

# Urogynecological Causes of Pain and the Effect of Pain on Sexual Function in Women

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**Abstract:** Female sexual dysfunction (FSD) is a complex biopsychosocial phenomenon. Screening, identifying and managing urogenital and sexual symptoms often result in significant improvement in women's quality of life. Providers must proactively question patients about possible presence of FSD. When a sexual problem is present, identify the type of FSD, counsel patients on the appropriate approaches to treatment. No single therapeutic approach is effective in treating all types of FSD.

**Key Words:** sexual dysfunction, interstitial cystitis, dyspareunia, urinary incontinence, pelvic organ prolapse, pelvic floor dysfunction

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Women with urogynecologic problems such as hypersensitivity disorders and incontinence commonly complain of sexual problems, including hypoactive sexual desire and dyspareunia. Research suggests that women are not routinely evaluated nor treated for sexual concerns associated with urologic conditions. To provide the highest quality patient care, it is incumbent upon urogynecologists/urologists to be familiar with, inquire about, and initiate management strategies for female sexual dysfunction (FSD) associated with a woman's urogynecologic condition.

Most American women consider their sexual health as an important part of their overall health.<sup>1</sup> Although the World Health Organization (WHO) recommends that health care professionals discuss patient's sexual health, the Global Study of Sexual Attitudes and Behaviors study estimated that only 14% of Americans aged 40 to 80 years reported that a physician had inquired about their sexual concerns within the past 3 years.<sup>2</sup> Similarly, Marwick's survey of 500 American adults aged 25 years or older showed that although 85% said they would try to talk to their physician about a sexual problem, 71% felt that the physician would dismiss their concerns.<sup>1</sup> In an online survey of 3807 women, Berman et al<sup>3</sup> reported that 52% of respondents stated that "the physician didn't want to hear about their sexual problems," whereas 76% were not given a diagnosis related to their sexual concern. Eighty-seven percent stated the provider did not follow up on the patient's sexual concerns in subsequent visits.

Community studies indicate that the prevalence of FSD secondary to sexual and pelvic pain is 26% (range, 7%–58%). Prevalence estimates varied depending on the time frame and inclusion of patient's distress. Respondents reported that of sexual difficulties they experienced for 1 month in the previous year, 62% to 89% persisted for at least several months and 25% to 28% persisted for at least 6 months or more.<sup>4</sup>

Screening, identifying, and managing symptoms of sexual pain often result in significant improvement in the woman's quality of life.<sup>5</sup> Management of sexual pain is challenging, and patients may benefit from a multimodal and multidisciplinary team approach. In 1999, the American Foundation for Urological Diseases International Consensus Conference defined and formally classified both FSD<sup>6</sup> and female hypersensitivity disorders (urgency and frequency syndrome, sensory urgency, urethral syndrome, and interstitial cystitis), thereby helping to underscore the integral role that the bladder can play in pelvic and sexual wellness as well as in dysfunction.<sup>7–9</sup> The landmark National Health and Social Life Survey established a strong association between urinary tract symptoms and arousal disorders (odds ratio, 4.2; 95% confidence interval, 2.75–5.89) and sexual pain disorders (odds ratio, 7.61; 95% confidence interval, 4.06–14.26).<sup>10</sup>

This article reviews several urogenital conditions and common disturbances in female sexual function associated with these conditions. It also includes a discussion of urogenital pain syndromes including interstitial cystitis (IC)/painful bladder syndrome (PBS), high-tone pelvic floor dysfunction, and provoked vestibulodynia.

## FEMALE SEXUAL DYSFUNCTION: OVERVIEW

Sexual dysfunction is broadly defined as the inability to fully enjoy sexual intercourse. Although sexual dysfunction rarely threatens physical health, it can take a heavy psychological toll and is associated with depression, anxiety, and debilitating feelings of inadequacy. The *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision 2000* describes sexual dysfunction as a disturbance in the sexual response cycle or pain associated with sexual intercourse (see FSD classification, Table 1). Dyspareunia is a perceptible biologic phenomenon that can have physical and psychosexual implications for the individual experiencing the pain as well as for the relationship(s) that is/are affected by the sexual pain condition.<sup>12</sup>

Although FSD is highly prevalent, the condition is not well defined or understood by the health care community. Discussing sexual matters, even as they pertain to urogynecologic problems, remains taboo for many patients and providers. Limited education in sexual problems may limit a clinician's recognition and treatment of FSD.<sup>13</sup> Although 75% of third year and fourth year medical students in one medical school thought that taking a sexual history would be an important part of their future career, only 58% of the respondents thought that they received adequate training in this area.<sup>14</sup> Similarly, a survey of 101 Canadian and US medical schools found that 67% provided approximately 10 hours of education in human sexuality. A survey of 78 obstetrician-gynecologists, family practitioners, internists, pediatricians, and surgeons showed that male physicians were more likely to report discomfort (35%) when taking a woman's sexual history than female providers (12%).<sup>15</sup>

Although sexual motivation in women is based primarily on intimacy, sexual stimuli play an integral role, and biologic and psychological factors govern the way these stimuli are processed.

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**TABLE 1.** Female Sexual Dysfunction Classification: Basson et al<sup>6</sup> (2000); Amato<sup>11</sup> (2006)

• Sexual desire disorders
Hypoactive sexual desire disorder
Sexual aversion disorder
• Sexual arousal disorders
Subjective arousal disorder
Genital arousal disorder
Combined arousal disorder
• Orgasmic disorder
• Sexual pain disorders
Dyspareunia
Vaginismus
Other sexual pain disorders

According to Basson,<sup>16</sup> instead of focusing solely on genital responses and other physical indicators of desire, any discussion of FSD must consider nontraditional components of a women's sexual satisfaction, including intimacy, trust, respect, communication, affection, vulnerability, and pleasure from sensual touching. Sexual response in women is highly variable and depends on a number of factors, including stage of life. The challenge when counseling women about sexuality and dysfunction is to determine whether their sexual symptoms reflect normative changes over the lifespan, that is, adaptations to their situational circumstances, or a sexual dysfunction.<sup>17</sup>

The Sexual Function Health Council of the American Foundation for Urological Disease convened a panel of experts in 1999 to expand the classes of FSD to include psychogenic and organic causes of desire, arousal, orgasm, and sexual pain disorders. One major difference in the newer classification system is that most of these diagnostic categories include a criterion for personal distress. Just as female sexual functioning has both physiologic and psychological aspects, a wide variety of factors can contribute to FSD.<sup>18</sup>

A common female sexual disorder is dyspareunia or pain experienced during or after sexual intercourse.<sup>19,20</sup> However,

pain during intercourse often affects other aspects of sexual functioning and may contribute to secondary female sexual arousal disorder or female orgasmic disorder.<sup>21</sup> Female sexual pain may be deep or superficial. Superficial or entry pain is often due to inflammation at the introitus (often seen in urogenital atrophy and impaired lubrication), a urinary tract or vaginal infection, and/or provoked vestibulodynia. Deep pain may occur in women who have IC/PBS, pelvic floor muscle spasm, as well as uterine, ovarian, and/or bowel pathology.<sup>24</sup>

Any condition that causes sexual pain can result in vaginismus.<sup>11</sup> This is a form of pelvic floor muscle hypertonus associated with recurrent or persistent spasm of the musculature of the vagina and pelvic floor that interferes with vaginal penetration, and results in personal distress. Pain that prohibits or interferes with sexual expression can contribute to secondary functional orgasmic disorder and cause a woman to avoid intercourse altogether (Table 2).<sup>21</sup>

## HYPERSENSITIVITY AND ASSOCIATED FSD

### Interstitial Cystitis/Painful Bladder Syndrome

Interstitial cystitis/painful bladder syndrome (IC/PBS) is a syndrome commonly associated with sexual pain in women. It is a visceral pain syndrome (not an end-organ disease) that involves chronic neurogenic inflammation, primary afferent nerve overactivity, and central sensitization that interact to perpetuate pelvic pain.<sup>25</sup> Interstitial cystitis/painful bladder syndrome is a clinical diagnosis characterized by suprapubic pressure and discomfort related to bladder filling in the absence of urinary tract infection or other pathology.<sup>26</sup> It is a symptom-based diagnosis with pain, urinary urgency, urinary frequency, and nocturia as key symptoms. Patients often present with only one symptom and may not develop the full spectrum of symptoms for several years.<sup>27,28</sup> FitzGerald et al<sup>27</sup> report that 80% of patients with IC or PBS complain of lower abdominal pain, 74% report urethral pain, 65% report lower back pain, and 27% report pain in "other areas," which may include the genitals. Patients may describe the pain as a dull ache, discomfort, burning sensation, or pressure sensation.

The prevalence of IC/PBS is estimated to be 3% to 6% according to the Rand Interstitial Cystitis Epidemiology (RICE) study,<sup>29,30</sup> suggesting that IC/PBS may be more common than

**TABLE 2.** Elements of a Urogynecologic Examination and Conditions That May Impair Sexual Function

Examination	Conditions to Consider
<b>Inspection of external genitalia</b>	
• Check muscle tone, skin color/texture, skin turgor and thickness, pubic hair amount, vaginal pH	Vaginismus, vulvar atrophy, vulvar dystrophy
• Perform cotton swab test of vulva, vestibule, hymenal ring, Bartholin and Skene glands (pain mapping)	Vulvar vestibulitis
• Expose clitoris	Adhesions
• Examine posterior fourchette and hymenal ring	Episiotomy scars, strictures
<b>Monomanual examination</b>	
• Palpate rectovaginal surface, levator muscles, bladder/urethra	Rectal disease, vaginismus, levator ani myalgia, interstitial cystitis, UTI
• Evaluate vaginal depth	Postoperative or postradiation changes, stricture
<b>Bimanual examination</b>	
• Palpate uterus and adnexa and perform rectovaginal examination	Fibroids, endometriosis, masses, cysts
• Conduct speculum examination and Papanicolaou test	Atrophy, HPV infection, cancer, cystocele, rectocele, uterine prolapse

Adapted from Kingsberg and Janata 2007<sup>22</sup> and Phillips 1998.<sup>23</sup> All permission requests for this image should be made to the copyright holders. HPV indicates human papillomavirus; UTI, urinary tract infection.

once thought, as previous epidemiological studies used restrictive diagnostic criteria.<sup>32-34</sup> Interstitial cystitis/painful bladder syndrome is considered one of the primary causes of chronic pelvic pain (CPP) as well as deep dyspareunia. Eighty-five percent or more than 9 million cases of CPP are thought to originate with bladder pain.<sup>35</sup> Epidemiologic studies suggest that CPP among women in the United States is as common as other chronic conditions such as back pain or asthma.<sup>36,37</sup> Interstitial cystitis/painful bladder syndrome is often misdiagnosed or under diagnosed. Not surprisingly, patients with IC/PBS report increased rates of depression, dyspareunia, sexual dysfunction, and an overall decrease in quality of life.<sup>38-40</sup> Women with genitourinary hypersensitivity disorders<sup>41,42</sup> classified by the International Continence Society as “genitourinary pain syndromes,” account for a large percentage of female patients who present to urogynecologic and sexual medicine practices.<sup>41</sup>

Interstitial cystitis/painful bladder syndrome symptoms typically begin with transient flares and remissions before progressing to severe, continuous, quality-of-life-altering symptoms. Interstitial cystitis/painful bladder syndrome should always be considered in the differential diagnosis for dyspareunia because it is estimated to occur in 49% to 90% of women with IC/PBS.<sup>43-50</sup> Butrick et al<sup>51</sup> suggested that up to 75% of patients with IC/PBS reported exacerbation of their symptoms after sexual activity. Up to 54% of women with IC/PBS avoid intercourse with their partners “most of the time.”<sup>44,45</sup> Early recognition is imperative to optimize therapeutic outcomes in these patients.<sup>52,53</sup> Mild and intermittent symptoms earlier in the disease tend to become constant and severe over time.<sup>27</sup> In addition, women with PBS/IC have significantly more hysterectomies and other pelvic surgeries in comparison with age-matched controls<sup>54</sup>; most of them are done before PBS/IC diagnosis. However, it is unclear whether these operations were performed because of pelvic pain related to undiagnosed PBS/IC or the surgery itself contributed to chronic pelvic pain. When the presentation of symptoms is unclear, specific tools are available to assist in quantifying the symptoms of IC. Currently, there are 2 validated questionnaires for IC/PBS, the O’Leary-Sant symptom and problem index and the pelvic pain and urgency/frequency scale. Both questionnaires are intended to distinguish IC/PBS from other diagnoses.<sup>37,55</sup>

In a recent case-control study comparing 554 patients with IC/PBS to 131 controls, the patients with IC/PBS reported significant FSD in all domains of the Female Sexual Function Index questionnaire with pain being the most significant finding.<sup>55</sup> The Female Sexual Function Index questionnaire is a brief questionnaire measure of sexual functioning in women.<sup>56</sup> Alterations in arousal, lubrication, and pain were most notable in subjects younger than 30 years, whereas those older than 50 years experienced less distress in relation to alterations in their sexuality caused by IC/PBS.<sup>55,57,58</sup> Female Sexual Distress Scale<sup>59</sup> is a screening questionnaire for measuring sexually related personal distress in women with FSD. The 12-item instrument has participants relate their feelings during the past 30 days concerning sexuality on a 5-point scale. A summative score of 15 or more indicates sexually related personal distress. Using the Female Sexual Distress Scale to compare 215 patients with IC/PBS to 832 controls, Peters et al<sup>57</sup> reported that patients with IC/PBS had significantly more dyspareunia (75% vs 30%), more fear of pain (50% vs 13%), significantly less sexual desire (86% vs 40%) and ability to achieve orgasm (63% vs 44%) compared to healthy controls.

Patients with IC/PBS frequently avoid penetration secondary to fear of pain. This response may contribute to or result from vaginismus-type pelvic floor muscle hypertonus, which inhibits comfortable intromission. Forced penetration can cause

more pain and mechanical trauma to the vestibule and urethra and can exacerbate symptoms of IC/PBS.<sup>12,45,60</sup>

Patients with IC/PBS vary with regard to the areas of their bodies that they describe as painful and inhibitory with respect to sexual activity. In a survey of 565 patients with IC/PBS, 60.8% reported pain in the vulvovaginal area, 56.7% in the lower abdomen, and 53.2% in the suprapubic region.<sup>43</sup> Dyspareunia can be the result of any of the painful areas mentioned above but is particularly dramatic in patients who present with periostial vestibular erythema and inflammation, characteristic of provoked vestibulodynia (a condition associated with IC/PBS in up to 60% of cases).<sup>45</sup>

Management of patients with dyspareunia and sexual dysfunction associated with IC/PBS is multimodal and should be designed to treat all pain generators simultaneously (eg, targeting the bladder, pelvic floor muscles, and the vulva). Treatment often combines dietary modifications, timed voiding, oral pharmacologic therapy, bladder instillations, physical therapy, and sex therapy.<sup>59</sup> By keeping a bladder diary, patients can gain insight into their symptoms and discover triggers (including certain foods, activities, or phases of their menstrual cycle). Elucidating timing of the pain related to sexual activity (eg, superficial touching, arousal, penetration, thrusting, orgasm, or post-coital activity) can help the physician tailor therapy.<sup>43</sup>

Sexual pain has ramifications for personal relationships and self-image. Couples often benefit from early referral for relationship and sexual counseling during their treatment course.<sup>45</sup> Withdrawing completely from intimacy can lead to depression and lowered self-esteem. Sexual partners should attempt to identify the types of behaviors that feel comfortable and are not threatening from a pain perspective. Behavioral strategies often include exploring alternatives to sexual intercourse (manual or oral pleasuring) and altering positions for coitus (female superior or side lying). In addition, one can limit thrusting, premedicate with analgesics 1 hour before coitus such as nonsteroidal anti-inflammatory drugs, acetaminophen alone or in combination with tramadol, muscle relaxants, and application of ice or heat packs to the genital or suprapubic area.<sup>44,45</sup>

Pelvic floor muscle internal massage, trigger point injections, as well as use of graduated dilators can be useful adjuvants to physical therapy and muscle-relaxing medications. Hypoallergenic nonirritating lubricants may reduce vulvar, urethral, and vaginal friction; and women with signs of vulvovaginal atrophy may benefit from application of locally applied estrogen.<sup>4,45</sup> Scheduling a clinic visit after intercourse might be useful to identify and treat postcoital flares.

Mainstays of pharmacologic therapy for IC/PBS include pentosan polysulfate, antihistamines, tricyclic antidepressants, anticholinergics, antiepileptics, muscle relaxants, anti-inflammatory agents, and narcotics if necessary. Intravesical instillations are used for symptom flares. Surgical therapy includes hydrodistention, sacral nerve stimulation, and, as a last resort, augmentation cystoplasty or urinary diversion.<sup>62</sup>

## HIGH-TONE PELVIC FLOOR DYSFUNCTION

Pelvic floor musculature is essential in maintaining appropriate pelvic organ function. The pelvic diaphragm (coccygeus and levator ani muscles) plays a crucial role in sexual response. These muscles are commonly affected by the surrounding visceral structures (bladder and rectum). Abnormal pelvic muscle function is estimated in 70% of women with genitourinary, bowel, and female sexual disorders.<sup>63,64</sup>

High-tone pelvic floor dysfunction, also referred to as vaginismus, tension myalgia of the pelvic floor, or levator ani syndrome<sup>65,66</sup> is closely associated with sexual dysfunction.<sup>8,67</sup> It can

also result from traumatic vaginal delivery, direct neuromuscular injury to the pelvic floor, chronic unconscious bracing behaviors (eg, holding urine for hours), sexual abuse, severe anxiety disorders, injury to the spine, postural stressors, microtrauma, and infection. Common urogynecologic contributors to hypertonic states are pelvic pain syndromes including IC/PBS, vaginismus, vestibulodynia, chronic pelvic pain, irritable bowel syndrome, and endometriosis.<sup>25</sup>

High-tone pelvic floor dysfunction can contribute to symptoms of frequency, urgency, dysuria, urinary retention, fecal retention, dyspareunia, and/or vaginismus.<sup>64,65,68</sup> High-tone pelvic floor dysfunction not only can play a causative role in these symptoms but the presence of irritative voiding symptoms and anticipation of genital pain during sex play can similarly result in pelvic floor muscle guarding that, over time, can lead to sustained shortening and spasm of the muscles.<sup>5</sup> As a result, it is often difficult to discern “which came first” in the case of co-incident IC/PBS and high-tone pelvic floor dysfunction.

Pelvic floor tone can be assessed by a digital examination to determine a woman's ability to isolate, contract, and relax the pelvic floor muscles. Digital examination is conducted by exerting light pressure on the inferior lateral walls of the vagina. The patient is asked to squeeze against the examining finger and to “lift” the pelvic floor, without simultaneously tightening the abdominal, gluteus, or adductor muscle groups. Patients may exhibit a spastic or high-tone pelvic floor dysfunction if there is an inability to produce sufficient muscle strength to squeeze or sustain the squeeze for a duration of 5 seconds or if she experiences muscle tenderness/pain when pressure is applied. These results can be verified by using tools designed to measure muscle activity such as a vaginal or anal manometer or electromyography.<sup>7,45,64</sup>

Therapy for high-tone pelvic floor dysfunction is aimed at muscle re-education to facilitate sexual comfort and pleasure. Pelvic floor muscle rehabilitative physical therapy using myofascial release techniques, pelvic strengthening and stabilization, biofeedback, and electrical stimulation is effective treatment for high-tone pelvic floor dysfunction. Internal pelvic floor muscle massage (Thiele massage) often facilitates the gradual introduction of vaginal dilators to prepare for sexual penetration.<sup>66,67</sup> Precoital analgesics, antispasmodics, and muscle relaxants<sup>68</sup> can also be useful adjuvant to physical therapy.<sup>5</sup>

In a recent randomized clinical trial comparing pelvic floor myofascial physical therapy and global therapeutic massage in women with chronic pelvic pain syndromes including IC/PBS, significantly more women in the myofascial group (57%) reported global improvement in symptoms compared only to 21% in the global therapeutic massage treatment group ( $P = 0.03$ ).<sup>69</sup>

Pelvic floor muscle rehabilitation often includes directed transvaginal or transrectal massage of the pelvic floor muscles to elongate shortened muscle bands and decrease spasm in women with dyspareunia and/or vaginismus.<sup>7,66,67</sup> Thiele reported a similar case series of 31 patients with pelvic floor-related pain in which 19 patients (61.3%) were “cured” and 11 patients (35.5%) were “improved” after a series of directed transrectal massages of the pelvic floor muscles. This suggests that pelvic floor manual therapy for decreasing pelvic floor hypertonus effectively ameliorates the symptoms of the urgency/frequency syndrome and sexual pain.<sup>70</sup>

Persistent pain can lead to both reflex and voluntary muscle contraction, which may result in more pain and dysfunction. Another biomechanical treatment of CPP and pelvic floor muscle hypertonus is tender point release and/or trigger point injections. These areas of muscle hyperirritability, usually within a taut band of skeletal muscle, are exquisitely painful upon com-

pression. Identification of specific tender points throughout the body is the mainstay of diagnosing myofascial pain syndromes. These hyperirritable spots are usually less than 1 cm in circumference and consist of palpable taut bands of skeletal muscle fiber that arise after acute or chronic trauma in genetically susceptible muscle.<sup>71</sup> Stimulation of these points often leads to an impulse, which travels to the central nervous system, eliciting pain at the same location or referred to another.<sup>72</sup> These points have been isolated for therapeutic intervention in the levator ani muscle and can be identified anywhere in the pelvic floor musculature. If physical therapy fails to be effective in relieving muscle pain and tenderness, other treatment modalities involving intravaginal muscle relaxants, trigger point injections, or botulinum toxin injections to pelvic floor muscles might be beneficial for patients with CPP.

A study evaluated the use of daily intravaginal 10-mg diazepam suppositories compounded in a paraffin base as adjunctive treatment for high-tone pelvic floor dysfunction. Sexual pain was improved in 25 of 26 patients on a visual analog scale, including increased ease and frequency of coitus with suppository use. Statistically significant improvement was demonstrated on the Female Sexual Function Index and during manual assessment of pelvic floor muscle tension during resting, squeezing, and relaxation.<sup>68</sup>

Langford et al<sup>73</sup> studied the role of trigger point injections in 18 women with CPP/levator ani spasm of at least 6 months' duration. Pelvic floor muscle trigger points were identified manually in subjects via intravaginal palpation. A mixture of 10 cm<sup>3</sup> of 0.25% bupivacaine, 10 cm<sup>3</sup> of 2% lidocaine, and 1 cm<sup>3</sup> (40 mg) of triamcinolone was used for injection of 5 cm<sup>3</sup> per trigger point. A mean follow-up of 3 months after trigger point injection resulted in improvement in 13 of 18 women for a comprehensive success rate of 72%. Of the 13 subjects who experienced any level of improvement, 6 (33%) of 18 patients were completely pain free.<sup>73</sup>

Based on the premise that paralysis of a spastic levator muscle will relieve pain,<sup>74–78</sup> an increasing number of investigators are studying the effectiveness of transvaginal injection of botulinum toxin A (Botox) for relief of refractory levator ani muscle spasm. In one pilot prospective cohort study, Botox was injected into the levator-ani muscles of 12 women with pelvic floor muscle hypertonicity and a minimum 2-year history of CPP. Forty units of medication were injected into each of the puborectalis and pubococcygeus muscles. Two weeks after the injection, median visual analog scale pain scores were significantly improved for dyspareunia ( $P = 0.01$ ) and dysmenorrhea ( $P = 0.03$ ). Pelvic floor muscle manometric measurements showed a 25% reduction in resting tension that was maintained 12 weeks after injection ( $P < 0.0001$ ). Quality-of-life scores were improved, although not significantly. Sexual activity scores were markedly improved, with a significant reduction in discomfort during intercourse ( $P = 0.02$ ).<sup>78</sup> In a similar trial by Abbot et al,<sup>75</sup> Botox injections were administered to 30 women with CPP and pelvic floor muscle spasm. Participants received a total of 80 units, 20 units in each of the puborectalis and pubococcygeus muscles on each side. The change from baseline in the treatment group was significant for dyspareunia ( $P < 0.001$ ), pelvic pain ( $P = 0.009$ ), and reduction in pelvic floor pressure on perineometry ( $P < 0.001$ ).<sup>75</sup>

Patients with severe hypertonus and voiding dysfunction who fail to respond to the pharmacological and behavioral therapies discussed earlier may be candidates for sacral neuromodulation. Sacral neuromodulation is a procedure in which the third sacral nerve root is stimulated by a mild electrical current from an implanted impulse generator. In the United States, InterStim sacral nerve modulation is approved for the treatment

of refractory urge incontinence, urinary frequency and urgency, and nonobstructive urinary retention. Stimulation of sacral roots innervating pelvic floor muscles have the potential for the treatment of pelvic floor dysfunction.<sup>79</sup> In 2 studies, sacral nerve stimulation lessened intractable pelvic pain.<sup>80,81</sup> It is thought that by re establishing pelvic floor muscle awareness, pelvic floor hypertonus can be decreased, which may, in turn, reduce symptoms of pelvic pain as well as lower urinary tract symptoms.<sup>79</sup>

## VESTIBULODYNIA

A prevalent cause of penetrative superficial dyspareunia is provoked vestibulodynia or vulvar vestibulitis syndrome. Vestibulodynia affects an estimated 6 million women in the United States (16% of women between the ages of 18 and 64, according to lifetime prevalence studies).<sup>82–84</sup> It is commonly seen in patients with IC/PBS, high tone pelvic floor dysfunction, and/or endometriosis and remains the most common form of genital pain that affects sexual relationships, causing superficial dyspareunia, which ranges from bothersome to prohibitive.<sup>41,84</sup>

Localized dysesthetic pain that characterizes vestibulodynia manifests as symptoms of chronic generalized rawness and discomfort at the opening of the vagina.<sup>85</sup> Other common symptoms include a clinical history of at least 3 to 6 months of allodynia within the vulvar vestibule and erythema at the inferior introital sulcus, medial to the Hart line, specifically in the periostial regions of the vestibular glands.<sup>85,86</sup> Hypersensitivity and erythema may or may not include the Skene glands and/or regions of the anterior fourchette.<sup>86,87</sup>

Vestibulodynia is most often symptomatic during sexual expression, but symptoms can occur with constrictive clothing, insertion of a tampon, or during a pelvic examination.<sup>85–87</sup> Kennedy et al<sup>88</sup> investigated the comorbidity of IC/PBS in patients with a known diagnosis of vulvar pain. The study subjects were twice as likely to have a diagnosis of IC/PBS than were the controls.<sup>88</sup> Although patients with vulvodynia report vulvar pain and dyspareunia, rarely do they initially report symptoms associated with IC/PBS. It is not unusual that during the course of vulvar treatment, discussions of bothersome urinary symptoms arise.<sup>89</sup>

The exact etiology of vestibulodynia is unknown. One theory proposes that women with vulvar vestibulitis syndrome/provoked vestibulodynia are homozygous for allele 2 of the IL-1RA gene (IL1RN\*2), a phenotype that is associated with ulcerative colitis, Crohn disease, and systemic lupus erythematosus. People with this phenotype have more prolonged and more severe proinflammatory responses than people with other IL-1RA genotypes.<sup>89</sup> Another theory is that neurogenic inflammation of the vulvar vestibule “end organ” occurs in response to noxious environmental stimuli, resulting in parasympathetic efferent and visceral nociceptive afferent hyperactivity. In response to this hyperactivity, the body releases antidromic substance P and calcitonin gene-related peptide, with nitric oxide processing occurring in the areas surrounding the introital glandular ostia.<sup>90</sup>

Researchers who have examined nerve fiber density in women with vestibulodynia found increased vestibular neural fiber proliferation, suggesting a higher number of vulvar nociceptors and greater neuronal firing.<sup>87,91</sup> Studies examining the vestibular mucosa, central nervous system pain pathways, and pelvic floor muscles in patients with vestibulodynia demonstrate immunohistochemical assays indicative of heightened proinflammatory substances and lowered anti-inflammatory responses in the neurochemical environment of the vestibule.<sup>92</sup> Chronic inflammation is thought to result in proliferation of c-fibers, which reduce the sensory threshold of the tissue. The result is that light

touch alone triggers the release of additional inflammatory cytokines and neuropeptides.<sup>93</sup> Prolonged inflammation of this type may result in the development of central sensitization. This may explain the observation that women with genital pain are more sensitive than controls to painful stimuli in areas other than the genitals.<sup>94,95</sup>

Yeast infections, predominantly *Candida*, seem to be one of the most commonly identified events that predate the onset of vestibulodynia. Women with vestibulodynia are 3 times more likely than controls to have a genetic variant of MC1-R.15. Alteration of this gene seems to result in a loss of anti-inflammatory, antinociceptive and *Candida*-inhibitory capabilities, and higher concentrations of proinflammatory nociceptor-sensitizing cytokines.<sup>96</sup>

The simple “touch test” remains the criterion standard in clinical use to quantify the localized pain associated with vestibulodynia. To perform this test, a saline-moistened swab firmly touches areas on the labia majora, interlabial sulci, and lateral labia minora. A comparison is made between the woman’s response to these touches and her response to similar “touches” applied to the ostia of the Skene glands and those of the major and minor vestibular glands. With vestibulodynia, a woman will report little or no pain when structures such as the labia majora or perineum are touched but will demonstrate painful sensitivity when the gland openings are touched. Ruling out coincident candidiasis is best accomplished by obtaining a fungal culture for species typing. After the touch test, encouraging the patient to hold a mirror and view the vestibule can show her the organic (rather than psychogenic) nature of her condition and familiarize her with genital anatomy.<sup>41,87</sup>

Low-dose tricyclic antidepressants such as amitriptyline, either alone or in combination with escitalopram, 10 to 20 mg, and perfenazine, 2 to 4mg, over a 6-month course has been shown to decrease symptoms in at least 41% of study subjects.<sup>97,98</sup> One study examined the effectiveness of gabapentin administration, with an average starting dose of 300 mg. The drug was titrated to a dose of 900 mg over 3 weeks. The most common adverse effect was fatigue, reported by 10% of the subjects. The study documented a 64% success rate (patient report of decreased symptoms) over 30 months.<sup>95,99</sup>

Several topically applied treatment options that have been compared with placebo have produced favorable results in limited study populations. These include 4% cromolyn cream, 5% lidocaine gel, 0.2% atropine cream, 0.01% estradiol cream, and limited use of ultrapotent corticosteroid creams. Compounded creams and ointments using hypoallergenic bases such as acid mantle, aquaphor, or petrolatum decrease the incidence of irritant dermatitis secondary to base additives and are generally tolerated by patients with vulvar pain.<sup>90,100–102</sup> Capsaicin cream seems to have a role in the treatment of sexual pain. Capsaicin is a chemical that activates A delta sensory neurons and unmyelinated c-fibers and facilitates depolarization of afferent neurons. When used on local erythematous painful areas on the vestibule for 20 minutes daily, it desensitizes tissue through degeneration of c-fiber-afferent neurons and the depletion of neuropeptides. In a study of 54 women with vestibulodynia, researchers reported that after 12 weeks of daily use, 95% of patients were able to have pain-free or mildly uncomfortable vaginal intercourse and reported increased frequency of physical intimacy.<sup>102</sup>

Montelukast, an oral leukotriene receptor antagonist, administered orally in 10-mg doses daily, has been shown to improve painful symptoms by 52% in a recent trial of 29 patients with vestibulodynia. It is proposed that the antihistamine action of montelukast may modulate the exaggerated proinflammatory activity of the vestibule.<sup>103</sup>

The delivery of Botox A directly into the vestibule has been the subject of preliminary study.<sup>104,105</sup> Because Botox blocks the cholinergic innervations of the target tissue and demonstrates efficacy at the parasympathetic and sympathetic neural synapses and neuromuscular junction potentially blocking local nociception, researchers postulated that it might be effective in the mucosa. Yoon et al<sup>105</sup> administered Botox A to 7 women with vestibulodynia who had not responded to any other form of pain management. Pain ratings decreased from 8.3 to 1.4 on a 10-point scale with a mean follow-up of 12 months after injection.<sup>105</sup> The women in the study reported no adverse effects from the treatment.

Nonpharmacologic treatments for sexual pain have focused on sex therapy and pain management techniques including cognitive behavioral therapy. A study that examined the efficacy of cognitive behavioral therapy for women with vestibulodynia resulted in improved sexual functioning, pain control, and vaginal muscle control.<sup>106</sup>

Several studies have examined the use of manual physical therapy with direct pelvic floor muscle massage in conjunction with pelvic stabilization for the treatment of vulvar pain. They collective report marked improvement in symptoms after a prescribed course of manual external and transvaginal physical therapy.<sup>70,107–111</sup>

Biofeedback can be a useful tool for teaching self-awareness of pelvic floor muscles and to help normalize pelvic floor tone by relaxing hypertonic muscles and improving muscle stability during rest and contraction.<sup>112</sup> Electromyography may be used to measure the activity of the muscles and provide visual and auditory feedback about the patient's ability to relax and contract her muscles.<sup>108,112</sup> A randomized controlled trial followed women with sexual pain who received electromyographic biofeedback or topical lidocaine for 4 months. Pretreatment and posttreatment questionnaires documented significant improvement in vestibular pain and pressure at 12 months, as well as improvement in sexual functioning and psychological adjustment. Results suggested that a combination of the 2 treatments could benefit women with sexual pain.<sup>113</sup>

For many women with vestibulodynia, a home program of internal self-massage and biofeedback can reduce the recurrence of trigger point formation and maintain sexual function.<sup>108,109</sup> A progressive dilator insertion program can be useful in maintaining sexual function and can be an important adjuvant to biofeedback.<sup>112</sup>

Patients who do not experience symptom improvement with nonsurgical treatment may pursue excisional treatment for sexual pain. In severe or recalcitrant cases, surgical intervention for superficial dyspareunia can be a viable option and yield high rates of success.<sup>114,115</sup> The surgical approach to localized dysesthesia is grouped into 3 categories: local excision, total vestibulectomy, and perineoplasty. Possible complications of surgery for vestibulodynia include blood loss, infection, granulation tissue, fissuring, cyst formation, vulvar adhesions, hematoma, poorly approximated incision lines, decreased lubrication, and continued pain.<sup>115</sup>

In one study, researchers reviewed patient outcomes 5 years after vulvar vestibulectomy. Of 134 women interviewed, 90% were satisfied with their surgical outcome, and 10% reported persistently worse symptoms. Additionally, 72% reported pain with sexual intercourse before surgery, and 11% were unable to engage in sexual activity after surgery.<sup>116</sup> Another study evaluated 111 women who underwent superficial vestibulectomy with adjuvant physical therapy for pelvic floor myalgia. Sixty-four percent of patients reported resolution of dyspareunia, 24% had less dyspareunia, and 11% were unimproved.<sup>117</sup>

When managing patients with vestibulodynia, it is of paramount importance that physicians reassure the patient and her partner that her pain is real, that there is a diagnosis, and it is not "in her head." This is important because many women report feeling confused, depressed, and "sexually defective" when they are unable to engage fully in a sexual relationship. If superficial pain is prohibitive, couples should be counseled to temporarily avoid penetrative sex play and identify mutual forms of pleasure that are enjoyable and nonthreatening. This sexual adjustment can often be best facilitated via a referral to a qualified sexual therapist. Then, as medical treatments and physical therapy progress, and when the woman can insert a size medium or large dilator into the vagina without pain, the couple can begin to experiment with gentle finger, penile, or vibrator insertion, reestablishing the woman's sexual confidence.

## SUMMARY: THE TEAM APPROACH TO WELLNESS

Screening, identifying, and managing urogenital and sexual symptoms often result in significant improvement in a woman's quality of life. Management of these issues can be challenging and may necessitate a multimodal, multidisciplinary approach by urologists, urogynecologists, gynecologists, physical therapists, sex therapists, and advanced practice nurses that comprise the health care team. Research suggests that treatment outcomes are more favorable when combined medical-psychosexual approaches are used.<sup>27,32</sup> The provision of supportive care, expert medical and surgical care can be augmented through knowledgeable referrals to specific practitioners and organizations that can assist women as they face the dilemma of managing urogynecologic symptoms and alterations in their sexual life.

The International Continence Society (<http://www.icsoffice.org/>); the Interstitial Cystitis Association (<http://www.ichelp.org/>); the International Society for the Study of Women's Sexual Health (<http://www.isswsh.org/>); the Interstitial Cystitis Association; the National Vulvodynia Association (<http://www.nva.org/>); the International Pelvic Pain Society (<http://www.pelvicpain.org/>); the American Association of Sexuality Educators, Counselors and Therapists ([www.aasect.org](http://www.aasect.org/)); and the American Physical Therapy Association (<http://www.apta.org/>) can assist in identifying relationship/sexual therapists, physical therapists, psychologists, sexual medicine centers, pain management programs, and other specialty services to support physicians and patients as they deal with the chronicity and complexity of these types of disorders.

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