Melena, rectal bleeding	Inflammatory bowel disease
Pain on defecation	Endometriosis, pelvic floor tension myalgia
Previous abdominal surgery or pelvic infection	Pelvic adhesions, abdominal wall trigger points
Multiple somatic complaints	History of sexual abuse, psychiatric disorder (eg, depression)

\*Reprinted with permission from Ryder R. Chronic pelvic pain. *Am Fam Phys.* 1996; 54:2225-2232.<sup>11</sup>

In all, taking a careful and thoughtful history may not only narrow the field of etiologic suspects, but may actually be therapeutic for patients as they relay their symptoms to a sympathetic listener and establish a rapport prior to undergoing an extensive and potentially uncomfortable physical examination—in which one goal will be to reproduce their pain.

#### APPROACH TO THE PHYSICAL EXAMINATION

As with taking the history, the physical examination must be approached in a setting and manner that is neither rushed nor superficial but, rather, patient, gentle, and considerate. Clinicians should be sufficiently skilled to screen for diagnoses that may be outside their area of specialty and, in fact, the primary care clinician may play an important role as “team captain” coordinating care, especially if he or she is the first physician to make contact with the patient. Therefore, it is important for the primary care clinician to have an understanding of all possible underlying causes of CPP and how to evaluate the patient for any/all of these.

In addition, clinicians may need to perform sequential examinations to elucidate as accurate a clinical picture as possible. Clinicians should not hesitate to establish a trusting relationship with the patient and then repeat the exam-

ination or attempt a more extensive examination once the patient is more comfortable. The examination also may need to be repeated during different phases of the menstrual cycle. Multiple examinations may be helpful in interpreting signs and symptoms in patients with generalized or nonspecific pain and/or to track pain progression. For example, while performing the examination the clinician should ask the patient to quantify her pain, and use this quantification for comparison with future examinations to show the patient her progress (or lack thereof).

#### GENERAL APPEARANCE AND MUSCULOSKELETAL EXAMINATION

A complete physical examination should begin with the general appearance of the patient, including gait assessment and posture evaluation. Balance testing, as assessed by having the patient stand on 1 leg, also can be beneficial. Assessments of spine and hip flexibility are elicited by having the patient bend forward and backward. There may be noticeable differences of several centimeters in height between the 2 hips, due to shortening and tightening of muscles or other musculoskeletal abnormalities. An accentuation of the lower spinal curve may indicate a contributory skeletal abnormality. Tenderness and asymmetry offer clues, as well (Table 3).<sup>16</sup>

#### EXAMINATION OF THE ABDOMEN

A thorough abdominal examination includes inspection, auscultation, and palpation. It should not fail to include auscultation for normal bowel sounds, general palpation for guarding, rebound tenderness and masses, including palpation of the umbilicus, incision sites, and the groin to assess for hernias or inguinal lymph nodes suggestive of an infectious or cancerous etiology.<sup>11</sup> In addition, a Carnett's test may be very helpful. Originally described in 1926,<sup>17</sup> the aim of this test is to localize tenderness to the abdominal wall vs intraperitoneal structures. During palpation of the tender area while the patient is supine, the patient performs a partial abdominal wall contraction (sit-up or stomach crunch) and is asked whether this improves or worsens the pain. If the pain worsens during abdominal muscle contraction, the origin is in the muscles and/or nerves of the abdominal wall. If the pain improves, this suggests an intraperitoneal source that has been shielded from the examiner's hand by the contracted rectus muscle. Causes of abdominal wall tenderness producing a positive Carnett's sign include myositis, muscle strain, trigger points, and nerve entrapment. Thomson and Francis assessed this test in 120 patients and found it to be a reliable means of identifying abdominal wall pathology, sparing the expense and dangers of invasive testing and even the risk of unnecessary surgery.<sup>18</sup> Evaluation for trigger points both in the abdominal and pelvic regions can be performed using a cotton swab. It is important to distinguish allodynia, in which a nonpainful

**Table 3. Physical Examination Findings and Correlation to Etiologies of Chronic Pelvic Pain\***

Standing Examination	Possible Problems Diagnosed
Gait	Short leg syndrome; herniated disk; general musculoskeletal problems
Posture with and without forward bending	Typical pelvic pain posture; scoliosis; one-leg standing
Standing on one leg with and without hip flexion	Laxity of the pubic symphysis; laxity of the pelvic girdle; weakness of the hip and pelvis
Iliac crest symmetry	Short leg syndrome; one-leg standing
Groin evaluation with and without Valsalva	Inguinal hernia; femoral hernia
Pubic symphysis evaluation, including trigger points	Peripartum pelvic pain syndrome; trigger points; osteitis pubis; osteomyelitis pubis
Hip and sacroiliac evaluation, including trigger points	Arthritis of hip; trigger points
Buttocks (gluteus and piriformis) evaluation, including trigger points	Piriformis syndrome; pelvic floor pain syndrome; gluteal trigger points
Fibromyalgia tender point evaluation	Fibromyalgia

\*Reprinted with permission from Howard FM. Chronic pelvic pain. *Obstet Gynecol.* 2003;101:594-611.<sup>1</sup>

stimulus is perceived as painful, from a trigger point. Allodynia can occur in large regions of tissue and reflects cutaneous sensory nerves overreacting to stimuli. A trigger point is a tender spot less than 2 cm in diameter created by injury at a nerve's motor end plate secondary to repetitive muscle trauma or strain. A tense band of muscle or a palpable nodule accompanies some trigger points. In other cases the trigger point is deep at the level of the fascia, and is diagnosed by deep palpation of a small, focal area reproducing the patient's pain. Slocumb found that superficial abdominal trigger points that appeared to be the cause of abdominal pelvic pain syndrome were responsive to local anesthetics in 89.3% of 131 patients, with 92.6% requiring 5 or fewer treatments and 68.2% followed up for longer than 6 months.<sup>19</sup>

#### UNIMANUAL, BIMANUAL, AND SPECULUM EXAMINATION OF THE PELVIS

Once the patient has been made to feel as physically and emotionally comfortable as possible, the pelvic examination should begin with an external inspection of the mons and vulva, looking for lesions or discharge that might suggest either neoplasm or infection. In addition, the clinician should be cognizant of any signs of trauma or irritation, such as lacerations or abrasions, and should check for evidence of atrophy, cystocele, urethrocele, rectocele, or uterine prolapse.

Careful inspection of the vulvar vestibule is followed by palpation of vestibular tissues with a cotton swab. Vestibular tissue occupies the compartment at the entrance to the vagina between the keratinized skin and the hymenal tissues. One may wish to conduct the speculum examination with a small (Pederson) speculum. Speculum examination is necessary to completely visualize the vagina and cervix. A Pap smear and appropriate cultures may be obtained at this point.

Following inspection and speculum examination, the manual portion of the pelvic examination should begin with introduction of 1 or 2 index fingers into the vagina to assess for introital tenderness or spasm suggestive of vaginismus. A 12-point unimanual examination is essential screening for myofascial sources of pain in the pelvic floor muscles. The 12-point examination includes palpation in 4 quadrants just beyond the hymen (urethra, rectum, and obturator muscles), in the mid vagina (bladder base, rectum, and pubococcygeus muscles), and upper vagina (bladder, cul-de-sac, and iliococcygeus muscles). (A detailed description of the structures palpated during the unimanual examination can be found in Howard et al's, *Pelvic Pain: Diagnosis and Management*.<sup>20</sup>)

Following the 12-point examination, adnexal and cervical motional tenderness should be assessed. As a final step, a bimanual examination should be completed using an internal hand to palpate the uterus and adnexal structures. An enlarged, irregular uterus may indicate

leiomyomata, or adenomyosis if it is also slightly tender and boggy. Tenderness also may represent chronic endometritis. A uterus that is retroverted and fixed in position can be the result of adhesions or implants from endometriosis. When feasible, clinicians may wish to perform the digital examination before the speculum portion, as the speculum tends to induce significant anxiety in many patients with CPP, and may change interpretation of the myofascial digital examination.

In selected cases a rectovaginal examination may be helpful, as in the case of uterosacral nodularity supporting a diagnosis of endometriosis.<sup>21</sup> It is important to mention that a digital rectal examination with stool guaiac smear testing recently has been called into question as an effective screening tool for occult blood or colorectal cancer.<sup>22</sup> Instead, the clinician should consider newer fecal DNA tests and also risk-based protocols for referrals to a gastroenterologist for sigmoidoscopy or colonoscopy.

#### DIAGNOSTIC TESTING

The patient's distress in CPP can motivate a costly and at times invasive diagnostic evaluation. Inappropriate resource use and risk can be avoided by conducting a thorough history and physical examination and only ordering those tests that pursue the most likely diagnostic possibilities. Tests to consider in selected cases as indicated by clinical findings include urinalysis and culture if bladder symptoms predominate, fecal DNA/immunochemical testing, screening for fecal occult blood, or referral for endoscopy if gastrointestinal (GI) symptoms predominate, and selected laboratory tests (thyroid-stimulating hormone, complete blood count, and fasting blood sugar) if depressive or constitutional symptoms are present. Tests for gonorrhea and chlamydia infection are helpful in at-risk patients or those with visceral pelvic tenderness.

Pelvic ultrasound commonly is indicated for suboptimal or incomplete pelvic examinations due to tenderness or habitus. Both transabdominal and transvaginal ultrasonography often are used as a first-line radiologic modality for diagnosis of CPP, because they are relatively inexpensive and do not require exposure to ionizing radiation. Ultrasound may detect leiomyomas and/or adenomyosis, however the nonspecific findings noted—such as an enlarged uterus or texture changes—may make it difficult to distinguish between these 2 diagnoses. Ultrasound also may be utilized to look for endometriosis (via detection of adnexal masses, but these may be difficult to differentiate from other etiologies, and the test may be insensitive for implants).<sup>23</sup> Abdominopelvic computed tomography, hysterosalpingogram, and magnetic resonance imaging (MRI) are not useful studies in most patients with CPP. MRI can add useful diagnostic information when ultrasound is equivocal for characterizing the origin of an adnexal mass as ovarian (dermoid,

endometrioma) or uterine (pedunculated subserosal leiomyoma) and for characterizing uterine abnormalities (adenomyosis vs leiomyoma).<sup>23</sup>

Additional evaluation is individualized and may be directed at establishing or ruling out IC (via hydrodistention cystoscopy<sup>24</sup> or potassium sensitivity test<sup>13</sup>), inflammatory bowel disease (via colonoscopy, sigmoidoscopy, or barium enema), radiculopathy (via nerve conduction/electromyographic studies), or bony pelvic or hip joint abnormalities (via x-rays of hips and pelvic region).

#### *SURGICAL MEANS OF DIAGNOSING CHRONIC PELVIC PAIN*

Although many women with CPP have undergone invasive testing (ie, hysteroscopy, laparoscopy, and/or cystoscopy to allow direct visualization of pelvic structures) in an attempt to arrive at a definitive diagnosis, these attempts are not always successful. For example, whereas 40% of all laparoscopies are performed for CPP, only 60% reveal an etiology.<sup>1</sup> The most common diagnoses made via laparoscopy include endometriosis (35%), pelvic adhesions (25%), and chronic pelvic inflammatory disease (5%). Other diagnoses include ovarian cysts, hernias, pelvic congestion syndrome, ovarian remnant syndrome, ovarian retention syndrome, postoperative peritoneal cysts, and endosalpingiosis.<sup>21</sup> In an extensive review of published reports by Howard, he found that 60% of women with CPP have a pathologic or anatomic abnormality that can be diagnosed via laparoscopy (most commonly endometriosis and adhesions) with clinical improvement afterwards in 65% to 80% women. Thus, there is a <50% chance for any given woman that diagnostic and operative laparoscopy will improve her pain (since 60% abnormality multiplied by a 65%-80% success rate yields a conditional probability of success in only 39%-48% of cases).<sup>2</sup>

#### *CONSCIOUS PAIN MAPPING VIA LAPAROSCOPY*

A relative newcomer on the diagnostic imaging scene is the use of conscious pain mapping conducted during laparoscopy. With this technique, patients are kept semi-awake (under conscious sedation) during their laparoscopy to attempt to reproduce and/or determine the site and degree of chronic pain, as for example, when organs, other structures, and adhesions are palpated or otherwise manipulated. Palter and Olive first described this technique, which they performed on 11 patients in 1996, and found it to be safe, effective, and less expensive than traditional laparoscopy for evaluation of CPP.<sup>25</sup> Since then, several investigators have utilized pain mapping for the diagnosis of CPP.<sup>26,27</sup> For example, Howard performed conscious pain mapping procedures on 50 consecutive women who had had at least 1 prior diagnostic procedure for CPP. Investigators determined that conscious pain mapping was successful in 35 cases

(70%). Twenty-nine patients had 42 specific positive sites, and 6 patients had diffuse visceroperitoneal pelvic tenderness. Adhesions and endometriosis accounted for 45% of positive lesions or sites. About half of women with endometriosis or adhesions mapped pain specifically to those lesions. Specific viscera accounted for 36% of positively mapped sites. Diagnoses of chronic visceral pain syndrome were suggested by the findings in 16 (46%) patients whose mapping was successful. In this study, 22 women (44%) had decreased pain postoperatively and 8 (16%) were pain free.<sup>27</sup> Follow-up periods in studies of pain mapping typically are 6 to 12 months, and long-term randomized, placebo-controlled studies of pain mapping are lacking.

#### *ETIOLOGIES AND COMORBIDITIES*

Pelvic pain may entail a family of overlapping diseases and conditions. As already emphasized, the underlying etiology of CPP can range from GI, urinary tract, or musculoskeletal disorders to psychiatric causes to specific gynecologic conditions, such as endometriosis or adenomyosis. Muscular and myofascial conditions may be the primary causes of CPP or may accompany pain resulting from other causes.<sup>16</sup> A lack of diagnosis sets the stage for pain to persist even after nonmuscular conditions are identified and treated.

#### *MUSCULOSKELETAL ORIGINS*

Muscle strain injury of the lower back, abdominal wall injuries, pelvic floor muscle damage, and much less commonly, fibromyalgia, all can result in severe, periodic pain. Muscular pain can be either somatic or visceral. Somatic pain arises from deep skin or muscle, and typically involves burning or aching. In contrast, visceral pain, which is associated with the abdominal cavity, often is described as a gnawing pain, though it may have the same characteristics as somatic pain. Somatic pain often is the result of a past injury. Visceral pain may be caused by tissue inflammation and can result from causes ranging from the lingering effects of ingestion of an irritating substance to injuries from excessive stretching, such as occurs during labor and child delivery.

Essential to identification of myofascial causes of pain, a careful examination focuses on muscles comprising the perineum and neighboring the vagina, where areas of muscle tension and tenderness as well as trigger points can be found. Perineal muscles contributing to pain may include the ischiocavernosus and bulbocavernosus muscles as well as the deep and superficial transverse perineal muscles. The obturator muscles and the puborectalis complex that forms the pelvic floor musculature can be palpated digitally during vaginal examination. The obturator muscles are accessible to examination lateral to the vagina just beyond the hymenal ring, and can be accessed more complete-

ly during the examination if the patient bends and crosses her leg over the midline. The pubococcygeus muscles run beside the mid vagina and iliococcygeus muscles beside the upper vagina. If a screening examination of the pelvic floor muscles reproduces the patient's pelvic pain or other aspects of the physical examination reveal possible myofascial sources of pain, a physical therapy evaluation is warranted to further define the problem and develop a treatment strategy.<sup>1,16</sup>

#### NEUROLOGIC CONDITIONS

Burning or radiating pelvic pain may be neurologic in origin. Nerves can be injured during surgical positioning, and thus a history of surgery should be considered as a possible etiology for CPP. Retractor placement may cause injuries to the general femoral nerve, the femoral cutaneous nerve, and the iliohypogastric or ilioinguinal nerves, and all of these may present as pain symptoms in the pelvic region. Neurologic causes also include postsurgical or postobstetric damage to the abdominal wall or vagina; these may cause trigger points that may also arise from chronic muscle strain unrelated to prior surgery. Peripheral neuropathy, lumbar disk disease, or tumors of the spinal cord, sacrum, or sacral nerve are other rare causes of chronic pelvic discomfort.

#### ENDOMETRIOSIS AND OTHER COMMON GYNECOLOGIC ETIOLOGIES

Endometriosis is frequently responsible for CPP, along with other associated symptoms such as dysmenorrhea, deep dyspareunia, and, in later stages, noncyclic abdominal pain. If endometrial implants involve the bladder or bowel, the patient also may have discomfort or bleeding upon urination or bowel movements. During menses, endometriotic peritoneal implants bleed within the tissues they have invaded. Over time these lesions may cause scarring that tethers the uterus and adnexal structures within the cul-de-sac, as well as adhesions of bowel and bladder.

Other potential gynecologic causes include chronic infections (such as chronic endometritis or residua of pelvic inflammatory disease); ovarian cysts; dystrophy or vein congestion; leiomyomata; neoplasms; adhesions (from endometriosis or prior surgeries); adenomyosis; vulvodynia; vulvar vestibulitis; dysmenorrhea and/or mittelschmerz; or uterine prolapse (Table 1).<sup>1</sup>

Recent evidence has prompted experts to question the role of adhesions in CPP. In a study conducted in The Netherlands 100 women found to have pelvic or abdominal adhesions during diagnostic laparoscopy for chronic abdominal pain were randomized to either immediate lysis of adhesions or no additional surgery (diagnostic laparoscopy only). Both groups reported similar and substantial improvements in pain and quality of life and by 12 months 27% in each group

were pain free. The researchers recommend abandoning lysis of adhesions for chronic abdominal pain.<sup>28</sup>

#### UROLOGIC CONDITIONS

Whereas chronic urinary tract infections (UTIs), renal calculi, and bladder neoplasms all may be potential causes of CPP, IC is the most common urologic cause in women with frequency of urination, urgency, and bladder pain.<sup>29</sup> UTIs and renal stones generally cause more acute symptoms of pain in the suprapubic area, groin, or lower back, dysuria, frequency, urgency, and difficulty voiding. A condition with unclear symptoms and origins, IC is thought to be caused by a defect in the bladder mucosa that permits urinary toxins to breach the bladder epithelium and over time create chronic inflammatory changes. Clinically, the predominant symptoms are urinary frequency, urgency, and nocturia, as well as severe lower abdominal or pelvic pain. Patients with IC may believe that they have had frequent urinary tract infections, but review of medical records often reveals that urine cultures have been negative.

Clemons et al used the Interstitial Cystitis Symptom Index and Problem Index to estimate the prevalence and risk factors for IC in women with CPP. Forty-five women scheduled to undergo laparoscopy for CPP were recruited, questioned about lower urinary tract symptoms, and asked to rate their pain. Cystoscopy with hydrodistention and bladder biopsy was performed at the time of laparoscopy. Seventeen (38%) of the women with CPP were diagnosed with IC. A score of  $\geq 5$  on the Symptom Index had 94% sensitivity (95% confidence interval [CI], 71%, 99.8%) and 93% negative predictive value (95% CI, 68%, 99.8%) in diagnosing IC. On multivariable analysis, an elevated Symptom Index score  $\geq 5$  (odds ratio [OR], 9.4; 95% CI, 1.01, 88.1) and an elevated dyspareunia score  $\geq 7$  (OR, 5.5; 95% CI, 1.10, 27.1) were risk factors for IC.<sup>30</sup>

Cystoscopic examination of the bladder under anesthesia can rule out other bladder diseases and look for evidence of glomerulations, small petechial hemorrhages, or larger Hunner's ulcers in the bladder wall, which are diagnostic of IC. However, cystoscopy is not 100% sensitive in capturing women who have disabling bladder pain symptoms and no evidence of other disease.<sup>31</sup> More recently, a potassium sensitivity test has been added to the diagnostic workup. In-office cystoscopy can be used along with potassium testing to measure the patient's pain before and after infusion. If pain increases, there is presumptive evidence of IC.<sup>32</sup> In a study by Parsons et al, 231 patients with IC and 41 control subjects underwent intravesical challenge with water and potassium chloride. Although neither group reacted to water that was administered intravesically, there was "marked sensitivity" to intravesical potassium in 75% of patients with IC vs 4% of controls ( $P < .01$ ).<sup>13</sup>

In another study, Parsons and colleagues attempted to determine the prevalence of IC in gynecologic patients with pelvic pain vs control subjects, as indicated by a positive result on a potassium sensitivity test. Two hundred forty-four patients with pelvic pain were given an initial clinical diagnosis on the basis of the chief symptomatic complaint(s) and were surveyed for urologic symptoms. Of the patients with pelvic pain, 197 (81%) showed a positive result on a potassium sensitivity test. Positive potassium sensitivity test rates were comparable across all 4 sites and all clinical diagnoses that included endometriosis, vulvodynia (vulvar vestibulitis), and pelvic pain. Urologic symptoms were reported by 84% of patients, but only 1.6% of the patients had received an initial diagnosis of IC. None of the 47 control subjects tested positive on the potassium sensitivity test.<sup>29</sup> These data along with findings from other studies raise concern about the sensitivity and specificity of the potassium sensitivity test.<sup>33</sup>

#### IRRITABLE BOWEL SYNDROME AND OTHER GASTROINTESTINAL CAUSES

The pain of IBS is fairly unrelenting, but is minimized or eliminated with defecation. Diagnosis depends upon meeting the Rome II International Criteria for this syndrome,<sup>34</sup> which include the presence of pain for at least 12 weeks out of the prior 12 months along with presence of at least 2 of the following 3 features: abdominal discomfort relieved by defecation; onset associated with a change in the frequency of stool; and/or onset associated with a change in the form or appearance of the stool. Some women with IBS have abdominal pain, gas, and bloating with predominantly constipation whereas others have diarrhea predominantly. For these symptoms, a presumptive diagnosis of IBS may be warranted, but if the patient also has the presence of blood in her stool, is anemic, has lost weight, is older than 50, or has other risk factors, she should be referred to a gastroenterologist for evaluation to rule out other possible causes of CPP with a GI component, such as inflammatory bowel disease, diverticular disease, or rarely, colon cancer.

#### PSYCHOLOGIC FACTORS

Depression and anxiety are common adjuncts to any chronic pain syndrome, including pain affecting the pelvic structures. Screening for depression may be accomplished quickly by assessing whether the patient has had either of its 2 major symptoms (a depressed mood or anhedonia) lasting most of the day for most days during at least a 2-week period. If the patient has had neither symptom, screening is negative and depression is not present. If the patient has had either depressed mood or anhedonia, the interview should continue to learn whether a total of 5 out of 9 symptoms are present as required by *Diagnostic and Statistical Manual of Mental*

*Disorders* 4th edition criteria.<sup>35</sup> Depressive symptoms may be explained by systemic conditions such as hypothyroidism, diabetes, or anemia, as well as substance abuse and other psychiatric disorders (eg, bipolar disorder, adjustment disorders, grief reactions).

Diagnosing and treating depression in these patients will help decrease their level of distress even while anatomic causes of pain are still being investigated. Delay or failure to perform screening for psychological etiologies often leads to unnecessary suffering on the part of the patient, and also can increase the patient's reticence to accept a psychiatric diagnosis and any proposed treatment. One useful example to help patients understand the importance of depression screening is to imagine 2 individuals, both with an x-ray showing a broken leg, but one having depression and the other not. When asked which individual has more pain in their leg, most patients answer correctly (the depressed patient). This example can help patients view depression as a comorbidity, but should not delay the evaluation for other (physical) causes of pain.

Unfortunately, a history of sexual and/or physical abuse is found commonly in patients with CPP, irrespective of its etiology.<sup>36-38</sup> In one investigation by Lampe et al comparing women with CPP, women with chronic back pain, and healthy women, 22% of patients with CPP had been sexually abused before their 15th birthdays, significantly more frequently than the other 2 groups (chronic low back pain, 0%;  $P = .019$ , pain-free control, 0%;  $P = .028$ ). Women with CPP were exposed more frequently to physical violence (38%) and suffered more emotional neglect (25%) in their childhoods than women in the pain-free control group (physical abuse, 5%;  $P = .012$ ; emotional abuse, 0%;  $P = .018$ ).<sup>39</sup> Experts believe that helping a patient disclose this history and providing messages of support can be therapeutic in its own right. Clinicians should not, however, conclude that the pain is caused by the trauma history. Instead, abusive experiences may be viewed as risk factors for chronic pain syndromes of varying etiologies.

In contradistinction to the comorbidities of depression and trauma history, somatization is a true cause of CPP. Criteria for somatization disorder include age younger than 30 years at onset of 4 pain symptoms (such as urinary pain, bladder pain, dyspareunia, dysmenorrhea, migraine headache, or back pain), at least 2 nonpain GI symptoms, such as bloating, constipation, or diarrhea, at least 1 nonpain sexual or reproductive symptom, such as menorrhagia, and 1 pseudoneurologic symptom.<sup>35</sup> Somatization is a subconscious disorder in which anxieties are transformed into physical symptoms. Patients are unaware of this transformation and are not using their symptoms for secondary gain. When somatization disorder is present, care for CPP should be supportive and hopeful, while

avoiding the use of surgical interventions and treatments with high risk/benefit ratios.

## CONCLUSION

CPP is a complex condition and one that often is multifactorial in origin. A careful and thorough history and physical examination are necessary to screen for underlying causes. Because multiple etiologies may be behind symptoms of pain and may be working in tandem, it is crucial that the primary care clinician be aware of and skilled in the evaluation of all possible causes in order to establish a treatment plan or refer to a specialist if need be. Ideally, an interdisciplinary team approach led by a supportive and thorough clinician is needed to assist the patient with this physically, emotionally, and financially challenging condition.<sup>4</sup> This approach is more likely to achieve long-term success than a traditional approach in which patients are sent from one specialist to another, each focusing exclusively on the narrow group of diagnoses they are trained to consider. Because data are lacking regarding etiologies of CPP in different demographic groups, in the future, this may prove to be a fruitful area for research. A follow-up review will explore the care and management of patients with CPP.

## REFERENCES

- Howard FM. Chronic pelvic pain. *Obstet Gynecol*. 2003;101:594-611.
- Howard FM. The role of laparoscopy in chronic pelvic pain: promises and pitfalls. *Obstet Gynecol Surv*. 1993;46:357-387.
- Zondervan K, Barlow DH. Epidemiology of chronic pelvic pain. *Baillieres Best Pract Res Clin Obstet Gynaecol*. 2000;14:403-414.
- Mathias SD, Kuppermann M, Liberman RF, Lipschultz RC, Steege JF. Chronic pelvic pain: prevalence, health-related quality of life, and economic correlates. *Obstet Gynecol*. 1996;87:321-327.
- Jamieson DJ, Steege JF. The prevalence of dysmenorrhea, dyspareunia, pelvic pain, and irritable bowel syndrome in primary care practices. *Obstet Gynecol*. 1996;87:55-58.
- Reiter RC. A profile of women with chronic pelvic pain. *Clin Obstet Gynecol*. 1990;33:130-136.
- Milburn A, Reiter RC, Rhombert AT. Multidisciplinary approach to chronic pelvic pain. *Obstet Gynecol Clin North Am*. 1993;20:643-661.
- Van Zandt S. Pelvic pain in women-better understanding of an elusive diagnosis. *Clin Rev*. 2000;10:51-69.
- Houghton IA, Lea R, Jackson N, Whorwell PJ. The menstrual cycle affects rectal sensitivity in patients with irritable bowel syndrome but not healthy volunteers. *Gut*. 2002;50:471-474.
- Erickson DR, Mast S, Ordille S, Bhavanandan VP. Urinary epithelial (MUC-1 glycoprotein) in the menstrual cycle and interstitial cystitis. *J Urol*. 1996;156:938-942.
- Ryder R. Chronic pelvic pain. *Am Fam Phys*. 1996;54:2225-2232.
- Parsons CL, Dell J, Stanford EJ, et al. Increased prevalence of interstitial cystitis: previously unrecognized urologic and gynecologic cases identified using a new symptom questionnaire and intravesical potassium sensitivity. *Urology*. 2002;60:573-578.
- Parsons CL, Greenberger M, Gabal L, Bidair M, Barne G. The role of urinary potassium in the pathogenesis and diagnosis of interstitial cystitis. *J Urol*. 1998;159:1862-1866.
- Harrop-Griffiths J, Katon W, Walker E, Holm L, Russo J, Hickok L. The association between chronic pelvic pain, psychiatric diagnoses, and childhood sexual abuse. *Obstet Gynecol*. 1988;71:589-594.
- National Institutes of Health. *The Neural Immune Mechanisms and Genetic Influences on Chronic Pelvic Pain in Women with Endometriosis*. Available at: <http://www.clinicaltrials.gov/ct/show/NCT00073801>. Accessed May 4, 2005.
- Baker PK. Musculoskeletal origins of chronic pelvic pain. Diagnosis and treatment. *Obstet Gynecol Clin North Am*. 1993;20:719-742.
- Carnett JB. Intercostal neuralgia as a cause of abdominal pain and tenderness. *Surg Gynecol Obstet*. 1926;42:625-632.
- Thomson H, Francis DM. Abdominal wall tenderness: a useful sign in the acute abdomen. *Lancet*. 1977;ii:1053-1054.
- Slocumb JC. Neurological factors in chronic pelvic pain: trigger points and the abdominal pelvic pain syndrome. *Am J Obstet Gynecol*. 1984;49:536-543.
- Howard FM, Perry CP, Carter JE, El-Minawi AM, Li RZ, eds. *Pelvic Pain: Diagnosis and Management*. Philadelphia, Pa: Lippincott Williams & Wilkins; 2000:26-42.
- Singh MK, Puscheck E. *Chronic Pelvic Pain*. Available at: <http://www.emedicine.com/med/topic2939.htm>. Accessed May 18, 2005.
- Agrawal J, Syngal S. Colon cancer screening strategies. *Curr Opin Gastroenterol*. 2005;21:59-63.
- Cody RF, Ascher SM. Diagnostic value of radiological tests in chronic pelvic pain. *Baillieres Best Pract Res Clin Obstet Gynaecol*. 2000;14:433-466.
- Nigro DA, Wein AJ, Foy M, et al. Associations among cystoscopic and urodynamic findings for women enrolled in the Interstitial Cystitis Data Base (ICDB) Study. *Urology*. 1997;49(suppl 5A):86-92.
- Palter SF, Olive DL. Office microlaparoscope under local anesthesia for chronic pelvic pain. *J Am Assoc Gynecol Laparosc*. 1996;3:359-364.
- Almeida OD Jr, Val-Gallas JM. Conscious pain mapping. *J Am Assoc Gynecol Laparosc*. 1997;4:587-590.
- Swank DJ, Swank-Bordewijk SCG, Hop WC, et al. Laparoscopic adhesiolysis in patients with chronic abdominal pain. A blinded, randomized controlled multicenter trial. *Lancet*. 2003;361:1247-1251. Erratum in: *Lancet*. 2003;361:2250.
- Howard FM, El-Minawi AM, Sanchez RA. Conscious pain mapping by laparoscopy in women with chronic pelvic pain. *Obstet Gynecol*. 2000;96:934-939.
- Parsons CL, Dell J, Stanford EJ, Bullen M, Kahn BS, Willems JJ. The prevalence of interstitial cystitis in gynecologic patients with pelvic pain, as detected by intravesical potassium sensitivity. *Am J Obstet Gynecol*. 2002;187:1395-1400.
- Clemons JL, Arya LA, Myers DL. Diagnosing interstitial cystitis in women with chronic pelvic pain. *Obstet Gynecol*. 2002;100:337-341.
- National Kidney and Urologic Diseases Information Clearinghouse. *Interstitial Cystitis*. Available at: <http://kidney.niddk.nih.gov/kudiseases/pubs/interstitialcystitis>. Accessed May 6, 2005.
- Parsons CL, Forrest J, Nickel JC, et al; Elmiron Study Group. Effect of pentosan polysulfate therapy on intravesical potassium sensitivity. *Urology*. 2002;59:329-333.
- Hanno P. Is the potassium sensitivity test a valid and useful test for the diagnosis of interstitial cystitis? *Int Urogynecol J Pelvic Floor Dysfunct*. 2005; Apr 15 [epub ahead of print].
- American Gastroenterological Association medical position statement: Irritable bowel syndrome. *Gastroenterology*. 2002;123:2105-2107.
- American Psychiatric Association. *Desk Reference to the Diagnostic Criteria from DSM-IV-TR*. Arlington, Va: American Psychiatric Association; 2000:168-169.
- Hilden M, Schei B, Swahnberg K, et al. A history of sexual abuse and health: a Nordic multicentre study. *BJOG*. 2004;111:1121-1127.
- Walling MK, O'Hara MW, Reiter RC, Milburn AK, Lilly G, Vincent SD. Abuse history and chronic pain in women: I. Prevalences of sexual and physical abuse. *Obstet Gynecol*. 1994;84:193-199.
- Walling MK, O'Hara MW, Reiter RC, Milburn AK, Lilly G, Vincent SD. Abuse history and chronic pain in women: II. A multivariate analysis of abuse and psychological morbidity. *Obstet Gynecol*. 1994;84:200-206.
- Lampe A, Solder E, Ennemoser A, Schubert C, Rumpold G, Sollner W. Chronic pelvic pain and previous sexual abuse. *Obstet Gynecol*. 2000;96:929-933.