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978-1-108-40022-0 — Office Gynecology
Edited by David Chelmow , Nicole W. Karjane , Hope A. Ricciotti , Amy E. Young
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CASE 1 A 27-Year-Old Woman with Recurrent Visits for Severe Pelvic Pain

Lee A. Learman

History of Present Illness

A 27-year-old woman returns to your office with severe pelvic pain that has persisted since her initial visit three months ago. Assessment at that time identified dysmenorrhea and pelvic floor myalgia as the leading pain generators. Screening for depression was negative. Pelvic ultrasound did not show uterine or adnexal abnormalities. The treatment plan included 84-day extended-cycle birth control pills, a referral for pelvic physiotherapy, and a high-dose regimen of a nonsteroidal anti-inflammatory drug (NSAID). The patient returned three months later with fewer bleeding days and improvement in pain, from 10 out of 10 to 8 out of 10. She had not made an appointment for physiotherapy. The patient was encouraged to continue her current regimen and urged to begin physical therapy, with follow-up planned in two to three more months.

The patient called the practice two weeks later asking for an urgent appointment and was scheduled the following day. At this visit she reported no improvement in pain since her visit one month ago. She has not had any further vaginal bleeding. She found physical therapy intolerably painful and could not get through the first session. It hurt so much that she took a 10 mg oxycodone pill left over from her partner's post-operative prescription. The oxycodone was very effective in reducing her pain, but has worn off. She says she is "miserable" and requests a prescription for oxycodone.

Review of systems is positive for occasional bloating and constipation. The patient has smoked one pack of cigarettes per day since age 15 and drinks alcohol with friends over the weekend. She denies use of other drugs. She has no other medical problems or prior surgeries.

Physical Examination

Vital Signs

Temperature	98.6°F (37.0°C)
Pulse	72 beats/min
Blood pressure	122/70 mmHg
Respirations	18 breaths/min
Body mass index (BMI)	24.8 kg/m^2
General	Well-developed, well-nourished woman in no acute distress.
Abdomen	Soft, no masses, mild lower quadrant tenderness without rebound or guarding. Normal bowel sounds.
External genitalia	Unremarkable.
Vagina	No lesions. Scant discharge.
	Tight, tender bands of pelvic floor muscles bilaterally, which when palpated reproduce the patient's pain.
Cervix	Nulliparous. No bleeding or discharge.
Bimanual exam	Limited by tenderness.

How Would You Manage This Patient?

The patient has been seen three times in the past three months for severe pelvic pain likely from dysmenorrhea and pelvic floor myalgia. Her dysmenorrhea has been adequately managed with extended-cycle birth control pills. Her pelvic floor myalgia has not been treated due to a delay, and then intolerance of physical therapy.

Rather than focusing exclusively on the patient's request for oxycodone, the visit focused on supporting adherence to the recommended course of treatment and establishing realistic expectations for symptom improvement. The patient was counseled that severe pelvic floor myalgia may require 12 or more weeks of skilled pelvic physical therapy once or twice a week. There are no more rapid alternatives for restoring normal muscle tone and flexibility, and for correcting any contributing biomechanical issues. She was counseled that opioid medications are effective for acute pain and have potential harms when used for chronic pain, particularly constipation, nausea, somnolence, tolerance requiring higher doses over time to achieve the same analgesia, chemical dependence, and opioid addiction [1]. In light of the patient's use of her partner's oxycodone, she was counseled that it is not safe to use medications prescribed for other individuals.

Short-term use of opioid medication may be necessary to manage this patient's reactive muscle pain after physical therapy visits. Screening for addiction risk is indicated in all patients, and may be particularly useful in light of this patient's chronic tobacco use and potential nicotine addiction. The patient's history of prior opioid use should be obtained, and her current use should be verified by performing a baseline urine drug screen (UDS) and searching available prescription monitoring registries.

If the patient is at low risk for opioid addiction, and additional analgesia is needed to make the physical therapy more tolerable, a short-term regimen can be prescribed according to evidence-based guidelines. The high-dose NSAIDs should be continued to provide baseline analgesia, and a short-acting opioid in doses up to 40 morphine milligram equivalents (MME) prescribed for pain exacerbations. The recommended starting dose of oxycodone is 5–15 mg (7.5–22.5 MME) every 4–6 hours [2]. Patients receiving opioid medications should not use other central nervous system depressants, such as benzodiazepines or alcohol, and cytochrome P450 3A4 inhibitors that impede opioid metabolism, such as amiodarone, cimetidine, fluoxetine, grapefruit juice, protease inhibitors, azoles, and macrolide antibiotics other than azithromycin. The patient should be advised that the opioid prescription is

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just one part of a comprehensive treatment plan. Adherence to the NSAID regimen, menstrual suppression, and physical therapy will be required for the patient's pain to improve and should be made a condition for prescribing the opioid medication.

After three months of physical therapy the patient's pelvic floor myalgia is greatly improved. She reports fewer flares, and only needs to take oxycodone once a week after a physically active day. A search of available prescription registries shows she has filled no other prescriptions for controlled substances. The oxycodone is refilled, adjusting the number of pills downward to accommodate her current use. She agrees with the plan to discontinue the oxycodone at her next follow-up visit and understands that a repeat urine drug screening will become necessary if opioid use becomes chronic (six months or longer) or if there is a suspicion of nonprescription drug use.

Initial Screening and Monitoring

The epidemic of prescription drug abuse in the United States has many negative effects on women's health [3]. When a patient comes to the office asking for an opioid prescription, it can be difficult to determine the root cause of the request. Frustration and urgency to find relief are normal reactions to severe pain, but these behaviors can raise clinicians' concerns about drug-seeking behavior. A few simple approaches can be used to rule out current use of illicit substances and misuse of prescription medication, and to stratify a patient's risk of future addiction.

First, a patient's current prescriptions for opioid and other controlled medications can be confirmed using searchable web-based prescription monitoring systems. Once an opioid medication is prescribed, the same monitoring systems can be checked periodically to confirm there are no other controlled substance prescriptions.

Second, a UDS can establish the absence of common drugs of abuse before an opioid is prescribed. A UDS is not commonly required before prescribing opioids for acute pain, as in the case of major surgical procedures or traumatic injuries. In contradistinction, UDS is an evidence-based recommendation before prescribing opioids for pain in the ambulatory setting and is generally repeated annually or semiannually, or when the patient's behavior raises concern about medication misuse or substance abuse [1].

Third, risk stratification is important for preventing opioid abuse and misuse. Many screening instruments exist for opioid risk assessment [4]; however, evidence of limited reliability and validity does not support their routine use [1]. Stratification can be done instead using clinical characteristics. High-risk features include pain involving more than three regions of the body without objective signs; severe pain exacerbations and limited coping strategies; major psychological disorders; younger age (<45 years old); resistance to participation in multimodal therapy; and severe limitations in usual activities. Patients with a history of drug abuse, misuse, addiction, diversion, dependency, alcoholism, tolerance with hyperalgesia, or HIV-related pain are also at high risk [1].

Pain Medication Agreements and Best Practices

In this case, the patient was able to participate in multimodal therapy, which effectively reduced her pain and her need for opioid medication. When patients require continuation of opioid medication for chronic pelvic pain, periodic prescription monitoring and UDS testing are safeguards for detecting and preventing opioid abuse and misuse. In addition, many practices routinely use long-term opioid agreements to align treatment expectations. Examples are publicly available and include a common set of statements signed by the patient, her physician, and a witness (Box 1.1). Failure to adhere to the agreement results in discontinuation of opioid therapy [5]. One study in a primary care clinic followed patients with a variety of chronic pain syndromes who were placed on opioid contracts and reported 63 percent adherence with median follow-up of 22.5 months. Seventeen percent of the contracts were canceled for noncompliance or substance abuse, and the other 20 percent of patients discontinued the use of opioid medication [5].

Box 1.1 Example of elements included in opioid agreements (contracts)

To not use illegal substances, street drugs, abuse alcohol, or take opioids prescribed for others.

To not be involved in the sale, illegal possession, diversion, or transport of controlled substances.

To take drug screening tests when requested by the physician.

To obtain all opioid prescriptions from a single physician and take other medications prescribed.

To use only one pharmacy for filling opioid prescriptions (specify name and phone number).

To follow up as scheduled regarding pain control and keep all scheduled appointments related to pain treatment (e.g., physical therapy, psychotherapy).

To allow the primary physician to communicate with other physicians and pharmacists regarding pain management as needed.

To use an effective method of contraception during the course of opioid treatment.

To contact the practice within 24 hours if an emergency occurs requiring a prescription for opioids.

Accepting that no allowances will be made for lost prescriptions, drugs, or any problems related to transportation or dates of medication pickup.

Accepting the possible adverse effects and dependencies associated with opioids as outlined by the physician.

To provide at least seven days of lead time for all refills and to schedule an appointment for pickup.

Accepting that opioid medication will be stopped if any of the following occurs:

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Box 1.1 (cont.)

- giving away, selling, or misusing the drugs or using other people's drugs or substances
- not complying with any of the terms of the agreement
- disrespecting or harassing clinic personnel
- not following up regularly or as requested
- not participating in other aspects of the treatment plan
- if pain and function do not improve

The Centers for Disease Control (CDC) published guidelines for opioid prescribing for chronic pelvic pain in 2016 [6], and the CDC website provides open access to a dozen clinical tools supporting evidence-based practice (www.cdc.gov/drugoverdose/prescribing/clinical-tools.html, accessed 5/3/2017). Best practices for chronic opioid prescribing expand beyond the clinician's role to a full-scale reengineering of the ambulatory care setting, similar to models of care for other complex chronic conditions. The Robert Wood Johnson Foundation funded a program called "Primary Care Teams: Learning from Exemplar Ambulatory Practices" (LEAP). A study of team-based approaches to improve chronic opioid therapy management in 30 LEAP clinics across the United States identified six building blocks for optimizing care. Of these components opioid contracts, registry tracking and planned visits with patients may be the most feasible to implement in Ob/Gyn practice [7].

Key Teaching Points

- Opioids are not first-line medications for pain in the ambulatory setting, but can be used short term if around-the-clock non-opioid analgesics do not provide adequate relief during pain exacerbations.
- Safe opioid prescribing requires baseline screening for drug abuse or misuse and appraisal of addiction risk.
- Risk stratification relies on clinical characteristics, including a history of prior drug dependence or addiction.
- Urinary drug screens and prescription registry searches should be done before prescribing opioid medications and periodically thereafter if opioid use exceeds six months.
- Pain medication agreements establish a shared understanding of expectations with patients requiring long-term opioid prescribing.

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CASE 2 A 25-Year-Old Woman with Deep Dyspareunia

Kate A. McCracken

History of Present Illness

A 25-year-old woman, gravida 0, presents with the complaint of painful intercourse. She is sexually active with one male partner with whom she has vaginal-penile intercourse. She complains of pain with insertion of the penis and with deep thrust. She reports trying "different positions" during intercourse, but continues to experience pain. She also notes intermittent pain that she localizes to the anorectal region. She reports a history of sexual assault. She denies any domestic violence and feels safe with her current male partner. She denies a history of pelvic trauma. She denies any other bowel or bladder symptoms.

Her only medication is a combined oral contraceptive pill, which she uses for contraception. She has regular menses, occurring during placebo pills, with five days of flow, and no dysmenorrhea. She has no significant past medical or surgical history. She has no known drug allergies. She reports consistent latex condom use. She has completed college and is working full time. She lives with her male partner. She drinks two alcoholic beverages per week. She denies tobacco and illicit drug use. Her family history is noncontributory.

Physical Examination

General appearance	Well-developed, well-appearing female in no acute distress
Vital Signs	
Pulse	75 beats/min
Blood pressure	118/64 mmHg
Height	65 inches
Weight	140 pounds
BMI	23.3 kg/m^2
Abdomen	Soft, non-distended, non-tender, no masses
Pelvic Exam	
External genitalia	Normal appearing. Pubic hair Tanner V. Normal urethral meatus.
Vagina	Normal mucosa. No atrophy, no lesions, no masses, scant clear vaginal discharge (no odor).
Cervix	Normal appearing nulliparous cervix without masses or discharge.
Bimanual exam	No urethral or bladder base tenderness. Bilateral levator ani tenderness. Uterus small, anteverted, mobile, non-tender. Cervix palpably normal and without cervical motion tenderness. No adnexal masses or tenderness bilaterally.
Rectal exam	Normal tone, no masses. Tenderness of the puborectalis musculature is present.
Gonorrhea/chlamydia/ trichomonas DNA amplification probes	Negative
Urine pregnancy test	Negative

How Would You Manage This Patient?

This patient has dysmenorrhea and chronic pelvic pain, which impacts her quality of life. A complete history identified no associated gastroenterologic, urologic, or psychiatric symptoms. A urine pregnancy test was negative and sexually transmitted infection screening was negative. A pelvic exam was notable for bilateral levator ani tenderness. The absence of other causes and presence of levator ani tenderness strongly suggest levator spasm as the source of her deep dyspareunia. She was referred for pelvic physical therapy. Three months after starting pelvic floor physical therapy, she reported significant improvement in her symptoms and was able to engage in vaginal-penile intercourse without difficulty.

Levator Ani Spasm Causing Dyspareunia

Definition, Pathogenesis, and Prevalence

Levator ani spasm syndrome is a particular type of myofascial pelvic pain, in which spasm of the levator ani muscle group leads to chronic or recurrent vaginal, rectal, or pelvic pain. Myofascial pain is characterized by hyperirritable areas within a muscle leading to persistently contracted fibers that cause pain. The primary reactive area within the muscle is termed a "trigger point." These areas typically manifest as a palpable, contracted, taut band or nodule. The pelvic floor musculature may develop trigger points and pain because the pelvic girdle is involved in a multitude of activities, including sexual function, bowel and bladder control, and musculoskeletal support of the upper and lower body, placing these muscles at risk for overuse injury. Pelvic floor myofascial pain may be a primary condition, or secondary to underlying conditions such as endometriosis or interstitial cystitis/painful bladder syndrome. Women with chronic pelvic pain may have reduced thresholds to pain in the pelvic floor musculature [1]. In some cases of levator ani muscle spasm, the pain may manifest as dyspareunia, which is defined as recurrent or persistent genital pain associated with sexual intercourse that is not caused exclusively by lack of lubrication or by vaginismus and causes marked distress or interpersonal difficulties [2, 3]. Dyspareunia is common, and although classified as a sexual pain disorder, it can be characterized as pain disorder that interferes with sexuality, rather than a sexual disorder characterized by pain [2]. The differential diagnosis of chronic pelvic pain and dyspareunia includes gynecologic (endometriosis, adenomyosis, uterine fibroids, pelvic inflammatory disease [PID], malignancy), urologic (interstitial cystitis, cystitis, nephrolithiasis,

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malignancy), gastroenterologic (irritable bowel syndrome [IBS], inflammatory bowel disease [IBD], constipation, celiac disease, hernias, malignancy), musculoskeletal (abdominal wall myofascial pain/trigger points, fibromyalgia), neurologic (nerve entrapment), and vascular (varicosities, pelvic congestion syndrome) causes. A population-based survey based on symptoms noted the prevalence of levator ani syndrome in women to be 7.4 percent [4, 5].

Presentation and Diagnostic Criteria

Patients typically describe pain from levator ani spasm syndrome as aggravated by a specific activity, often sexual activity. Common precipitating factors include sexual intercourse, sitting for long periods of time, stress, defecation, childbirth, prior trauma, and prior surgical procedures. In general, trigger points within the pelvis may refer pain to the vagina, vulva, perineum, bladder, rectum, buttocks, lower abdomen, or even the upper thighs. Patients may describe a pressure sensation, ache, or burning sensation. The symptoms may be intermittent or continuous and acute or chronic. In addition, patients may experience concomitant bladder symptoms or constipation. Specific diagnostic criteria for levator ani syndrome, set forth primarily by gastroenterologists, are known as the Rome III criteria. The criteria are:

- symptoms are present for more than three months;
- episodes of pain should last at least 20 minutes; and
- symptoms are associated with puborectalis muscle tenderness when palpated [6, 7].

Evaluation/Examination

Evaluation begins with a comprehensive patient history. Particular attention should be paid to gynecologic, sexual, gastrointestinal, and urinary symptoms. The pain should be characterized in terms of onset, location, radiation, severity, and timing. Provoking or relieving factors should be elicited. Providers should inquire about the impact of certain positions on the pain, as myofascial pain is often aggravated by specific positions and relieved by others. Menstrual history and impact of menses on the pain should be reviewed. A history of trauma such as prior pelvic surgeries, back or hip injuries, and childbirth may also be relevant. A psychosocial history is also important as patients may have other contributing conditions such as depression or post-traumatic stress disorder from history of sexual assault or interpersonal violence. Any prior treatments and their impact on symptoms should be noted.

The physical exam should include assessment of the patient's abdomen and trunk; pelvic exam including external genitalia, internal genitalia, and pelvic floor musculature; and anorectal exam. The exam has the potential to trigger the patient's pain and be very uncomfortable. The patient should be allowed to be in control of the exam by communicating that she may ask the examiner to stop at any time. An external genital exam should be performed. The examiner should ask the patient to contract her pelvic floor or bear down. Women with myofascial pelvic pain disorders may have weak musculature, which will be detectable by an asymmetric contraction when bearing down. An anal wink should be elicited to evaluate for other neurologic conditions. A speculum exam should be performed to assess the vaginal mucosa and cervix. Tests for gonorrhea, chlamydia, trichomonas, and yeast can be obtained if appropriate, based on risk factors or physical findings. This is particularly important in sexually active women to rule out an infectious etiology like gonorrhea, chlamydia, trichomonas, or pelvic inflammatory disease. Bimanual exam should include palpation of the urethra, bladder base, cervix, uterus, and adnexa to help rule out other etiologies of pain.

The pelvic floor muscles should be systematically palpated to identify trigger points or contracted muscle bands. Examiners should first insert one finger into the introitus and palpate the bulbocavernosus muscle, located just lateral to the introitus. Next, the superficial transverse perineal muscles should be palpated by moving the finger inferiorly. Last, the levator ani muscle complex should be examined. The levators are the "pelvic floor" surrounding the rectum. Moving medial to lateral, the complex is composed of the pubococcygeus, puborectalis, and iliococcygeus muscles. The examiner may picture the vagina as a face of a clock with the pubococcygeus muscle from 7 to 11 o'clock and 1 to 5 o'clock. The puborectalis is slightly more lateral within the distal vagina (Figure 2.1) and the iliococcygeus is from 4 to 8 o'clock [7]. Each muscle group should be palpated and note taken of whether palpation elicits pain. Trigger points are tender to palpation, and palpation may cause involuntary spasm. With levator ani spasm, palpation of the levators will elicit pain. Unilateral or bilateral tenderness may be present. The patient should be asked to rate the pain throughout the exam and whether palpation of the trigger points reproduces her presenting symptoms. A rectovaginal exam should be performed, noting any decreased tone, masses, tenderness, rectovaginal septum nodularity, or trigger points involving the pubococcygeus and puborectalis muscles.

Pelvic ultrasound is not usually required for the diagnosis of levator ani spasm, but can be useful when ruling out other underlying structural causes of pain such as ovarian cysts or masses and uterine masses. Diagnostic gastrointestinal procedures such as colonoscopy or upper GI endoscopy may be useful if the patient's history or physical exam suggests a functional or structural gastrointestinal condition.

Treatment

Treatment of levator ani spasm typically involves a combination of therapies. A multidisciplinary approach may be beneficial. Commonly used modalities include pelvic floor physical therapy with trigger point release maneuvers, biofeedback, heat, massage, warm sitz baths, cognitive-behavioral therapy, and pharmacologic agents such as nonsteroidal anti-inflammatory drugs and other analgesics and muscle relaxants [6].

First-line therapy includes pelvic floor physical therapy. Referral to a pelvic floor physical therapist with specific experience treating dyspareunia and pelvic floor disorders is important. The therapist may use a variety of techniques including strengthening exercises, stretching (e.g., sitting with hips

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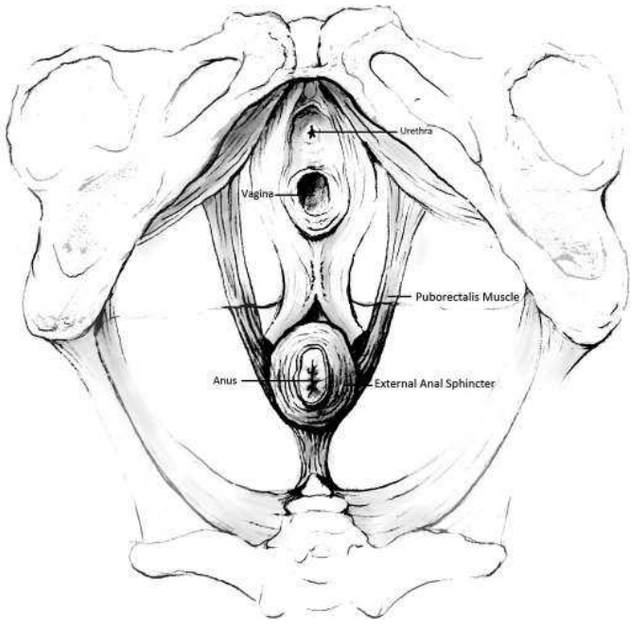

Figure 2.1 Pelvic bones and muscles of pelvic floor. Anatomic structures are indicated (illustration by Joseph Werkmeister).

flexed), transcutaneous nerve stimulation, and biofeedback. Pelvic floor physical therapy should be initiated as soon as the diagnosis is made and continued while other adjuvant therapies are added.

Cognitive-behavioral therapy ("systemic desensitization") may help the patient gain a sense of control over penetration into the vagina. This is a useful tool in many cases of dyspareunia, as it helps reduce automatic vaginal muscle contractions. This therapy can be initiated simultaneously with a pelvic floor physical therapy referral. Vaginal dilators are commonly used during desensitization and pelvic floor physical therapy. Dilator therapy begins by teaching Kegel exercises and relaxation. The patient is then instructed to start with the smallest dilator and progressively increase the diameter as she becomes more comfortable and notes a reduction in vaginal muscle spasms. It is important to confirm the patient understands that the therapist is not actually physically dilating her vagina, but gradually desensitizing her reaction to vaginal penetration.

Alternative therapies such as massage and relaxation techniques may be appropriate adjunctive interventions for many patients and enhance the effectiveness of traditional therapy. These should be discussed with the patient and integrated into her treatment plan early on. Muscle relaxants such as cyclobenzaprine and baclofen are useful adjuncts, but should be primarily used short term and typically only as second-line therapies if the patient is not coping well with pelvic floor physical therapy. The psychological effect of dyspareunia and pelvic pain on relationships and sexual function should be addressed in the treatment plan. Partners may be involved with therapeutic measures like using vaginal dilators, but only after the patient has gained a sense of control over her symptoms and is ready to welcome partner participation.

Key Teaching Points

- Levator ani spasm is a form of myofascial pelvic pain that may lead to dyspareunia.
- Evaluation involves identification of trigger points, tender or taut muscle foci within the levator ani muscle complex, which are signs of levator ani spasm.
- Treatment is multifactorial.
- First-line therapies include pelvic floor physical therapy, heat, massage, and cognitive-behavioral therapy with vaginal dilator use.
- Second-line therapies include pharmacologic therapies such as nonsteroidal anti-inflammatory drugs and muscle relaxants.

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CASE 3 A 16-Year-Old Adolescent with Ongoing Dysmenorrhea Despite Oral Contraceptive Pill Use

Geri D. Hewitt

History of Present Illness

A 16-year-old adolescent, gravida 0, presents with ongoing lower abdominal cramping pain that worsens with vaginal bleeding. She underwent menarche at age 14 and within six months began having regular monthly cycles with dysmenorrhea. Her pediatrician prescribed nonsteroidal anti-inflammatory drugs (NSAIDs), which initially provided some improvement in her symptoms. Six months later, the patient reported worsening dysmenorrhea and the patient was started on low-dose combination hormonal oral contraceptive pills. After three months, the patient still reported dysmenorrhea, and her pediatrician switched her to extended cycle combined hormonal contraception pills. The patient reports good compliance over the last three months on the new regimen, but reports still experiencing lower abdominal crampy pelvic pain, which worsens with unscheduled bleeding. At times, her pain is so significant that despite taking NSAIDs she has had to leave school early or miss sports practices. She denies dysuria, constipation, nausea, vomiting, fever, and ever being sexually active.

She has no medical problems and has never had surgery. She has no known drug allergies, and her only medications are her combined hormonal contraceptive pill and NSAIDs. She does well academically in school, lives with both parents and two siblings, and denies alcohol, tobacco, or marijuana use. Her family history is significant for endometriosis in her mother, which required infertility treatment to achieve conception.

Physical Examination

General appearance	Well-developed, well-nourished teen who is engaged, is communicative, and appears to be in no acute distress
Vital Signs	
Pulse	78 beats/min
Blood pressure	108/62 mmHg
Height	65 inches
Weight	130 pounds
BMI	21.6 kg/m^2
Abdomen	Soft and non-tender, no masses

How Would You Manage This Patient?

This patient has dysmenorrhea and chronic pelvic pain, which is impacting her quality of life and ability to function despite six months of combined hormonal contraceptives and NSAIDs and therefore needs additional evaluation. A focused history identified no associated gastrointestinal (GI), urologic, musculoskeletal, or psychological symptoms. A urine specimen was collected for pregnancy testing and sexually transmitted infection (STI) screening. Both were negative. After pelvic examination education, consent was obtained from both the patient and her mother, and a pelvic examination was performed. No abnormalities were noted. A pelvic ultrasound identified no anatomic abnormalities.

The patient underwent diagnostic laparoscopy with peritoneal biopsies, coagulation of possible endometriotic implants, and insertion of a levonorgestrel-releasing intrauterine system (LNG-IUS). Pathologic examination of the peritoneal biopsies confirmed endometriosis. Three months after surgery, she reported her symptoms have improved. She is using less NSAIDs and no longer experiencing disruption in school or sports practices.

Adolescent Endometriosis

Dysmenorrhea is the most common gynecologic complaint and the leading cause of school absenteeism among adolescents and young adult women [1]. In epidemiologic studies, 60 to 70 percent of adolescents reported experiencing painful periods and 15 percent reported interruption of their daily activities due to severe menstrual pain [2]. Up to 90 percent of adolescents experiencing dysmenorrhea have primary dysmenorrhea or painful menses without an identifiable etiology [2]. Primary dysmenorrhea may be caused by an overproduction of prostaglandins within the endometrium. Both prostaglandins and leukotrienes are biochemical by-products of ovulation and inflammatory modulators known to cause myometrial contractions and vasoconstriction leading to local tissue ischemia and crampy pain [2]. Secondary dysmenorrhea is painful menses due to an identifiable abnormality, most commonly endometriosis, and the next most common, outflow tract obstructions (Box 3.1) [2]. Types of outflow tract obstructions that present with pain at the time of or shortly after menarche include imperforate hymen, transverse vaginal septum, obstructed hemivagina and ipsilateral renal anomaly syndrome, lower vaginal atresia, cervicovaginal agenesis/dysgenesis, and obstructed uterine horn [3].

The initial evaluation of dysmenorrhea focuses on menstrual history and associated symptoms. A family history of endometriosis should be elicited, particularly in first-degree relatives, and if present should raise clinical suspicion [4]. A pelvic examination is not necessary in patients who have never been sexually active and have a history compatible with primary dysmenorrhea [1]. A trial of empiric therapy is a reasonable first step. NSAIDs are the initial pharmacologic intervention in patients with primary dysmenorrhea not needing contraception. NSAIDs lead to a reduction in prostaglandin production and improvement in symptoms [1]. In patients who need contraception, do not tolerate or cannot take NSAIDs, or need additional symptom relief, hormonal therapies including combined hormonal contraceptives, progestin-only contraceptive

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Box 3.1 Causes of secondary dysmenorrhea

- Endometriosis, including endometrioma
- Outflow tract obstruction
  - Imperforate hymen
  - Distal vaginal atresia
  - Vaginal/cervical atresia
  - Transverse vaginal septum
  - Cervical stenosis
  - Obstructive mullerian anomaly
- Ovarian cysts
- Uterine polyps
- Uterine leiomyomata
- Adenomyosis
- Pelvic inflammatory disease
- Pelvic adhesions

pills, transdermal patch and vaginal ring, depot medroxyprogesterone intramuscular injection, etonogestrel subdermal implant, and LNG-IUS are all effective in treating primary dysmenorrhea [1]. While safe and effective strategies for treating primary dysmenorrhea are available, many symptomatic teens do not seek treatment and rely on less effective over-the-counter or non-pharmacologic interventions [5].

Patients who do not respond to standard therapy for primary dysmenorrhea, have onset of severe symptoms with onset of menarche or shortly thereafter, or experience atypical symptoms such as heavy or abnormal menstrual bleeding, mid-cycle pain, or dyspareunia require further evaluation (Table 3.1) [5]. Patient history should review symptoms related to GI, urologic, musculoskeletal, and psychosocial etiologies, which may contribute to the pain. Evaluation for other causes of dysmenorrhea should include a pelvic examination, particularly if the patient is sexually active. Many adolescents who are not sexually active are able to tolerate a pelvic examination with education and support. The pelvic examination can identify signs of pelvic inflammatory disease, outflow track obstruction, and adnexal masses, and allow for assessment of tenderness and uterosacral nodularity. Pelvic imaging should be ordered regardless of the findings on pelvic examination. Ultrasound is the preferred initial imaging modality. There is no evidence that MRI is more advantageous as the initial study. Although a normal pelvic ultrasound does not eliminate the possibility of endometriosis, it can identify mullerian abnormalities and ovarian masses including endometriomas.

Patients with dysmenorrhea or chronic pelvic pain with no other identified etiology based on careful history, physical examination, and pelvic ultrasound and who have not improved after at least three months of initial medical therapy with NSAIDs and hormonal medications should undergo laparoscopy. Up to 70 percent of girls and adolescents with dysmenorrhea unresponsive to initial medical treatment will be diagnosed with endometriosis at the time of laparoscopy [6]. Endometriosis remains a surgical and pathologic diagnosis in adolescents, requiring the presence of endometrial glands and stroma in the biopsy specimen. There is no role for empiric use of gonadotropin-releasing hormone (GnRH) agonists in this patient population. Laparoscopy should be performed for diagnostic (both visual inspection and peritoneal biopsies) as well as therapeutic purposes with coagulation, ablation, or resection of visible implants. Endometriotic implants can appear different in adolescents. Moving the laparoscope within millimeters of the peritoneum to identify the clear or red

Table 3.1 Diagnostic and therapeutic considerations in adolescents with dysmenorrhea

Historical or physical findings	Things to consider in differential diagnosis	Interventions to consider
Persistent, significant dysmenorrhea despite good compliance with at least 3–6 months of hormonal agents and NSAIDs	Secondary causes of dysmenorrhea	Pelvic examination Pelvic ultrasound Diagnostic laparoscopy
Concomitant symptoms such as abnormal or heavy vaginal bleeding, pain with intercourse, noncyclic pain, painful defecation	Endometriosis	Pelvic examination Diagnostic laparoscopy
Cyclic abdominal pain with primary amenorrhea or early onset dysmenorrhea shortly after menarche	Obstructed outflow tract	Pelvic examination Pelvic ultrasound
History of endometriosis in first-degree relative	Endometriosis	Diagnostic laparoscopy
Known renal abnormality	Mullerian anomaly	Pelvic ultrasound
Adnexal mass	Ovarian cyst or endometrioma	Pelvic ultrasound
Vaginal discharge, cervical motion tenderness, uterine or adnexal tenderness	Pelvic inflammatory disease	STI testing Pelvic ultrasound Antibiotics

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Cambridge University Press
978-1-108-40022-0 — Office Gynecology
Edited by David Chelmow , Nicole W. Karjane , Hope A. Ricciotti , Amy E. Young
Excerpt
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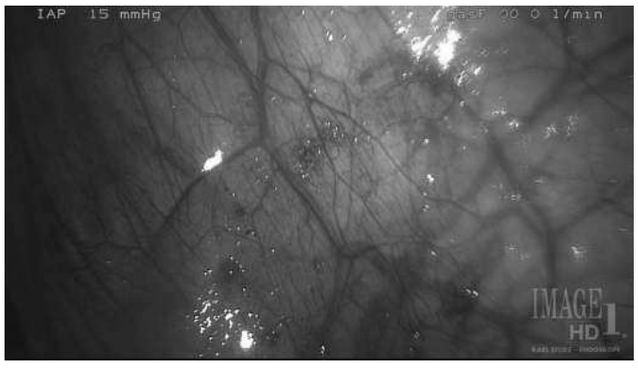

Figure 3.1 Laparoscopic images of adolescent endometriosis. The lesions are clear and vesicular. Peritoneal biopsies of the lesions were performed. Pathological examination confirmed endometriosis.

lesions in the anterior or posterior cul-de-sacs or on the pelvic side walls may increase sensitivity of the diagnostic laparoscopy (Figure 3.1) [7]. Most adolescents have American Society of Reproductive Medicine Stage 1 or 2 disease at the time of diagnosis. Stage of endometriosis does not predict the extent of painful symptoms. The clear or red endometriotic implants more common in adolescents are more likely to be associated with pain than are the black or blue lesions typically seen in adult women [7]. Many pediatric and adolescent gynecologists recommend placing an LNG-IUS at the time of laparoscopy to decrease discomfort with insertion and perforation risk. An LNG-IUS can be beneficial regardless of intraoperative findings, as it has been shown to help decrease pain associated with both dysmenorrhea not responsive to hormonal contraceptives and pain associated with endometriosis [7].

Adolescent endometriosis is considered chronic and progressive. The goals of therapy include symptom relief, suppression of progression of disease, and protection of future fertility. There is no cure, nor is there one single best treatment option. Therapy must be individualized [7]. Adolescent endometriosis is best treated with a combination of conservative surgical therapy for both diagnosis and treatment and ongoing medical therapies, such as hormonal therapies or possibly GnRH agonists. Regardless of symptomatology, adolescents with endometriosis should continue on hormonal therapy to suppress disease progression until attempting conception. Hormonal therapies include both combined hormonal contraceptives, preferably administered continuously to suppress menses, or continuous progestins in oral (such as progestin-only contraceptive pills or norethindrone acetate 5 mg daily or twice daily), IM, or IUS form. If a patient has continuous pain attributed to endometriosis and is over 16 years old, GnRH agonists can be used with addback therapy to diminish side effects and protect bone health [7]. NSAIDs should be the mainstay of pain relief. Adolescents should not be prescribed narcotics chronically outside of a specialized pain management team. Adolescents with endometriosis often benefit from ongoing education and support as well as integration of other services such as biofeedback, pain management teams, acupuncture, and herbal therapy [7].

Key Teaching Points

- The vast majority of adolescents with dysmenorrhea have primary dysmenorrhea, which responds well to standard medical therapy with NSAIDs and hormonal contraceptives.
- Patients with ongoing symptoms despite treatment with NSAIDs and hormonal contraceptives require further evaluation including pelvic examination and pelvic ultrasound.
- The most common cause of secondary dysmenorrhea in adolescents is endometriosis, followed by outflow tract obstruction.
- Diagnostic laparoscopy should be considered in adolescents with significant dysmenorrhea despite treatment with NSAIDs and hormonal contraceptives. In appropriately selected patients, most will have pathologically proven endometriosis at the time of their laparoscopy. Visible lesions should be biopsied to confirm diagnosis and surgically treated with excision or ablation.
- GnRH agonists should not be prescribed to adolescents unless the diagnosis of endometriosis is confirmed.
- Once the diagnosis of endometriosis is confirmed by laparoscopy, the patient should be maintained on suppressive therapy, which may include hormonal agents or possibly GnRH agonists with addback. The patient may also require supplementary symptomatic therapy with NSAIDs.

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Cambridge University Press
978-1-108-40022-0 — Office Gynecology
Edited by David Chelmow , Nicole W. Karjane , Hope A. Ricciotti , Amy E. Young
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CASE 4 A 37-Year-Old Woman with Pain at the Lateral Aspect of Her Pfannenstiel Incision

Christopher M. Morosky

History of Present Illness

A 37-year-old female, gravida 3, para 3, presents with a nine-month history of right lower quadrant pain in the lateral aspect of her prior Pfannenstiel incision. She describes the pain as 9/10 in severity, piercing and stabbing in quality, with radiation into her right upper medial thigh and vulva. Bending to lift objects and walking make the pain worse. The pain is improved with sitting and leaning forward slightly. She has had no relief with over-the-counter analgesics or with two short courses of different prescription opiates.

Her past medical history is unremarkable. She is currently taking only occasional ibuprofen for her pain. She has undergone three cesarean deliveries all through Pfannenstiel incisions. She has had no other surgeries or hospitalizations. Her last cesarean delivery was two years ago and included a bilateral tubal ligation. She initially had lingering pain for six months after the surgery, which resolved for three months and then returned at the lateral aspect of her incision. Two pelvic ultrasounds, a CT scan of the abdomen and pelvis, and a diagnostic laparoscopy have been unable to identify the source of her pain.

Physical Examination

General appearance	An alert and oriented woman who is in moderate discomfort
Vital Signs	
Temperature	98.7°F (37.1°C)
Pulse	72 beats/min
Blood pressure	124/82 mmHg
Respirations	18 breaths/min
Oxygen saturation	99% on room air
Height	64 inches
Weight	123 lb
BMI	21.1 kg/m^2
Abdomen	Soft and non-distended. Well-healed low-transverse scar. Moderate shooting pain elicited with light palpation of the right lateral aspect of the scar. No hernia present.
External genitalia	Numbness and decreased sensation of the right groin and mons pubis compared to the left using gentle palpation with a cotton swab. No rashes, lesions, or skin changes.
Bimanual exam	Normal-sized anteverted uterus. Non-tender. No pelvic masses.
Speculum exam	No lesions on the vagina or cervix. Physiologic discharge present without blood.
Provoking procedure	The patient is asked to lie supine on her back. She is then asked to raise her head and neck slightly from the exam table, causing mild contraction of her abdominal muscles. This maneuver causes a significant increase in her right lower quadrant pain.

How Would You Manage This Patient?

The patient has entrapment of the right ilioinguinal-iliohypogastric nerves. She is experiencing all three components of the diagnostic triad associated with ilioinguinal-iliohypogastric nerve entrapment or neuroma formation. As a diagnostic and therapeutic office-based procedure, she was consented for a neuronal blockade. Using a 25-gauge needle, a total of 3 cc of 1 percent lidocaine buffered with sodium bicarbonate was injected into the area of the patient's pain at the right lateral aspect of her Pfannenstiel incision. Ten minutes after injection, she reported being pain-free for the first time in nine months.

Ilioinguinal-Iliohypogastric Nerve Entrapment

Injury to the ilioinguinal-iliohypogastric nerves can occur through severing the nerve, causing neuroma formation, stretch, compression with retractors, entrapment with suture, fibrosis, and scarring [1, 2]. Ilioinguinal-iliohypogastric nerve injury can occur after transverse incisions in the lower abdomen, inguinal herniorrhaphy, and laparoscopy. It is estimated that 6–18 percent of patients following cesarean delivery and 5–32 percent of patients following hysterectomy will suffer from chronic postsurgical pain, and approximately 2–4 percent of patients will suffer from chronic lower abdominal pain due to ilioinguinal-iliohypogastric nerve entrapment following a Pfannenstiel incision [1].

The ilioinguinal nerve is a mixed nerve with both motor and sensory functions. It arises from the L1 and L2 spinal nerve roots with variable contribution from T12. The iliohypogastric nerve is also a mixed nerve arising from the L1 and often the T12 spinal nerve roots [3, 4]. Both nerves emerge from the upper part of the lateral border of the psoas muscle. Although there is variation in location, these nerves pierce the transversus abdominis muscle approximately one centimeter above the anterior superior iliac spine. The nerves travel in an inferior-medial course, and eventually pierce the aponeurosis of the internal and external oblique muscles. The iliohypogastric nerve goes on to provide sensory innervation to the superomedial thigh, mons pubis, and labia majora. The iliohypogastric nerve divides into lateral and anterior cutaneous branches. The lateral cutaneous branch provides sensory innervation to the gluteal region. The anterior cutaneous branch provides sensory innervation to the hypogastric region (Figure 4.1). Transverse incisions in the lower abdomen and laterally placed laparoscopic trochar ports can cause direct injury to these nerves or entrapment of these nerves with suture placement and scarring.

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