

The Treatment of Dysmenorrhea



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KEYWORDS

- Adolescent • Menstrual problems • Dysmenorrhea • Menorrhagia
- Excessive uterine bleeding

KEY POINTS

- The time between menarche and the establishment of ovulatory menstrual cycles is variable but may take as long as 2 to 4 years.
- Primary dysmenorrhea is a clinical diagnosis rarely requiring extensive diagnostic tests and is generally responsive to graded management using nonsteroidal anti-inflammatory drugs (NSAIDs) and combined oral contraceptives.
- Excessive uterine bleeding can be seen as a consequence of physiologic anovulation from an immature hypothalamic-pituitary-gonadal axis but when it occurs soon after menarche bleeding diathesis must be considered.
- When evaluating dysmenorrhea, the history and physical examination provide important clues to etiologic factors and guide the diagnostic evaluations that may be needed.
- Evidence is available to support the use of both NSAIDs and hormonal treatments for the management of primary dysmenorrhea.

INTRODUCTION

Menstrual disorders and abnormal uterine bleeding are common concerns that bring young women to the physician's office. Complaints include menses that are too painful (dysmenorrhea), are absent or occur irregularly (amenorrhea or oligomenorrhea), or are prolonged and heavy (menorrhagia, or excessive uterine bleeding). In providing optimal reproductive care to these adolescents, the medical provider must be able to distinguish normal developmental patterns or symptoms requiring education and reassurance from pathologic conditions requiring prompt assessment and treatment. This article is a discussion of the normal menstrual patterns seen in adolescent females with an evaluation and management approach to primary and secondary dysmenorrhea.

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NORMAL MENSTRUAL PATTERNS IN ADOLESCENTS

Normal menstrual cycles require the maturation of the complex feedback system of the hypothalamic-pituitary-gonadal (H-P-G) axis. The mature system involves orderly and sequential release from the pituitary of luteinizing hormone (LH) and follicle-stimulating hormone (FSH), in response to gonadotropin-releasing hormone from the hypothalamus. This results in the growth and maturation of follicles in the ovary, oocyte maturation, and estrogen and progesterone secretion. In the initial follicular phase of a normal menstrual cycle, increasing levels of FSH stimulate the maturation of an ovarian follicle as well as the secretion of estrogen. Estrogen, in turn, stimulates endometrial proliferation. In an ovulatory midcycle, the rising level of estrogen switches from a negative feedback mechanism on both LH and FSH to a positive mechanism. The resulting surge of LH precipitates the release of an oocyte from a mature follicle. The second half of the menstrual cycle, the luteal phase, is characterized primarily by secretion of progesterone as well as estrogen by the corpus luteum formed by the residual follicle. This results in falling levels of FSH and LH, and some additional growth but also stabilization of the thickened endometrium. In the absence of pregnancy and implantation, after about 10 to 14 days, the corpus luteum involutes, and estrogen and progesterone levels decline, resulting in endometrial shedding, or menstruation. In most adult women, this cycle averages 28 days but can vary from 24 to 35 days and typically lasts 4 to 6 days.

Ovulatory menstrual cycles occur at varying rates following menarche. Within 2 years of menarche, 18% to 45% of female patients will have established regular ovulatory cycles. This increases to 45% to 70% by 2 to 4 years following menarche and to 80% by 5 years.¹ Dysmenorrhea generally occurs during ovulatory cycles, explaining why most dysmenorrhea in adolescents usually has onset 6 to 12 months following menarche. Dysmenorrhea can occur less frequently, however, even with anovulatory cycles. Studies have shown that girls who experience menarche earlier generally establish ovulatory cycles within a shorter time than those girls whose menarche occurs later in age.²

Before the establishment of ovulatory cycles, follicular development that does not result in ovulation still can produce levels of estrogen that stimulate endometrial proliferation. Eventually the negative feedback effect of this level of estrogen will reduce gonadotropins, resulting in falling levels of estrogen and a withdrawal bleed. In this situation, the lack of progesterone to stabilize the endometrium can result in cycles that are prolonged and excessive. This anovulatory excessive bleeding is physiologic and will usually resolve with maturation of the H-P-G axis and the establishment of ovulatory cycles.

Typical parameters for uterine bleeding considered to be excessive include a duration lasting more than 7 days, reports of perceived flow that is heavier than normal (quantified as more than 80 mL/cycle), cycles occurring less than every 24 days or more than 35 days, and any bleeding between normal cycles.^{3,4}

Dysmenorrhea, or painful menses, is a commonly experienced symptom in women of reproductive age. When severe enough, it can result in restrictions in normal functioning, such as attending school or work. There are 2 commonly defined categories of dysmenorrhea: primary and secondary. Primary dysmenorrhea refers to pain during menses in the absence of any specific pathologic state and is characterized by recurrent, crampy, bilateral lower abdominal pain. Secondary dysmenorrhea refers to pain during menses that can be explained by an organic pathologic condition or any disorder that is determined to be responsible for the reported symptoms of pain with menstruation.

EPIDEMIOLOGY

Dysmenorrhea is considered the most common symptom of all menstrual complaints, especially during middle and later adolescence. Prevalence rates range from 67% to 90% in young women between the ages of 17 and 24 years.⁵ A systematic review conducted by the World Health Organization (WHO) in 2006 found the prevalence of menstrual pain in reproductive-aged women to be between 17% and 81%.⁶ This review, however, found that severe dysmenorrhea was reported in only 12% to 14% of community-based samples of women in the United Kingdom. Despite that many of these studies use different populations and criteria for assessing the severity of symptoms, these ranges are similar to many previous studies and confirm the high prevalence of this symptom.

Risk factors for dysmenorrhea include younger age (<30 years), early age of menarche (<12 years), nulliparity, and low body mass index (<20).^{7,8} The higher rates of dysmenorrhea among women with a strong family history of dysmenorrhea have been postulated to be the result not only of genetic factors but also possibly through conditioned behavior learned from one's mother or sisters or similar family lifestyles.⁹ Family history of dysmenorrhea, onset of menarche before age 12 years, and reports of irregular or heavy menstrual flow or longer duration of menstrual bleeding episodes have also been reported as increased risk factors for dysmenorrhea.⁹ A limited number of studies also suggest a positive association between depression and/or somatization and dysmenorrhea.⁸ The mechanism for this is poorly understood but it is postulated that mental distress can disrupt several neuroendocrine responses, such as impairment of follicular development, progesterone synthesis, prostaglandin activity, and adrenaline and cortisol release.¹⁰ A recent meta-analysis from Britain did not find significant differences in reports of dysmenorrhea by race or ethnicity, and no consistent data have been reported for obesity, alcohol or tobacco use, education, or marital status as risk factors.⁷

PATHOPHYSIOLOGY

Primary dysmenorrhea results from excessive production of prostaglandins at the time of ovulatory menses.^{11,12} In the second half of an ovulatory cycle, the withdrawal of progesterone from the normally involuting corpus luteum causes the release of phospholipids, in particular omega-6 fatty acids, which, in turn, are initially converted to arachidonic acid, and then to prostaglandins.¹³ This production of prostaglandin results in increased intrauterine pressure and abnormal uterine contractions. In addition, vasoconstriction of uterine vessels results in decreased blood flow, ischemia of the uterine muscles, and increased sensitivity of pain receptors, all of which cause pelvic pain.¹⁴ Endometrial blood flow has been shown to decrease during these uterine contractions, suggesting that the resulting ischemia is responsible for the pain.¹⁵ Prostaglandins are also converted to leukotrienes that, along with the prostaglandin F₂-alpha, are also responsible for the systemic symptoms, such as nausea, vomiting, headache, and dizziness, that may accompany menstrual cramps. The requirement for ovulatory cycles to be present for primary dysmenorrhea to occur in part explains why most adolescents will not develop dysmenorrhea with initial menarche but may have pain after they have established more regular menses several months after menarche.

PATIENT EVALUATION OVERVIEW

Primary dysmenorrhea generally coincides with onset of ovulatory cycles. Localized symptoms include lower abdominal pain or pelvic pain, with or without radiation to

the lower back or thighs. The pain generally begins with the onset of the menstrual period and can last anywhere from 8 to 72 hours in duration. Additionally, common systemic symptoms are headache (59%), dizziness (28%), fatigue (67%), nausea (55%) or vomiting (24%), and back pain (56%).¹³

As with any physical complaint referable to the genitourinary system in an adolescent, the evaluation of menstrual pain must include a comprehensive history as well as a physical examination with components determined by the history. This is important to rule out any possible pathologic causes for the menstrual pain, as well as to determine the best approach for management. In the sexually active female, it is essential to include a comprehensive sexual history, which is best done separately from the parents, to assure confidentiality of the information obtained.

CLINICAL ASSESSMENT

History

The history should include questions in the following areas:

- Menstrual history
- Specific therapies attempted and their success
- Family history of dysmenorrhea
- Sexual history
- Review of systems (ROS) focusing on systemic, gastrointestinal (GI), genitourinary (GU), musculoskeletal, and psychosocial areas

Box 1 provides specifics areas in the history that need to be considered.

Physical Examination

A general physical examination should be done when the history and ROS point to a possible systemic or non-GU cause for the pain.

A pelvic examination is essential in adolescents who are sexually active, and who report severe pain or limitation of activity, or who have not responded to first and second line treatments for dysmenorrhea.

In a nonsexually active adolescent, with a history that indicates no systemic disease, but is typical for primary dysmenorrhea, a pelvic examination as part of the initial evaluation may not be necessary. In all other adolescents a complete pelvic examination is indicated; with primary dysmenorrhea the pelvic examination is normal. The external genital examination is important for determining sexual maturity rating, the presence of a normal perineal opening, or signs of trauma. The speculum examination is important in determining whether any anatomic conditions are involved, such as outflow obstruction, or the presence of vaginal or cervical discharge, suggestive of infection. The bimanual examination can provide clues as to whether the uterus is nontender, mobile, of normal size, and texture, and whether there are any masses, such as fibroids. The adnexa and uterosacral ligaments should be palpated for tenderness, masses, and nodularity consistent with endometriomas. In a nonsexually active female, a recto-abdominal examination can provide similar information.

DIFFERENTIAL DIAGNOSIS

When obtaining the history from an adolescent, and completing the physical and pelvic examination, several causes need to be considered, before it can be concluded that primary dysmenorrhea is the cause for the menstrual pain, even though almost 90% of dysmenorrhea in an adolescent is primary. **Table 1** lists causes for gynecologic-associated menstrual pain, both primary and secondary, as well as their clinical

Box 1**Components of the medical history: dysmenorrhea***Menstrual history*

- Age at menarche
- History and characteristic of menstrual cycles
 - Interval between periods
 - Typical duration of menses
 - Nature of flow
 - Dates of most recent menses: last menstrual period (LMP) and previous last menstrual period
 - The pediatrician may need to educate the teen that the LMP begins on the first day of menses, and not on the last day.
 - Pattern of menses (irregular vs regular)
 - History of when menstrual pain developed following menarche
 - Characteristics of menstrual pain (location, nature, timing related to onset of menses, duration, associated systemic symptoms, and severity)
 - Extent of functional impairment of activities, such as school, work, typical activities
 - Whether lower abdominal cramping is present at other times in the menstrual cycle
 - Acuity or chronicity of reported pain
- Any therapies that have been used in the past and the response to these
 - Including medications (types, specific doses and duration of treatment), conservative measures (heating pads, exercise) and complementary alternative treatments, such as supplement, herbal remedies, vitamins.
- Family history of dysmenorrhea

Sexual history

- History of sexual activity
- Age of coitarche
- Numbers of prior sexual partners
- History of any sexually transmitted infections
- Presence of dyspareunia
- Contraceptive use, presently and in the past.

ROS

- Probe for any systemic symptoms or symptoms that may indicate a pathologic cause of menstrual pain.
 - Generalized systemic symptoms, such as fatigue, dizziness, or premenstrual physical or emotional symptoms
 - GI symptoms, such as vomiting, diarrhea, pain on defecation, (these may be present in primary dysmenorrhea or may be seen in endometriosis)
 - GU symptoms
 - Musculoskeletal symptoms, particularly in the hip and pelvic area (to rule out possible trauma or tumor as cause of pain)
 - Psychosocial history (to evaluate for substance abuse, especially tobacco smoking, and stress, anxiety, or history of sexual abuse).

features, and the diagnostic evaluations that may be indicated. Of note, is that when menarche is associated with significant pain, one needs to suspect an outflow obstruction.^{16,17} A noncommunicating uterine horn is an obstructive müllerian anomaly that is seen with menstrual flow. Obstructive anomalies such as imperforate hymen, transverse vaginal septum, or vaginal agenesis should be considered with the onset of acute

Table 1 Differential diagnosis of dysmenorrhea, clinical features, and suggested diagnostic evaluation		
Condition	Clinical Features	Evaluation
Primary dysmenorrhea	Recurrent, crampy, suprapubic pain occurring at start of menses, lasting 2–3 d, often accompanied by systemic symptoms	Diagnosis is clinical Should rule out pregnancy
Endometriosis	Cyclic (can be noncyclic) pain with menses Associated with deep dyspareunia, dysuria, dyschezia, and fertility problems Decreased mobility of uterus on examination, adnexal masses, and uterosacral nodularity	Transvaginal and pelvic ultrasound highly accurate for bowel and ovarian endometriomas MRI may be indicated for deep infiltrating endometriomas Laparoscopy with biopsy is preferred diagnostic test
Pelvic inflammatory disease	Lower abdominal pain in sexually active female Abnormal findings on examination: cervical motion tenderness, uterine and adnexal tenderness, cervical or vaginal mucopurulent discharge May have systemic signs, temperature >38.3°C	Cervical infection with <i>Chlamydia trachomatis</i> or <i>Neisseria gonorrhoeae</i> confirmatory May have elevated erythrocyte sedimentation rate or C-reactive protein Transvaginal ultrasound usually not indicated
Adenomyosis	Usually associated with menorrhagia and intermenstrual bleeding Enlarged, tender, boggy uterus on examination	Transvaginal ultrasound or MRI will detect endometrial tissue within the endometrium
Leiomyomata	Cyclic pelvic pain, usually with menorrhagia Occasional dyspareunia	Transvaginal ultrasound will detect fibroids
Ectopic pregnancy	History of preceding amenorrhea, abnormal uterine bleeding Acute, severe lower abdominal pain Cramping on affected side May present with blood loss, hypovolemia	Positive urine human chorionic gonadotropin pregnancy test Pelvic or transvaginal ultrasound will show lack of intrauterine gestational sac or extrauterine gestational sac
Interstitial cystitis	Suprapubic pain, usually noncyclic, with urinary symptoms (frequency, urgency) Radiation of pain to groin and rectum Normal pelvic examination	Urinalysis Cystoscopy with biopsy, showing bladder wall mucosal irritation
Chronic pelvic pain	History of noncyclic pain for at least 6 mo May radiate toward vagina or rectum May be worsened by anxiety; often associated with dyspareunia, pain on defecation Burning pain unilaterally on rectal examination may suggest pudendal nerve entrapment	Pelvic MRI along pudendal nerve to assess nerve and surrounding structures With negative workup, diagnosis may be based on clinical history

Adapted from Osayande A, Mehulic S. Diagnosis and initial management of dysmenorrhea. *Am Fam Physician* 2014;89:341–6.

pelvic pain, in the absence of menses in a teen whose Sexual Maturity Rating is advanced enough for menarche to have occurred. In these situations, pelvic or transvaginal ultrasound can identify whether the pelvic and uterine anatomy is normal or associated with these structural anomalies. In addition, several nongynecologic conditions should be considered. These include GI causes (irritable bowel syndrome, inflammatory bowel disease, chronic constipation, and lactose intolerance), GU causes (cystitis, renal calculi), and psychogenic causes (trauma, history of sexual abuse).

DIAGNOSTIC EVALUATION

As listed in [Table 1](#), with a history consistent with primary dysmenorrhea and a normal physical and/or pelvic examination (if indicated), no further laboratory or diagnostic tests are indicated. If an underlying cause for the menstrual pain is suspected, several laboratory tests or diagnostic studies may be indicated and judiciously done.

TREATMENT

The overall goal of treatment of dysmenorrhea is the reduction of reported pain and associated systemic symptoms, as well as improved function, such as fewer days lost from work, school, or extracurricular activities.

Pharmacologic Treatment Options

Primary dysmenorrhea

The goal of pharmacologic therapies is to reduce the production of prostaglandins and leukotrienes responsible for the menstrual pain and associated systemic effects. First-line therapies are thus aimed at the reduction of prostaglandins and leukotrienes, through the use of nonsteroidal anti-inflammatory drugs (NSAIDs) and/or hormonal contraceptives.

Nonsteroidal anti-inflammatory drugs The support for the efficacy of NSAIDs lies in their ability to inhibit the enzymes of the cyclooxygenase (COX)-1 and COX-2 pathways that metabolize the fatty acid arachidonic acid to prostaglandin. Both of the classes of NSAIDs, those that are nonspecific and inhibit both COX-1 and COX-2 (ibuprofen, naproxen, diclofenac potassium, and meclufenamate) and those that are specific for COX-2 only (celecoxib, rofecoxib, and valdecoxib), are effective in the treatment of dysmenorrhea. However, because of evidence linking COX-2 inhibitors to cardiac complications, they are no longer recommended for the treatment of dysmenorrhea.¹³ The action of NSAIDs on COX-1 inhibition is also responsible for the side effects of GI upset and renal failure; these can be minimized with short-term use.

A 2010 Cochrane review of 73 randomized controlled trials reported strong evidence to support the use of NSAIDs as the first-line treatment of primary dysmenorrhea and up to 80% of patients will respond to them.¹⁸ No NSAID has been proven more effective than any other. Thus, the choice of which preparation to use should be based on patient preference, and the tolerability and efficacy for each individual patient. It is recommended that all NSAIDs should be taken, if possible, 1 to 2 days before the start of the menses, preferably with a loading dose and continued regularly for the first 2 to 3 days of menstrual bleeding or for the duration of the cramping. Recommended doses of specific NSAIDs are listed in [Table 2](#).

Hormonal Agents

The data supporting the efficacy of hormonal contraceptives, such as oral, intravaginal, or intrauterine, for the treatment of primary dysmenorrhea is limited, although this

Agent	Loading Dose	Maintenance Dose ^a
Ibuprofen	400 mg	200–400 mg q 4–6 h
Naproxen	500 mg	250 q 6°–8° or 500 q 12°
Naproxen sodium	550 mg	275 mg q 6°–8° or 550 mg q 12°
Diclofenac potassium	100 mg	50 q 6°–8° (max daily dose 200 mg)
Mefenamic acid	500 mg	250 q 6° or 500 mg q 8°

^a Recommended for duration of menses or as long as pain is experienced.

is common clinical practice, especially for dysmenorrhea that is unresponsive to initial treatment with NSAIDs.¹⁹ High-quality randomized clinical trials evaluating the effectiveness of oral contraceptives in reducing menstrual pain are lacking, although smaller studies have found response rates as high as 80%.²⁰

Combined hormonal contraceptives, including combined oral contraceptives, the contraceptive ring, and the transdermal patch, all work to decrease the endometrial lining, which in itself produces prostaglandins and leukotrienes that contribute to the menstrual pain. In addition, their role in inhibiting ovulation and subsequent progesterone production also decreases the formation of prostaglandins and leukotrienes. Thus, these products have been prescribed for primary dysmenorrhea, as well as some causes of secondary dysmenorrhea, particularly endometriosis. Davis and colleagues²¹ demonstrated in a randomized clinical trial that adolescents with moderate and severe dysmenorrhea experienced reduced pain with a cyclic prescribed low-dose combined oral contraceptive (levonorgestrel 100 mgs plus ethinyl estradiol 20 µg). Reports of pain relief have also been greater with the vaginal ring than the transdermal patch and some studies have found menstrual pain exacerbated with the patch.^{13,22} In a small randomized clinical trial with 35 adolescents and young adults, continuous combined oral contraceptives showed more immediate relief of pain than cyclic contraceptive pills, although the effects were similar at 6 months.²³ Given that an adolescent may abandon a method if no relief is experienced within 2 to 3 menstrual cycles, continuous methods may be preferable. The effectiveness of extended, continuous cycles has also been described using the vaginal ring.²⁴ Keep in mind that with the sexually active adolescent, the use of hormonal contraception for management of the dysmenorrhea also provides effective contraception.

Long-acting reversible contraceptives have also been found to be effective treatments for both primary and secondary dysmenorrhea. These include the levonorgestrel-containing intrauterine system, LNG-IUS (Mirena), the etonogestrel-containing subdermal implant (Nexplanon), and depot-medroxyprogesterone. For the sexually active adolescent, these also provide the benefit of highly effective contraception. Concerns about the long-term adverse effect of medroxyprogesterone on bone accretion and weight gain need to be considered. In a study from the United Kingdom, 92% of adolescents reported significant improvements in menstrual pain with the LNG-IUS.²⁵ Another study by Subhonen and colleagues²⁶ reported better efficacy of the LNG-IUS compared with combined oral contraceptives. The etonogestrel-containing subdermal implant has also been shown to have similar efficacy to the LNG-IUS, with 81% reporting improvement in menstrual pain.²⁷ Endometrial atrophy caused by the LNG-IUS and the inhibition of ovulation caused by both depot medroxyprogesterone and the etonogestrel implant have been postulated as mechanisms accounting for their beneficial effect on menstrual pain.

Nonpharmacologic Treatment Options

Several studies have assessed the role of complementary alternative and nonpharmacological therapies for the treatment of primary dysmenorrhea. Khan and colleagues²⁸ examined several systematic reviews and trials evaluating the efficacy of nondrug, nonsurgical treatments for primary dysmenorrhea. They found that, although many of these interventions, such as acupressure, behavioral therapies, herbal remedies, thiamine, transcutaneous electrical nerve stimulation, topical heat, and Vitamin E, have some evidence of effectiveness, the strength of this effectiveness is very weak and the quality of the studies in general were poor. They concluded that good quality and more creative and innovative research in this area is needed to guide clinical practice for these methods.

Treatment of Secondary Dysmenorrhea

If the history and physical examination point to a pathologic cause for the dysmenorrhea, the diagnostic evaluation can be tailored to the specific condition under consideration and treatment provided for that condition (see [Table 1](#)). In addition, if primary dysmenorrhea is initially suspected and the adolescent fails to respond to treatment with either an NSAID or hormonal treatment after 2 to 3 full menstrual cycles, consideration of less common causes for dysmenorrhea are imperative.

For endometriosis, combined oral contraceptives are recommended as the first-line treatment and have been found to be highly effective.²⁹ In addition, several clinical trials have supported the use of depot medroxyprogesterone, the etonogestrel subdermal implant (Nexplanon), and the LNG-IUS (Mirena) in endometriosis.³⁰ Laufer and colleagues³¹ found that in a group of adolescents who reported lack of response to either NSAIDs or combined hormonal contraceptives, a 67% rate of endometriosis was diagnosed through laparoscopy. Delay in diagnosis in adolescents has also been attributed to the fact that they may report noncyclic pain and may lack the experiences of dyspareunia or fertility problems.

With any müllerian anomaly that presents with cyclic pain, as well as menses, the assumption is that there is partial patency of the uterine or vaginal tracts. In the case of obstructing uterine horns or vaginal septa, referral to a gynecologist for surgical repair is indicated. The reader is referred to the excellent references published by Dietrich for a full description of these müllerian anomalies.^{16,17}

ADDITIONAL CONSIDERATIONS

As previously described, most cycles in the first 2 years after menarche are anovulatory.¹ Despite this lack of ovulation, regular menses are possible in response to the cyclic rising and falling levels of estrogen secreted from developing follicles that cause endometrial lining buildup followed by periodic shedding. In fact, a prospective study from the WHO of early adolescent girls found that by 2 years after menarche, 67% of menstrual cycles were reported as regular (ie, occurring at intervals of 20–40 days and lasting no more than 10 days) and, presumably, many of these regular menses were anovulatory.³² Further, this study also found that 5% of these young adolescents reported cycles lasted longer than 7 days, and 0.5% longer than 10 days. Thus, it is relatively uncommon for these anovulatory cycles secondary to an immature H-P-G axis to result in an unstable endometrium that produces irregular sloughing and excessive of prolonged uterine bleeding.³³

However, there may be specific pathologic conditions in which menarche is associated with excessive uterine bleeding requiring evaluation and treatment. These

conditions encompass a wide variety of causes, and the pathophysiology associated with each depends on whether it is hormonally mediated, secondary to a systemic medical condition, arising from a specific genital tract abnormality, or pregnancy-associated. If excessive bleeding during cyclic menses is associated with signs of ovulation, such as cramping, premenstrual, or systemic symptoms, the cause is more likely to be either normal bleeding perceived as excessive by the teen or a bleeding diathesis. With cyclic or noncyclic bleeding that is painless, anovulatory bleeding should be suspected and a variety of hormonally mediated conditions that cause disruption of the H-P-G axis are more likely to be involved. A complete discussion of these conditions is beyond the scope of this article. A situation that may arise at the outset of menarche is the excessive uterine bleeding secondary to a bleeding disorder.

Bleeding disorders are important conditions to consider with any adolescent presenting with excessive uterine bleeding, especially when it presents soon after menarche. Claessen and Cowell³⁴ reported on a series of adolescents presenting for acute menorrhagia and found that 20% overall, 25% of those with a presenting hemoglobin less than 10 mg/100 mL, and 50% of those presenting at menarche were subsequently found to have a primary coagulation disorder. Von Willebrand disease, a deficiency of clotting factors important in platelet adhesion, is the most commonly seen inherited coagulation disorder but others, such as hemophilia A or B, can be seen. Acquired platelet disorders can also present with menorrhagia and include idiopathic thrombocytopenia purpura, autoimmune disorders, and aplastic anemia, as well as congenital disorders such as Glanzmann thrombasthenia.³⁵

Because excessive bleeding can cause hemodynamic instability and anemia, it is also essential for the pediatrician to determine the acuity versus chronicity of the bleeding, and probe for specific signs that indicate hypovolemia and/or anemia. These may indicate the need to determine volume status urgently, as a priority over determining the cause of the excessive bleeding. Symptoms of fatigue, lightheadedness, presyncope should all raise concern about the teen's hemodynamic stability. In the setting of acute bleeding and/or hypovolemia, referral to an emergency setting and consultation with either a gynecologist or a hematologist are most appropriate.

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