

# Pelvic Pain in Adolescents

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## Abstract

Dysmenorrhea and noncyclic pelvic pain (chronic pelvic pain) are common in adolescents. The evaluation of teens with dysmenorrhea or chronic pelvic pain is aimed to diagnose possible gynecologic conditions (endometriosis, pelvic inflammatory disease, ovarian cysts, and obstruction of the reproductive tract) and nongynecologic conditions (irritable bowel syndrome, interstitial cystitis, and myofascial pain). The management of chronic pelvic pain in adolescents is often more complex than in adult women because both the adolescent and her parents are counseled and addressed, and her long-term emotional and physical health, fertility, and sexuality are considered. Dysmenorrhea and chronic pelvic pain are often associated with depression and anxiety in adolescents. Thus, psychosocial counseling plays an important role in the management of these patients. This review will present a systematic approach to the evaluation and treatment of dysmenorrhea and chronic pelvic pain in adolescents.

## Keywords

- ▶ adolescent
- ▶ chronic pelvic pain
- ▶ dysmenorrhea
- ▶ endometriosis

Chronic pelvic pain is defined as a persistent cyclical or noncyclical pain lasting at least 6 months and causing significant interference with daily life activities, and this definition is similar for adolescents and adult women.<sup>1</sup> Adolescents may report dysmenorrhea, a cyclical pelvic pain associated with menstruation, as well as nonmenstrual or chronic pelvic pain, a pelvic pain which may or may not be associated with menstruation. Many conditions causing chronic pelvic pain and/or dysmenorrhea are similar in adolescents and in adults, with the important exception of obstructive reproductive tract anomalies, which are almost exclusively diagnosed in adolescents. The patient's younger age and her evolving physical and emotional puberty require a specialized approach by the physician throughout her history taking, exam, evaluation, and treatment plan. The management of chronic pelvic pain in adolescents is often more complex than in adult women because both the adolescent and her parents are counseled and addressed, and her long-term future function, fertility, and sexuality are considered.

## Prevalence

While chronic pelvic pain affects approximately 15% of adult women, its prevalence in adolescents is unknown.<sup>2</sup>

Nevertheless, numerous studies have investigated the prevalence of dysmenorrhea in adolescents and report an overall prevalence for this condition that ranges from 30 to 90%.<sup>3</sup> This large range of dysmenorrhea prevalence reflects subjectivity of this condition, its varied definitions and severity, as well as some geographical and cultural differences. Severe dysmenorrhea interfering with daily activities is less common and reported to affect up to 9% of adolescents.<sup>4</sup> Although dysmenorrhea has been speculated to occur primarily in ovulating adolescents, recent studies have shown that painful menstruation may occur after anovulatory cycles.<sup>5</sup> Adolescents with severe dysmenorrhea were found to have impaired quality of life and increased risk for depression and anxiety compared to controls, emphasizing the importance of evaluation and treatment of these young patients.<sup>6</sup>

## Differential Diagnosis

Chronic pelvic pain in adolescents may be caused by gynecological and nongynecological conditions. Since gynecological etiologies are rare in prepubertal and premenarchal girls, the patient's pubertal stage should be

considered when the likely differential diagnosis is determined.

### 1. Gynecologic conditions.

The main gynecologic conditions associated with chronic pelvic pain and/or dysmenorrhea in adolescents are endometriosis, obstruction of the reproductive tract, pelvic cysts or masses, and pelvic inflammatory disease.

*Endometriosis* in adolescents has been the focus of extensive interest and research in recent years, with the understanding that both early and advanced stage endometriosis may occur in adolescents. Although rare cases of endometriosis have been described in premenarchal, posttelarche girls, it is mainly a condition of postmenarchal teens. Endometriosis appears to be a common cause of dysmenorrhea and chronic pelvic pain in adolescents. Janssen et al investigated the prevalence of endometriosis in adolescents in a meta-analysis study. Among adolescents who underwent laparoscopy for the investigation of pelvic pain, endometriosis was found in ~60% of all cases and in 75% of adolescents whose pain was unresponsive to medical treatment.<sup>7</sup> This study may have overestimated the prevalence of endometriosis in adolescents with chronic pelvic pain because most studies included in the meta-analysis were performed in tertiary centers likely to treat refractory pelvic pain and more severe cases. Endometriosis-related pain in adolescents includes dysmenorrhea, noncyclical pain, pain associated with bowel movement and urination, and dyspareunia in sexually active teens. Contrary to early studies in which most adolescents with endometriosis were diagnosed with minimal or mild disease, more recent studies described advanced stage endometriosis (including endometrioma, deep infiltrating endometriosis, and cul-de-sac obliteration) in 30 to 40% cases.<sup>7,8</sup> Surgically diagnosed endometriosis lesions in adolescents are often described as clear, red, white, and/or yellow-brown, as opposed to the “power-gun” black lesions observed in adults.<sup>9</sup>

*Obstructive reproductive tract anomalies* are usually diagnosed through workup for primary amenorrhea in an otherwise pubertal adolescent with cyclical or noncyclical pelvic pain. Although the pelvic pain is typically of a chronic type, many of these patients present at the emergency room with an acute pain exacerbation, sometimes associated with urinary retention, back pain, or constipation caused by the significant accumulation of menstrual blood in the vagina and/or in uterus.<sup>10</sup> *Imperforate hymen* is readily diagnosed by inspection of the external genitalia and identification of the bulging bluish hymenal membrane. *Transverse vaginal septum* may be diagnosed by visualization of a normal-appearing hymenal ring without a bulging membrane, while on gentle introduction of a Q tip through the vagina an obstruction at the level of the septum is identified. In these cases, the large hematocolpus is visualized on pelvic ultrasound performed via an abdominal or translabial approach and the diagnosis of a transverse septum may be suspected, but further imaging with magnetic resonance imaging (MRI) is required to identify the level and the

length of the obstruction, and to differentiate this anomaly from vaginal agenesis. The diagnosis and treatment may be delayed in cases of anomalies with partial obstruction of the reproductive tract. In those cases, the pubertal and menstruating adolescent will present with dysmenorrhea or prolonged pelvic pain, while hematometra or hematocolpus will be demonstrated on ultrasound.<sup>11</sup> These uncommon anomalies include the OHVIRA syndrome (uterus didelphys with obstructed hemivagina and ipsilateral renal agenesis), where a one side of a didelphys uterus is blocked by an oblique vaginal septum, and a bicornuate or unicornuate uterus with an obstructed noncommunicating horn. When diagnosis and treatment of outflow tract obstruction anomalies is delayed, the increased retrograde menstruation may cause endometriosis. Fortunately, this type of endometriosis may resolve once the obstruction is corrected.

*Adnexal cysts* are common in adolescents and include functional and nonfunctional cysts.<sup>12</sup> Functional ovarian cysts occur in postmenarchal teens and are usually associated with acute pelvic pain during ovulation or from hemorrhage or rupture of a corpus luteum cyst during the luteal phase of the cycle. However, functional ovarian cysts may also be diagnosed in adolescents with irregular menses and anovulation. Nonfunctional adnexal cysts include paratubal and paraovarian cysts, endometrioma, benign ovarian cysts such as benign cystic teratoma and benign serous or mucinous cystadenoma, and the rare cases of ovarian borderline or malignant tumors (germ cell, granulosa cell, or epithelial tumors). Some of these cysts, particularly benign cystic teratoma and germ cell tumors, may be diagnosed in premenarchal and even prepubertal girls. Many cysts are asymptomatic, especially those with a small diameter. Larger ovarian cysts may be associated with a chronic, pressure-type pelvic pain of a cyclical or noncyclical nature. The association between cyst size and pelvic pain is not well defined, but it appears that cysts with a diameter of less than 4 cm are rarely symptomatic. Adnexal cysts may also cause adnexal torsion, presenting with acute onset pelvic or abdominal pain, often associated with nausea or vomiting. Similar to adult women, pelvic ultrasound is the primary imaging performed in adolescents for the evaluation of adnexal cysts, being widely available as well as sensitive and specific. On pelvic ultrasound, the different characteristics of functional, benign, and malignant adnexal cysts may be evaluating using the gray scale, color Doppler, and power Doppler features.<sup>13</sup> Based on this evaluation, expectant management and surveillance may be offered to adolescents with functional appearing cysts, while further investigation and surgery is considered in cases of symptomatic non-functional appearing cysts, especially those with features suggestive of malignancy.<sup>14</sup>

Adolescents are at increased risk for *pelvic inflammatory disease* (PID) in those with high-risk behavior (i.e., multiple partners, less frequent use of condoms, and associated substance abuse), increased risk for sexually transmitted

infections, and biologic factors such as their protruding cervical transformation zone whose columnar cells are more vulnerable to infection by *Chlamydia gonorrhoeae* and *Neisseria trachomatis*.<sup>15</sup> Chronic pelvic pain is a common long-term sequela of PID in adolescents. The PEACH trial (PID Evaluation and Clinical Health) reported that 30% of adolescents diagnosed and treated for PID developed chronic pelvic pain. This prevalence increased to 68% in those with recurrent episodes of PID and to 52% in those with recurrent lower genital tract infection.<sup>16</sup>

## 2. Nongynecologic conditions.

Similar to adult women, the nongynecologic differential diagnosis of chronic pelvic pain in adolescents includes gastrointestinal, urological, and musculoskeletal conditions. *Irritable bowel syndrome*, one of the functional gastrointestinal disorders, is characterized by recurrent episodes of abdominal and pelvic pain that are typically associated with bowel movements, as well as altered bowel movements in the form of constipation, diarrhea, or alternating constipation and diarrhea. Unlike the inflammatory bowel diseases, a structural bowel abnormality is absent in cases of irritable bowel syndrome. Symptom severity and disease exacerbations are often associated with psychosocial stress and mood problems. With the aim of avoiding unnecessary testing, a system of symptom-based criteria referred to as the Rome criteria has been developed for the diagnosis and classification of functional gastrointestinal disorders.<sup>17</sup> According to the latest update of these criteria, Rome IV, irritable bowel syndrome is diagnosed in a patient reporting recurrent abdominal pain present at least 1 day per week in the last 3 months in association with defecation, a change in frequency of stool, or a change in the appearance of stool. Conversely, “red flag” symptoms such as weight loss, unexplained fever, rectal bleeding, severe vomiting or diarrhea, joint pain, and a family history of inflammatory bowel disease are not typical of irritable bowel syndrome and should prompt an investigation for organic gastrointestinal disorders including celiac disease and inflammatory bowel disease.<sup>18</sup>

*Interstitial cystitis*, also called painful bladder syndrome, is defined as lower abdominal pain associated with urinary symptoms such as urinary frequency, urgency, dysuria, and nocturia. Although interstitial cystitis is a well-known etiology of chronic pelvic pain in adult women, there are relatively few studies on its prevalence among teens. Rackow et al evaluated 28 adolescents and young women with chronic pelvic pain by laparoscopy and cystoscopy.<sup>19</sup> Almost 40% of patients were found to have interstitial cystitis (diagnosed on cystoscopy by identification of postdistension capillary hemorrhages, terminal hematuria, or ulcerations of the bladder mucosa called *Hunner's ulcers*), and 25% were found to have both endometriosis and interstitial cystitis, an association which has also been described for adult women. Teens with persistent urinary symptoms and a negative urine culture should also be tested for sexually transmitted

infections. Prentiss et al reported that among 233 teens with urinary symptoms evaluated at a pediatric emergency department, 9% were found to have a sexually transmitted infection.<sup>20</sup>

*The musculoskeletal system* may be the primary cause of chronic pelvic pain, or secondarily involved as a response to another pain generator. The components of the musculoskeletal system which can cause or contribute to pelvic pain include the abdominal wall muscles, the abdominal wall fascia, the pelvic and hip muscles, the sacroiliac joints, and the lumbosacral muscles. Few studies have evaluated the musculoskeletal component in teens with chronic pelvic pain. Schroeder et al evaluated 63 teens with a diagnosis of chronic pelvic pain. Of those, up to 80% had signs of musculoskeletal involvement on physical exam.<sup>21</sup> In addition, 10% of teens were found to have trigger points, defined as hypersensitive areas on abdominal palpation. Patients who were diagnosed with myofascial-type pain were referred to physical therapy. Symptom resolution was reported by 95% of patients who completed the physical therapy, highlighting the importance of identification and appropriate treatment of myofascial pain.

*Pelvic and abdominal adhesive disease* is a controversial cause of chronic pelvic pain in adults and children. In adults, 70% of patients with chronic pelvic pain report an initial improvement in their pain after laparoscopic adhesiolysis, but the long-term efficacy of adhesiolysis is unknown and questionable.<sup>22</sup> In adolescents, the surgical history is often unremarkable and severe adhesive disease in the absence of endometriosis or PID is rare. However, in some cases, the surgical history includes conditions likely associated with severe adhesive disease such as major abdominal surgeries or ruptured appendicitis and peritonitis in infancy. In those teens, the pelvic adhesive disease is possibly a contributing factor to their chronic pelvic pain. However, when performing laparoscopy for evaluation and treatment of teens with suspected severe adhesive disease, the risk for surgical complications (such as bowel injury) should be considered and patients should be advised that this is often not a durable treatment as adhesions may recur after surgery.

## Evaluation

### 1. History.

After evaluating the medical and surgical history of the patient, the pelvic pain characteristics (the pain's location, character, intensity, and radiation) and its interference with daily life activities are assessed. In addition, precipitating pain factors (i.e., physical activity, bowel movements, urination) and relieving factors (rest, lying down) are ascertained. Pain interference with daily life may be assessed by asking about school absence and academic performance, avoidance of social activities, and avoidance of sports activities. The pain's relation to menstruation and its cyclical or noncyclical pattern is assessed. The gastrointestinal and urinary symptoms are addressed as

discussed earlier. In particular, pain with bowel movements, rectal bleeding, or hematuria are assessed, and may be associated with deep infiltrating endometriosis or with inflammatory bowel disease and other nonfunctional gastrointestinal conditions. The adolescent's pubertal development (i.e., age at telarche and menarche) and the characteristics of her menstrual periods (regularity, duration, and flow) are noted. Previous treatments for pelvic pain (medical, surgical, and alternative medicine) and their outcomes are noted. The family history is usually obtained from the parents. The pertinent conditions include family history of endometriosis, breast and ovarian cancer, and inherited thrombophilia. The third one is important for evaluating the possibility of treatment with estrogen-containing hormonal medications.

Once the clinician has established a good rapport with the patient, a confidential discussion is undertaken. The adolescent is asked about her sexual activity, risk for sexually transmitted disease, dyspareunia, smoking and drug use, past or present exposure to abuse, and mood and sleep problems. This discussion is obviously modified according to the patient's age and understanding. Some adolescents may not be willing to discuss these issues on the initial visit and further visits may be required to develop their trust in the physician. Subsequently, the parents are offered the possibility of a confidential discussion with the physician. There is a wide variation between the different U.S. states and other countries regarding adolescents' rights to confidentiality and consent for contraception, sexually transmitted diseases screening and treatment, mental health care, and substance abuse counseling and treatment. The physician should be aware of the federal and state laws pertinent to his/her practice.

## 2. Physical examination.

Inspection and palpation of the abdominal wall for masses, hernias, and myofascial trigger points can be performed in all patients. It is helpful to ask the patient to point the location of her pain, and then to palpate this area gently toward the end of her abdominal exam to avoid exacerbating pain at the start of the examination. Increased pain upon flexion and contraction of the abdominal wall muscles (the Carnett sign) suggests a myofascial etiology. The back and the sacro-iliac joints are palpated for tenderness and radiation. The Tanner stage (breast and external genitalia) is assessed. A pelvic exam is offered to sexually active teens who are comfortable with this exam. The pelvic exam may also be deferred to a later visit in cases of apprehension and anxiety and may be performed in the presence of the teen's mother or female relative or friend, or privately according to her preference. During the pelvic exam, a small size speculum may be used to observe the cervix (looking for signs of cervicitis) and the vaginal fornices (observing whether pigmented endometriosis lesions are visible in the posterior fornix). Subsequently, a single-digit exam (if possible) is performed to systematically

assess for pelvic floor muscles tenderness and contraction, bladder/urethral, cervical motion, and uterine tenderness. Then, if possible, a bimanual exam is performed to assess for uterine size, mobility, and adnexal tenderness and pelvic masses. Patients with abdominal wall myofascial pain often report tenderness during the bimanual exam. In these cases, it is important to ask the patient if the pain occurs primarily with the abdominal versus vaginal hand. If any portion of the exam is tender, the patient should be asked to rate the severity of the pain (often with a 0–10 numeric rating scale) and whether the pain is similar in location or quality to the pain she usually experiences. If the pelvic exam cannot be performed, the anatomy of the external genitalia is evaluated, and a Q-tip gently introduced into the vagina to assess for outflow tract obstruction. On the rectal exam, pelvic masses and uterosacral ligament nodularity associated with endometriosis may be discovered.

## 3. Imaging and laboratory tests.

Extensive imaging and testing are usually unnecessary. A pelvic ultrasound is performed as the primary imaging test, via a transabdominal or transvaginal approach in the older teens who are sexually active and comfortable with this exam. The pelvic ultrasound is aimed to identify any adnexal cysts or masses and any evidence of reproductive tract outflow obstruction such as hematometra or hematocolpus. The specific gray scale and Doppler flow parameters observed on the pelvic ultrasound will determine the adnexal cyst's type and guide further management. Most cases of reproductive outflow tract obstruction (other than imperforate hymen) will require further imaging with MRI. In those cases, urinary tract anomalies which are common in patients with Mullerian anomalies are also evaluated.

In patients with suspected endometriosis, a focused transvaginal ultrasound performed by specially trained sonographer may reveal findings of deep infiltrative endometriosis in the uterosacral ligaments, rectovaginal septum, rectosigmoid, vagina, and bladder.<sup>23</sup> MRI is also sensitive and specific for diagnosing deep infiltrative endometriosis lesions, especially rectosigmoid lesions.<sup>24</sup> However, these imaging modalities cannot detect superficial peritoneal endometriosis lesions. Endometriomas are usually easily detected on pelvic ultrasound and/or MRI.

The primary laboratory tests include a pregnancy test, testing for sexually transmitted infections (most often using the urine nucleic acid amplification tests), and a urine analysis and culture. Additional laboratory tests are ordered according to the patient's findings and differential diagnoses.

## Management

When forming the plan for medical and surgical management, both the teen and her parents are counseled while maintaining the patient's confidentiality (i.e., regarding her sexual activity). Parents are often concerned that the use of hormonal

medications such as combined oral contraceptive pills (COC) for their noncontraceptive benefits may negatively impact their child's sexual behavior. Other parental concerns regarding the use of hormonal medications involve their perceived negative effects on cancer risk and future fertility.<sup>25</sup> These concerns should be addressed by the physician.

The management of *endometriosis* in adolescents is similar to its management in adults but with emphasis on optimizing their long-term health, reproductive and sexual function. In the absence of endometriomas or signs of deep infiltrating endometriosis on exam or on imaging, empirical medical treatment with first-line hormonal suppression is appropriate as the initial management option. COC are often helpful in alleviating both dysmenorrhea and noncyclical pelvic pain.<sup>26</sup> A cyclic or a continuous regimen may be used. Vercellini et al reported that switching from a cyclic COC regimen to a continuous COC regimen improved dysmenorrhea in more than 70% of adult women, and a similar benefit may be expected in adolescents.<sup>27</sup> The main disadvantages of the continuous regimen are spotting and breakthrough bleeding, reported in a third of patients.<sup>27</sup> There have been concerns regarding the possible adverse effects of COC on weight gain and final stature in adolescents. However, a meta-analysis study concluded that COCs do not increase the risk of obesity and do not affect growth and stature.<sup>26</sup> Nevertheless, COCs may have a negative impact on bone mass density acquisition in adolescents, although the long-term implications of this process are unknown.<sup>28,29</sup> Teens may also be prescribed combined estrogen-progestin formulations via the vaginal ring or the transdermal patch, with presumed similar benefits and risks, including the risk for venous thromboembolic events which are estimated to be in the range of 4/10,000 women-years for otherwise healthy young women using low-dose COCs.<sup>30</sup> Alternatively, various progesterone preparations may be empirically prescribed. Eber et al evaluated the use of Dienogest in adolescents aged 12 to 18 years with clinically suspected endometriosis.<sup>31</sup> After 52 weeks of treatment, endometriosis-associated pain improved, along with a decrease in lumbar bone mineral density, which partially recovered after 6 months of treatment discontinuation. Other oral progesterone preparations, such as norethisterone acetate, appear to have a similar benefit in alleviating dysmenorrhea in adolescents.<sup>32</sup> Intrauterine progesterone treatment with the levonorgestrel-containing intrauterine device does not require day-to-day compliance, but its insertion may be associated with significant discomfort even in sexually active teens.<sup>33</sup> Thus, the optimal timing for the levonorgestrel-containing intrauterine device may be at the time of laparoscopy. Symptoms' improvement with empirical hormonal therapy does not confirm or rule out the diagnosis of endometriosis. Indeed, laparoscopy remains the gold standard for the endometriosis diagnosis in teens and adults.

Laparoscopy is offered to teens with suspected endometriosis whose pain is unresponsive to first-line hormonal medical treatment, or whose disease appears to be advanced. Minimal or mild stage endometriosis (with the typical appearance of clear, red, or white peritoneal lesions in

adolescents) is surgically managed by excision or ablation, with 80% of teens reporting significant improvement in their pain after surgery.<sup>9,34</sup> However, because pain recurrence is common, postoperative hormonal suppression is recommended to decrease risk of recurrent pain and avoid reoperation, performed in up to 35% of teens.<sup>35</sup> Endometrioma in adolescents can be managed surgically by cystectomy or by drainage and cyst ablation. The former procedure is associated with a lower recurrence rate, but also with higher risk of ovarian damage and decreased ovarian reserve, which may reduce future fertility.<sup>36</sup> In adults, hemostasis with bipolar energy is also associated with decreased ovarian reserve, as opposed to the use of sutures or hemostatic agents.<sup>36</sup> Thus, adolescents with endometrioma and/or deep infiltrative endometriosis should be managed by experienced surgeons. These patients also benefit from postoperative hormonal suppression.

Gonadotropin-releasing hormone agonists may be offered to teens with surgically confirmed endometriosis whose pain has not been well controlled with other hormonal medications. This medication is reserved for teens with a surgically confirmed disease and for a limited duration of 6 to 12 months in view of its risks of bone density loss. In addition, the "add back" therapy consisting of oral progestin and estrogen (most often norethindrone acetate and conjugated equine estrogen) is recommended when prescribing GnRH agonists to teens, with the aim of reducing its short- and long-term side effects.<sup>37</sup>

*Reproductive outflow tract obstructive anomalies* are managed surgically. Imperforate hymen in a teen presenting with a large hematocolpus is usually readily diagnosed and managed by surgical excision of the hymenal membrane. Other types of outflow tract obstruction require expertise in their diagnosis and surgical management and should be referred to experienced physicians.<sup>10</sup>

*Ovarian cysts* with a simple cyst appearance on ultrasound or with the sonographic characteristics of functional findings (i.e., corpus luteum cysts) may be managed expectantly in the absence of adnexal torsion signs. Teens with persistent ovarian cysts, cysts with non-simple sonographic characteristics, and cysts causing pelvic pain are referred for surgical cyst excision, preferably by laparoscopy. Unless malignancy is suspected, laparoscopic cystectomy with ovarian preservation is the appropriate procedure in these young patients.

*Irritable bowel syndrome* is managed by a combination of dietary interventions, lifestyle modifications (such as fiber supplements and lactose-free diet), probiotics, possibly medications (such as antispasmodics and antidiarrheals), and psychological therapy (such as Cognitive behavioral therapy).<sup>18</sup>

Patients with mild symptoms of *interstitial cystitis* may be managed by dietary interventions (i.e., avoiding dietary triggers such as caffeine) and bladder training. In patients with moderate to severe symptoms, medical therapy and pelvic floor physical therapy may be added. Those patients are usually referred to specialists for treatment by bladder hydrodistension, bladder instillations, and trial of medications such as pentosan polysulfate, neuropathic medications, and antihistamines.<sup>38</sup>

*Physical therapy* is recommended for teens with a myofascial pain component. If trigger points can be identified, trigger point injections with local anesthetics and/or corticosteroids may be used. These patients may also benefit from hormonal suppression of their menstrual periods, because myofascial pain is often exacerbated by the hormonal changes associated with the menstrual cycle.

*Psychosocial counseling* plays an important role in the management of teens with dysmenorrhea and chronic pelvic pain, which are at increased risk for depression and anxiety.<sup>39</sup> On one hand, chronic pelvic pain may lead to or exacerbate underlying depression and anxiety. On the other hand, the perception of pain may be increased in teens with depression and anxiety, and they are at risk for developing maladaptive pain coping strategies such as social withdrawal.<sup>40</sup> Psychosocial counseling has its therapeutic effects and may also identify the teens who could benefit from antidepressant therapy. In addition, various cognitive behavioral therapies may provide patients with strategies for positive pain coping. Additional strategies for stress management and improved quality of life such as art, yoga, and alternative medicine are tailored according to the teen's preferences.

#### Conflict of Interest

The authors have no conflict of interests to disclose.

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