

Management of Dyspareunia and Associated Levator Ani Muscle Overactivity

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Background and Purpose

Musculoskeletal dysfunction is a known cause of dyspareunia and a reason for referral for physical therapist management. The purpose of this case report is to describe the physical therapist management of a patient with dyspareunia and overactivity of the pelvic-floor muscles with a limited number of visits and a focus on self-management strategies.

Case Description

This case involved a 30-year-old married woman with levator ani muscle overactivity and dyspareunia that was 1 year in duration.

Intervention

The therapist explained the anatomy and function of the pelvic-floor muscles during intercourse, instructed the patient on how to control the levator ani muscles, and instructed her on vaginal self-dilation techniques.

Outcomes

The patient attended 3 physical therapy sessions over a period of 9 weeks. She performed vaginal self-dilation at home. She rated pain during intercourse as 0/10 on a verbal rating scale and had no remaining tenderness in the levator ani muscles at discharge.

Discussion

Some women with dyspareunia may improve with an intervention that emphasizes education and vaginal self-dilation techniques. Future research should compare home-based and clinic-based treatments.

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Dyspareunia is pain before, during, or after intercourse.¹ Dyspareunia in women can have a significant negative effect on quality of life and may affect between 20% and 50% of all women.² Mathias et al³ reported that 88% of women surveyed who had pelvic pain and were sexually active stated that they had pain during intercourse in the previous month. These reports likely underestimate the true prevalence of dyspareunia, because many women with dyspareunia do not seek medical treatment.⁴

Possible causes of dyspareunia include injury to the pelvic area during childbirth, vulvar atrophy, endometriosis, pelvic inflammatory disease, infection, adhesions, and interstitial cystitis.⁴ Psychosocial factors such as depression, physical or sexual abuse, and anxiety also are possible causes of dyspareunia.⁵ Women with dyspareunia, however, are less likely to report a history of physical or sexual abuse compared with women diagnosed with pelvic pain.⁴ Musculoskeletal dysfunction, specifically muscle pain and overactivity of the levator ani muscles, is another cause of dyspareunia documented in the literature.^{1,2,6-9} Overactivity of the levator ani muscles is a condition in which these muscles do not relax completely, or contract when they should relax.¹ Overactive, nonrelaxing muscles are painful to touch, and pain itself may cause spasms of the levator ani muscles, preventing intercourse entirely.^{1,7}

Dyspareunia, vaginismus (muscle spasm in the outer third of the vagina that interferes with intercourse),^{2,10} and vulvar vestibulitis (severe pain in the vestibule)^{4,11} are all associated with pain and overactivity of the levator ani muscles. Women diagnosed with dyspareunia are sometimes referred for physical therapist intervention to address any musculoskeletal component of their pain.¹² The

goal of physical therapist intervention for dyspareunia is to reduce vaginal pain by reducing overactivity of the pelvic-floor muscles, improving the patient's ability to control these muscles, and increasing the ability of the vaginal tissue to tolerate a stretch.^{10,12} Physical therapist interventions for musculoskeletal dysfunction related to dyspareunia include the use of manual therapy, biofeedback, exercise, and vaginal dilators.^{9,13-17} As reported in the literature, these interventions are time intensive, requiring several visits over a long period.¹³⁻¹⁵

Vaginal self-dilation is a technique that uses vaginal dilators to desensitize the vaginal tissue, promote muscle relaxation, and relieve symptoms of dyspareunia.¹⁸ Successful use of this technique in combination with psychotherapy interventions has been described in the literature.^{18,19} In a randomized clinical trial by Schnyder et al,¹⁸ 97.2% of patients who performed vaginal dilation, either with verbal instruction on how to perform the dilation at home or with actual insertion of the dilator by the health care provider, reported pain-free intercourse after an average of 6.3 sessions. This study, however, did not evaluate the success of vaginal dilation in conjunction with physical therapy treatment, and this study still required an average of 6.3 visits with the health care provider over approximately 12 weeks.¹⁸ The effectiveness of home-based vaginal dilation rather than clinic-based treatment is not known. It may be possible for patients to succeed with fewer clinic visits than the range of 8 to 31 visits previously described in physical therapy literature.^{13,14} If this is true, it is important to identify characteristics of patients likely to respond to minimal intervention.

The purpose of this case report is to describe the management of a patient with levator ani muscle overac-

tivity and dyspareunia with an emphasis on home-based treatment. This report meets the University of Oklahoma's Institutional Review Board requirements for the privacy of patient information.

Case Description

History

A 30-year-old, married woman was referred by her urogynecologist for treatment of pelvic-floor spasm and pelvic pain. Her husband attended the examination. Her chief complaint was pain during intercourse, which began as lower abdominal pain during intercourse 1½ years previously. Over time, the pain developed at the entrance of the vagina and then throughout the vagina during intercourse. On a verbal rating scale, she rated her pain as 10/10 during intercourse and 0/10 immediately afterward.²⁰ On a pain drawing, she mapped her pain to the lower abdominal area, inferior to the umbilicus. She described her pain as moderate-to-severe shooting, stabbing, and sharp pain. She reported no pain at rest, during physical activity, or during urination and defecation. She reported having no symptoms of voiding or bowel dysfunction. She could not correlate the onset of her pain with any specific event. Intercourse with her husband was pain-free before this time. She was not sexually active due to her pain.

She completed the 6-item Urinary Distress Inventory-Short Form (UDI-6) questionnaire and the Incontinence Impact Questionnaire-Short Form (IIQ-7). The UDI-6 and IIQ-7 measure symptom distress and life impact of urinary incontinence and related conditions for women, and they correlate well with the long forms of the questionnaires.²¹ These questionnaires are a routine part of the examination of any patients with a pelvic-floor dysfunction who have been referred to my clinic. Although the patient was not referred to my

clinic because of incontinence, incontinence is often associated with other diagnoses; therefore, it was important to find out whether this is the case for this patient.

The patient's responses on the UDI-6 indicated that she was bothered "moderately" by pain or discomfort in the lower abdominal or genital area, and she indicated in writing that this pain occurred during intercourse.²¹ She reported being bothered "not at all" by frequent urination, urine leakage, or difficulty emptying her bladder. On the IIQ-7, she scored 0 on all 7 items for a total score of 0, indicating that she was "not at all affected" by urine leakage or prolapse.²¹

Her significant medical history included uterine rupture, pelvic fracture, internal bleeding, hepatic laceration, and collapsed lung with subsequent laparotomy and hysterectomy following a motor vehicle accident 11 years before the onset of her pain. She denied any history of physical or sexual abuse. Her primary goal was to eliminate pain during intercourse.

Examination and Evaluation

A lower-quarter screen was performed to rule out neurological or musculoskeletal dysfunction. This screen included examination of the range of motion of the hips and back; myotome testing of L2-S1; palpation of bony landmarks of the lumbar spine, sacrum, and pelvis for symmetry and pain; motion testing of the sacroiliac joint; palpation of the musculature of the abdominal wall and buttock; and reflex testing.²² The lower-quarter screen was negative for lumbar and sacroiliac joint dysfunction, pain, weakness, neurological dysfunction, and reproduction of symptoms.

After obtaining appropriate verbal consent, an internal pelvic-floor mus-

cle examination was performed due to the patient's chief complaint of dyspareunia and the physician's diagnosis of pelvic-floor spasm. The examination was performed in the dorsal lithotomy position. Sensation in the S2-4 dermatomes, tested with a cotton-tipped swab, was normal.²³ Cotton-swab testing of the vestibule as described by Bergeron et al¹¹ was negative for tenderness. To examine for pain, pressure was applied to the pelvic-floor muscles externally,⁷ and internally through vaginal palpation using one digit.²⁴ Although less accurate as a measurement of strength (force-producing capacity of muscle), vaginal palpation is the preferred method to determine qualitatively whether the patient can correctly contract and relax the pelvic-floor muscles.^{1,24,25} Vaginal palpation also is used to test for pain.^{1,17,24,25} The patient denied any pain with external palpation. Any pressure or stretch internally to the vaginal sidewalls caused immediate tenderness and pain that reproduced her pain during intercourse. Internal tenderness to palpation in the muscle bulk of the levator ani and obturator internus muscles bilaterally also reproduced her pain during intercourse.

The Figure depicts internal palpation of the obturator internus muscle and the 3 components of the levator ani muscles: the puborectalis, pubovisceral, and iliococcygeus muscles. The location of tenderness in the levator ani muscle group was confirmed by asking the patient to contract her pelvic-floor muscles.²⁵ The palpable increase in muscle tension at the location of tenderness confirmed that the site of pain was in the levator ani muscle bulk.²⁵ The procedure was repeated for the obturator internus muscle bilaterally by resisting hip external rotation on each side.²⁵ She generated a weak levator ani muscle contraction; however, this did not increase her pain.¹ The

International Continence Society (ICS) recommends that therapists grade a pelvic-floor muscle contraction as absent, weak, normal, or strong.¹ The patient was then asked to relax her pelvic-floor muscles voluntarily. The patient's voluntary relaxation of the pelvic floor was partial, meaning the pelvic floor returned to its precontraction state, according to the ICS recommended terminology.¹

Diagnosis

The patient's primary complaint was superficial and deep dyspareunia. My diagnosis included pain and overactivity of the levator ani and obturator internus muscles. Palpation of these muscles reproduced the patient's pain during intercourse, which indicated that pain and overactivity of these muscles likely contributed to her complaint of dyspareunia. Based on the physical examination, it did not appear that her symptoms arose from any abnormality of the lumbar spine, sacroiliac joint, abdominal wall, or other lower-extremity muscle system. The UDI-6 and IIQ-7 questionnaires ruled out the presence of incontinence and voiding dysfunction. The patient was classified into Preferred Physical Therapist Practice Pattern 4C (Impaired Muscle Performance) in the *Guide to Physical Therapist Practice*.²⁶

Prognosis

The patient was able to achieve partial muscle relaxation using the cues that I gave to her, and she and her husband expressed a willingness to perform a home program of vaginal dilation independently for a few weeks. Her primary goal was to achieve pain-free intercourse. Based on the results of the study by Snyder et al,¹⁸ previous clinical experience in similar cases, and the patient's motivation to succeed independently, I expected the patient to achieve her goal of pain-free intercourse over the next 12 weeks.

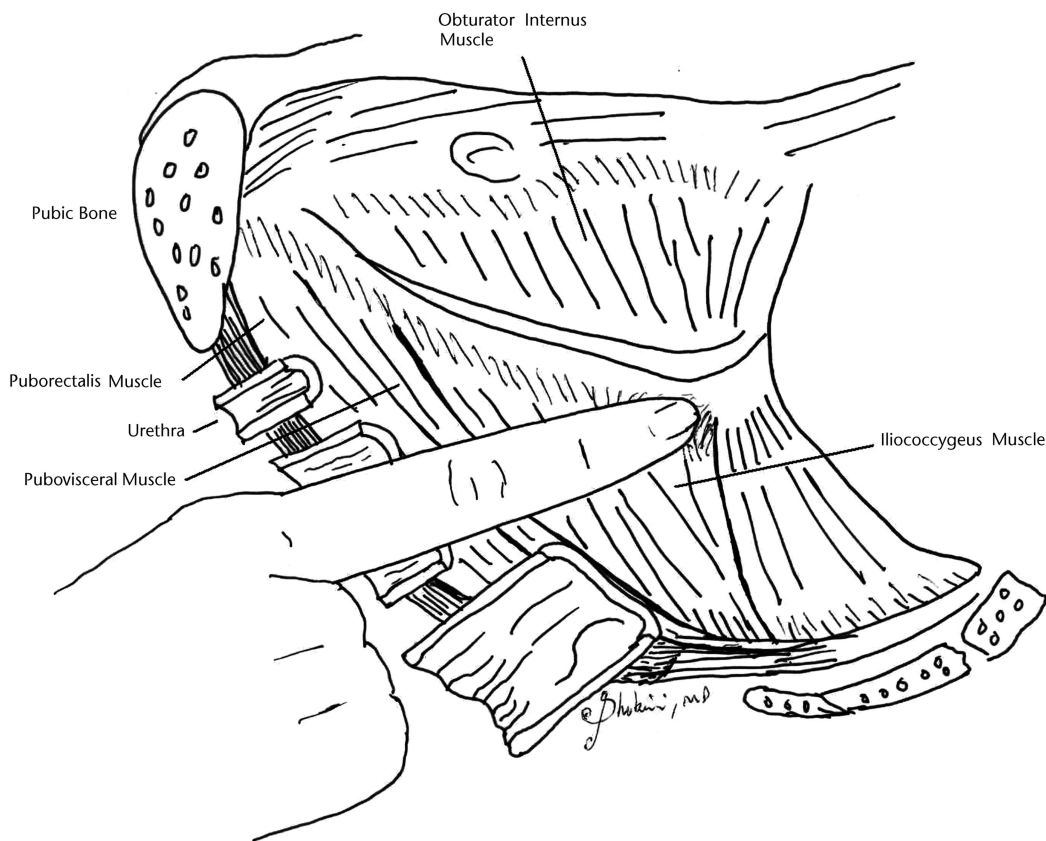


Figure.

Internal palpation of the obturator internus muscle and the 3 components of the levator ani muscles: the puborectalis, pubovisceral, and iliococcygeus muscles.

I anticipated seeing the patient 3 to 6 times, once every 2 to 3 weeks, depending on her level of independence with the home program.¹⁸ The patient made a return appointment for 2 weeks later.

Intervention

I explained that previous painful attempts at intercourse can cause the pelvic-floor muscles to contract to close the vagina and prevent intercourse.¹ I further explained pelvic-floor anatomy and emphasized that the pelvic-floor muscles should relax sufficiently to allow intercourse to occur.²⁷ It is important to understand this before attempting vaginal self-dilation.¹⁰

After completing the examination, the patient was cued to contract her pelvic-floor muscles, and the gloved

examination finger was inserted or a stretch applied during the relaxation phase after the contraction. Fitzgerald and Kotarinos⁹ and Weiss¹⁶ described this contract/relax technique as promoting muscle relaxation by applying a stretch immediately after an isometric muscle contraction and maintaining the stretch pressure as the patient contracts again. I cued the patient to relax her muscles using this technique and using deep breathing. The patient's level of discomfort was used as a guide, and the patient could stop the session at any time. Repeated stretches were applied to the posterior and side walls of the vagina. Her pain during the stretches decreased when she could achieve muscle relaxation below the normal resting state of the muscle. The ICS has defined this state as complete

relaxation.¹ Because the patient was able to achieve muscle relaxation that improved with verbal and tactile cues and because of a lack of time, a biofeedback examination was not performed at the initial visit.

I instructed the patient and her husband to begin using a slender taper candle as a dilator at home in conjunction with contraction and relaxation exercises for the levator ani muscles. The patient chose to begin dilation with a taper candle rather than a commercially available dilator because of convenience. Evidence for the use of vaginal dilators to desensitize and stretch the vaginal tissue is limited, although dilators have been used for some time for this purpose.^{19,28} A taper candle or a dilator may allow the patient to desensitize the vaginal tissue to stretch and may

provide tactile feedback on muscle relaxation and contraction. This technique allows the patient to stretch and perform muscular re-education at home, pace the progression of the stretches, and exhibit control over the therapy.¹⁰ It is theorized that this patient control is important for women with symptoms of dyspareunia.¹⁰

I instructed her to apply a stretch to the posterior vaginal wall (downward) and the vaginal sidewalls (to the sides) as she could tolerate this. The patient was taught to contract her muscles, and then insert the candle further or apply a stretch during the relaxation phase. This was an adaptation of the contract/relax technique described above. She was advised to perform deep breathing during stretching, perform all stretching in a pain-free way, and to stretch most days of the week for 5 to 10 minutes. Similarly, Schnyder et al¹⁸ recommended using dilators for 10 to 15 minutes, 5 times per week.

The patient returned for her follow-up appointment 3 weeks later. She was unable to return at 2 weeks due to an unrelated illness. She reported using the candle dilator without pain with her husband's assistance. Because there was no tenderness to palpation during a one-digit examination of the pelvic floor, I attempted to insert a dilator* (28 mm × 140 mm). The patient tolerated the insertion of the dilator approximately half way (6.5 cm) without pain. Progression of the dilator past this point caused pain. Her husband had questions about stretching techniques, and he observed the therapist insert the dilator and apply a stretch to the posterior and side walls of the vagina. He acknowledged that he understood this technique, and the pa-

tient took home the larger dilator to use in place of the taper candle.

I chose not to use other intervention techniques at that time because the patient was doing well with her home program. The patient scheduled her follow-up appointment for 3 weeks later and was instructed to progress to a larger dilator as soon as she was able to do so.

One week later, the patient obtained a larger dilator (32 mm × 146 mm) from the physical therapy clinic. Her stretches continued to be pain free. Two-and-a-half weeks later, the patient obtained the largest dilator (38 mm × 157 mm).

Outcome

The patient returned for her third and final appointment 6 weeks after her second appointment, a total of 9 weeks since her first physical therapy session. The primary outcome measure assessed was pain during intercourse, which was rated using a verbal rating scale. At this third and final appointment, she rated pain during intercourse as 0/10. Re-examination of her pelvic-floor muscles was negative for any muscle tenderness or overactivity. The patient met her goal of pain-free intercourse and was discharged from physical therapy. The patient was contacted by telephone for follow-up 2 months later. She reported that intercourse was still pain-free.

Discussion and Conclusion

The purpose of this case report was to describe the management of a patient with dyspareunia and levator ani muscle pain and overactivity over a minimal number of visits, with an emphasis on home-based treatment. The etiology of dyspareunia and levator ani muscle overactivity in this case was unknown, but this is often difficult to determine.⁴ In this case, the patient self-paced her home program by performing stretching, mus-

cle contraction and relaxation, and desensitization exercises using progressively larger dilators. Other reports of physical therapist interventions for dyspareunia include a more clinic-based program involving manual therapy, biofeedback sessions, or a therapist-directed vaginal stretching program.^{13,14,18}

The use of progressive vaginal dilation to reduce muscle pain and overactivity and to desensitize the vaginal tissue is not a new concept, and was described more than 30 years ago by physicians, psychotherapists, and sex therapists.¹⁹ A review by Reissing et al¹⁹ examined 22 different studies of treatments for dyspareunia and vaginismus. These studies were uncontrolled clinical studies or quasi-experimental studies. Eighteen studies involved the use of vaginal dilators, but only 3 studies mentioned in the review described the combination of mechanical vaginal dilation and instruction in pelvic-floor muscle control and relaxation: Barnes et al,²⁹ Dawkins and Taylor,³⁰ and Lamont.³¹

These studies reported success rates of 66% to 100%, with success defined as successful intercourse; however, these studies also used a combination of sex therapy, couples therapy, and communication exercises in addition to vaginal dilation and pelvic-floor muscle control exercises. These studies reported that these interventions occurred over an average of 3.4 to 11 treatment sessions. These studies did not involve treatment by a physical therapist. None of the remaining studies in the review involved the use of mechanical dilation and pelvic-floor muscle control together or any mention of the use of physical therapy interventions, but emphasized psychotherapy interventions. The reviewers highlighted the poor methodological qualities of these studies.¹⁹ Further research of higher methodological

* Milex Vaginal Silicone Dilators, 4311 N Normandy Ave, Chicago, IL 60634-1403.

quality is needed to define treatment protocols for dyspareunia and to clarify the role of physical therapy intervention in the management of this condition.

Electromyographic (EMG) biofeedback was not used in this case because of the patient's success with verbal and tactile feedback. There is some evidence that EMG biofeedback is helpful for muscle reeducation in patients with overactivity of the levator ani muscles.¹⁵ Glazer et al¹⁵ reported success with biofeedback-assisted pelvic-floor muscle exercises for patients with vulvar vestibulitis and dyspareunia; 26 of 28 patients resumed intercourse after 6 visits and an average of 16 weeks of at-home practice. In the study by Glazer et al, the patients used biofeedback at home to assist in pelvic-floor muscle contraction and relaxation. Although the patient in this case report did not use EMG feedback at home, she did use a vaginal dilator, a form of tactile feedback that may have served the same purpose as the biofeedback described in the study by Glazer et al.¹⁵ In addition, patients in the study by Glazer et al had dyspareunia attributed to vulvar vestibulitis, which the patient in this case report did not have. Downey and Frederick¹⁴ also reported successful use of EMG biofeedback in the treatment of a patient with vulvar vestibulitis and dyspareunia related to a gynecological examination in 8 treatment sessions.

Insurance plans may not cover EMG biofeedback, and the equipment is expensive for clinicians to purchase. The purpose of EMG biofeedback is to provide feedback on the patient's ability to contract and relax a muscle. Biofeedback is appropriate if the patient lacks this ability, or if the physical therapist uses the biofeedback to document muscle performance.²⁴ I could not find a compar-

ison of verbal and tactile feedback to EMG feedback documented in the literature. Future studies should compare these forms of feedback.

Various case reports and case series in the literature mention the use of manual therapy and myofascial techniques to decrease levator ani muscle overactivity and pain.^{13,14,16,32} Downey and Frederick¹⁴ and Weiss¹⁶ described manual therapy techniques in detail; however, both articles described a program of clinic-based rather than home-based treatment. Weiss¹⁶ recommended 1 to 2 visits per week for 8 to 12 weeks for patients with myofascial trigger points in the pelvic floor. However, the patients in the study by Weiss¹⁶ had interstitial cystitis and urgency frequency syndrome, which differed from the patient in this case report.

Downey and Frederick¹⁴ described the use of manual stretching performed by the therapist, biofeedback, and a home exercise program for the pelvic-floor muscles for a patient with vulvar vestibulitis over the course of 8 visits. The patient described in their case report was unwilling to perform self-stretching techniques at home, and the patient tolerated the therapy with minimal pain.¹⁴ In such cases, clinic-based intervention may be an acceptable alternative to a more patient-directed program.

Holland¹³ described physical therapist management of dyspareunia in 31 visits that included myofascial release techniques, moist heat, biofeedback, exercise, and vaginal dilation using a taper candle at home. The case report by Holland did not specifically describe the manual therapy techniques used and required 28 additional visits over a much longer time period (1 year) compared with the patient described in this case report. FitzGerald and Kotarinos⁹ recommended ten 1-hour

sessions of manual therapy to treat patients with pelvic-floor dysfunction; however, this recommendation was based on expert opinion. The patient described in the present case report received manual therapy on the first visit and was instructed to perform manual techniques with her dilator at home. Such a home program may achieve results equivalent to manual therapy sessions performed by a physical therapist in some patients. Future studies should compare clinic-based manual therapy and vaginal self-dilation.

Case reports are not capable of demonstrating cause and effect, so it is not possible to conclude that the interventions described in this case report caused the positive outcomes. Another potential limitation of this case report is the lack of a quality-of-life scale or a validated sexual function questionnaire as an outcome measure. This report uses a verbal rating scale of pain during intercourse as the primary outcome measure, as is used in other case reports.^{8,14,32} The patient's primary complaint was pain, and although there are validated questionnaires related to sexual function, women may find these questionnaires embarrassing. The detail required by these questionnaires may not be necessary.

Other limitations of this case report include the terminology used to describe pelvic-floor muscle contraction and relaxation. The ICS does not provide clear distinctions among the terms used to grade pelvic-floor muscle function (ie, absent, weak, normal, and strong).¹ Although "overactivity" is the recommended term to describe a muscle that will not relax voluntarily, the reliability of this assessment method is not known.¹ Other terms in the literature that are associated with dyspareunia include "muscle spasm" and "hypertonus." There are no clear definitions of

spasm and hypertonus as they relate to the pelvic-floor muscles in the literature. Another potential limitation is that muscle palpation was the only method used to measure muscle activity in this case report, and additional assessment with EMG was not performed. Future studies should document patient pain levels when comparing interventions, because many manual techniques can be painful.

This patient achieved her goal without extensive clinic-based interventions. Future research should compare clinic- and home-based interventions in patients with varying levels of dyspareunia. The patient in this case report was motivated to perform the prescribed muscle relaxation and re-education techniques at home and had at least a partial ability to relax her levator ani muscles during the initial examination. Research is needed to establish a clinical prediction rule to help determine whether these or other patient characteristics are necessary to succeed with minimal clinic-based intervention.

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References

- Messelink B, Benson T, Berghmans B, et al. Standardization of terminology of pelvic floor muscle function and dysfunction: report from the pelvic floor clinical assessment group of the International Continence Society. *NeuroUrol Urodyn*. 2005; 24:374-380.
- Basson R, Berman J, Burnett A, et al. Report of the international consensus development conference on female sexual dysfunction: definitions and classifications. *J Urol*. 2000;163:888-893.
- Mathias SD, Kuppermann M, Lieberman RF, et al. Chronic pelvic pain: prevalence, health-related quality of life, and economic correlates. *Obstet Gynecol*. 1996;87:321-327.
- Heim IJ. Evaluation and differential diagnosis of dyspareunia. *Am Fam Physician*. 2001;63:1535-1544.
- Latthe P, Mignini L, Gray R, et al. Factors predisposing women to chronic pelvic pain: systematic review. *BMJ*. 2006;332:749-755.
- American College of Obstetricians and Gynecologists. ACOG Practice Bulletin No. 51: chronic pelvic pain. *Obstet Gynecol*. 2004;103:589-605.
- Prendergast SA, Weiss JM. Screening for musculoskeletal causes of pelvic pain. *Clin Obstet Gynecol*. 2003;46:773-782.
- Monif GR, Belatti RG Jr. Intercourse-related vaginal pain syndrome: a variant of "vulvar vestibulitis syndrome"? *Am J Obstet Gynecol*. 1993;169:194-196.
- FitzGerald MP, Kotarinos R. Rehabilitation of the short pelvic floor, II: treatment of the patient with the short pelvic floor. *Intl Urogynecol J Pelvic Floor Dysfunct*. 2003; 14:269-275.
- Crowley T, Richardson D, Goldmeier D. Recommendations for the management of vaginismus: BASHH Special Interest Group for Sexual Dysfunction. *Int J STD AIDS*. 2006;17:14-18.
- Bergeron S, Binik YM, Khalife S, et al. Vulvar vestibulitis syndrome: reliability of diagnosis and evaluation of current diagnostic criteria. *Obstet Gynecol*. 2001;98:45-51.
- Rosenbaum TY. Physiotherapy treatment of sexual pain disorders. *J Sex Marital Ther*. 2005;31:329-340.
- Holland A. Case report: physical therapy intervention for dyspareunia. *Journal of the Section on Women's Health*. 2003;27(1):18-20.
- Downey P, Frederick I. Physical therapy treatment for vulvar vestibulitis: a case report. *Journal of Women's Health Physical Therapy*. 2006;30(1):16-19.
- Glazer HI, Rodke G, Swencionis C, et al. Treatment of vulvar vestibulitis syndrome with electromyographic biofeedback of pelvic floor musculature. *J Reprod Med*. 1995;40:283-290.
- Weiss JM. Pelvic floor myofascial trigger points: manual therapy for interstitial cystitis and the urgency-frequency syndrome. *J Urol*. 2001;166:2226-2231.
- FitzGerald MP, Kotarinos R. Rehabilitation of the short pelvic floor, I: background and patient evaluation. *Intl Urogynecol J Pelvic Floor Dysfunct*. 2003;14:261-268.
- Schnyder U, Schnyder-Luthi C, Ballinari P, Blaser A. Therapy for vaginismus: in vivo versus in vitro desensitization. *Can J Psychiatry*. 1998;43:941-944.
- Reissing ED, Binik YM, Khalife S. Does vaginismus exist? A critical review of the literature. *J Nerv Ment Dis*. 1999;187:261-274.
- Ohnhaus EE, Adler R. Methodological problems in the measurement of pain: a comparison between the verbal rating scale and the visual analogue scale. *Pain*. 1975;1:379-384.
- Uebersax JS, Wyman JF, Shumaker SA, et al. Short forms to assess life quality and symptom distress for urinary incontinence in women: the Incontinence Impact Questionnaire and the Urogenital Distress Inventory. *NeuroUrol Urodyn*. 1995;14:131-139.
- Kleeman S. Clinical evaluation and diagnostic tests for urinary incontinence. *Journal of Pelvic Medicine and Surgery*. 2004; 10:93-107.
- Bourcier A, Juras J, Villet R. Office evaluation and physical examination. In: Bourcier A, McGuire E, Abrams P, eds. *Pelvic Floor Disorders*. Philadelphia, Pa: Elsevier Saunders; 2004:133-148.
- Bø K, Sherburn M. Evaluation of female pelvic-floor muscle function and strength. *Phys Ther*. 2005;85:269-282.
- Shelley B, Dunbar A. Clinical commentary: palpation and assessment of the pelvic floor muscles using depth and positional measurements. *Journal of the Section on Women's Health*. 2004;28(1):19-24.
- Guide to Physical Therapist Practice*. 2nd ed. Alexandria, Va: American Physical Therapy Association; 2001.
- Wallace K. Female pelvic floor functions, dysfunctions and behavioral approaches to treatment. In: Agostini R, ed. *Clinics in Sports Medicine: The Athletic Woman*. Vol 13. Philadelphia, Pa: WB Saunders Co; 1994:459-481.
- McGuire H, Hawton K. Interventions for vaginismus. *Cochrane Database Syst Rev*. 2003;(1):CD001760.
- Barnes J, Bowman EP, Cullen J. Biofeedback as an adjunct to psychotherapy in the treatment of vaginismus [abstract]. *Biofeedback Self Regul*. 1985;9:281-289.
- Dawkins S, Taylor R. Non-consummation of marriage. *Lancet*. 1961;2:1029-1033.
- Lamont JA. Vaginismus. *Am J Obstet Gynecol*. 1978;131:632-636.
- Kalina CW. Manual therapy intervention for dyspareunia of musculoskeletal origin: A case report [abstract]. *Journal of the Section on Women's Health*. 2004;28(2):17-20.