Original Study

Hormonal Contraceptives, Intrauterine Devices, Gonadotropin-releasing Hormone Analogues and Testosterone: Menstrual Suppression in Special Adolescent Populations

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ABSTRACT

Menstrual suppression (the use of hormonal contraceptive methods to eliminate or significantly decrease the frequency of menstrual cycles) is frequently used in the adolescent population for the management of menstrual symptoms such as heavy or painful periods, premenstrual syndrome, menstrual migraines, or even for patient preference. However, in cases of menstrual suppression in special populations additional risks and benefits need to be considered. The purpose of this article is to review the options and medical considerations for menstrual suppression in patients undergoing chemotherapy who might be at risk of abnormal uterine bleeding, those with intellectual or physical disability, and transgender and gender nonbinary individuals.
Key Words: Menstrual suppression, Developmental and physical disability, Heavy menses, Transgender, Intrauterine devices, Gonadotropin-releasing hormone analogues, Testosterone

Introduction

Since the establishment that monthly menses could be manipulated to achieve amenorrhea or at least less frequent menstrual cycles, menstrual suppression with hormonal contraceptives has become an accepted practice.[1] Menstrual suppression is often used to treat issues such as heavy or painful menses, as well as to improve symptoms in patients with chronic pain or those with migraines, mood issues, nausea, or bloating associated with menses. In specific patient populations such as those with an oncologic diagnosis, developmental and physical disabilities, and transgender and gender nonbinary patients, achieving amenorrhea or less frequent menstrual bleeding requires some additional considerations as well as discussion of some other options not used in routine settings. In this review, in addition to the use of hormonal contraceptive options for menstrual suppression, we also discuss the use of gonadotropin-releasing hormone (GnRH) agonists in oncology patients and the effect of testosterone therapy on menstrual bleeding in transgender individuals.

Hormonal Methods of Menstrual Suppression

Combined Hormonal Contraceptives

Combined oral contraceptives (COCs) come in different combinations of levels of ethinyl estradiol (ranging from 10 μg-50 μg) with different doses and generations of progesterone. Traditional dosing intervals can be 21-24 days of active medication with a 4-7 day placebo break. However, several extended cycle regimens have been introduced which range from 42-84 days with a subsequent placebo or low-dose estrogen-only week. Patients can also be instructed to take active medication until breakthrough bleeding occurs when a pill break and a hormone-free interval is started (usually 4 days). With initiation, irregular or breakthrough bleeding is a known side effect; however, irregular bleeding decreases with prolonged use.[2,3] In a randomized study that compared continuous with cyclic COC use, amenorrhea was seen in 79% of continuous COC users at pill pack number 13.[4] Lower-dose estrogen COCs are associated with increased breakthrough bleeding and therefore COCs with ethinyl estradiol dose greater than 20 μg are usually used if menstrual suppression is the primary goal.[5,6] In addition, the use of 30-35 μg ethinyl estradiol COCs has been advocated because studies have shown that when adolescent patients have prolonged use of COCs containing less than 30 μg of estrogen, bone mineral density (BMD) might be adversely affected.[7,8]

The vaginal ring can also be used in an extended manner as well with the insertion of a new vaginal ring every 3 weeks. Studies of extended-cycle vaginal ring users shows excellent efficacy and amenorrhea rates.[9–11] Similar satisfaction has been noted with extended use of the transdermal contraceptive with placement of a new patch weekly.[12] Similar to COCs, if breakthrough bleeding occurs when using the transdermal patch or vaginal ring in a continuous fashion, patients can take a break from the patch or vaginal ring for a hormone-free interval before restarting the method.

Progestin-Only Methods

Progestin-only methods of hormonal contraception, including depo-medroxyprogesterone acetate (DMPA) injection, levonorgestrel intrauterine device (IUD), progestin-only pills, and the etonogestrel implant, can be used for menstrual suppression with varying levels of efficacy. Because of excellent amenorrhea rates and overall ease of use, DMPA and levonorgestrel IUD are frequently used forms of progestin-only methods for menstrual suppression. DMPA users report improving amenorrhea rates with continued usage with 46% reporting amenorrhea at 1 year of use.[13,14] Levonorgestrel IUD users also achieve excellent rates of amenorrhea (50% amenorrhea at 1 year; 60% with continued use of the IUD at 5 years).[1,15—17] In addition, although amenorrhea might not be achieved, another 25% of patients reported oligomenorrhea while using the levonorgestrel IUD with rates of unscheduled spotting in only 11% of users at 2 years.[17] It should be noted that amenorrhea rates for the levonorgestrel IUD are highest when the 52-mg IUD approved for 5 years is used as opposed to other forms of the levonorgestrel IUD, which have overall lower daily dosage of hormone and also lower amenorrhea rates.[18—20] The 52-mg IUD that is approved for 3 years has amenorrhea rates of 19% at 12 months and 38% at 3 years.[21] The 13.5 mg IUD approved for 3 years has an amenorrhea rate of 6% at 1 year and 12% at 3 years.[22] The 19.5 mg IUD approved for 5 years has amenorrhea rate of 12% at 1 year.[23] Although excellent for contraception, the copper IUD is not used for the goal of menstrual suppression.

Progestin-only pills can also be used for menstrual suppression in individuals who do not desire or have a contraindication for estrogen. Improved rates of amenorrhea can be achieved with uptitration of medications such norethindrone acetate or medroxyprogesterone acetate (daily up to 3 times per day dosing) with reports citing up to 76% amenorrhea rates at 2-year follow-up.[1,24,25] However, escalating doses of progestin-only pills might not be well tolerated with side effects such as weight gain and mood changes.[24] Progestin-only medication such as norethindrone 0.35 mg ("minipill") can be used as well for menstrual suppression; however, in addition to issues with need for strict compliance and breakthrough bleeding, amenorrhea rates are poor with only 10% of patients achieving menstrual suppression with this method.[1,24,26] The etonogestrel implant, although an excellent contraceptive option, functions poorly if the desired outcome is menstrual suppression, with reported amenorrhea rates of 13% at 12 months of use and higher rates of irregular bleeding.[13]

Table 1 summarizes methods, doses, amenorrhea rates and considerations for menstrual suppression methods discussed.

Special Populations

Patients with Developmental and Physical Disabilities

Patients with developmental and physical disabilities have a wide spectrum of abilities with some having only physical disabilities such as patients with spinal cord injury, whereas others might have a developmental disability that has intellectual as well as physical manifestations. When patients with disabilities and their families/caregivers present for discussion of menstrual suppression, it is important to undertake a detailed discussion addressing who desires menstrual suppression and why menstrual management is desired. Patients and caregivers might desire menstrual suppression for a multitude of reasons. For example, patients with physical disabilities might report that menstrual hygiene is difficult because of limited mobility and would prefer suppression of menses. In addition, with the start of menses, caregivers of patients with developmental disabilities might report mood swings, self-mutilation, or other behavioral changes surrounding menses, which might be the patients' way to express pain or distress.[34—36] In these circumstances, initiation of menstrual suppression might be helpful for control of menstrual-related symptoms.

Importantly, some caregivers might present before the onset of menarche to discuss menstrual suppression. Although counseling can be conducted, to ensure the absence of an obstructive congenital anomaly, demonstrate a functional hypothalamic-pituitary-gonadal axis and endogenous estrogen production, no method should be initiated before the onset of menses.[34,35] It is also important to discuss whether caregivers or patients are also concerned about contraception. Although often thought of as an asexual population, patients with developmental and physical disabilities lead sexual lives. This discussion presents an excellent educational opportunity for a frank conversation about puberty, sexuality, and issues of consent in an individualized and developmentally appropriate manner, which can help to ensure that contraceptive goals are also achieved. In addition, this patient population is vulnerable to sexual abuse.[37] Therefore, a discussion about suspicion for abuse is imperative as well as counseling that menstrual suppression and contraception cannot prevent sexual abuse.[34]

When patients with developmental or physical disabilities present for evaluation and describe a history of heavy or irregular menses, a thorough history should be undertaken because there are several reasons for menstrual irregularity in these individuals. For example, patients with Trisomy 21 have been shown to have a higher incidence of thyroid disease, which can lead to menstrual irregularities.[34,38] In addition, patients with disabilities might be receiving medications that might lead to abnormal menstruation. For example, antipsychotic medications and antidepressants can lead to hyperprolactinemia (Table 2) and some antiseizure medications such as valproic acid might lead to signs of hyperandrogenic anovulation.[39] Because hyperprolactinemia might be associated with amenorrhea, it can be tolerated if menstrual suppression is a goal and no structural causes (such as a prolactinoma) are identified. However, providers should consider that hyperprolactinemia is associated with adverse effects on BMD (due to the hypoestrogenic state) and galactorrhea and therefore ensure appropriate monitoring of symptoms and BMD.

Most hormonal options for menstrual suppression can be used in this patient population, but several considerations need to be taken on the basis of the medical history of the patient. If there are no medical contraindications for use of

Table 1
Medications for Menstrual Suppression

Method	Dose	Amenorrhea Rates	Considerations
COCs	Different dosage levels of ethinyl estradiol and different generations of progestins; monophasic COCs used in continuous fashion (1 tablet daily) without use of placebo week	Almost 80% at 1 year of use[4]	VTE consideration in immobile patients Interactions with antiepileptic medications BTB
PO progestin-only medications	Norethindrone 0.35 mg; daily PO medication Norethindrone acetate, medroxyprogesterone acetate; PO medications with uptitration of doses (once to 3 times daily) as required	Low efficacy[1,24,26] Improved efficacy compared with norethindrone; 76% at 2 years[1,24,25]	Ideal if estrogen is contraindicated and PO medication is desired by patient BTB and especially with norethindrone need for strict compliance
Depo-medroxyprogesterone acetate injection	150 mg intramuscular (most commonly used); can also be given 104 mg subcutaneously Injections every 12 weeks; might shorten interval if BTB occurs	46% at 1 year of use[13,14]	Irregular BTB, weight gain, and issues regarding bone mineral density with prolonged use
IUD	20 μg per day released by 52-mg levonorgestrel IUD approved for 5 years Additional IUD doses 52 mg 3-year IUD; 19.5 mg 5-year; 13.5 mg 3-year	52 mg 5-year 50% at 1 year; 60% at 5 years of continuous use[1,15–17] (see text for amenorrhea rates for other IUD types)	Requires procedure for placement; patients with disabilities (physical or developmental) might require sedation/general anesthesia for placement
GnRH agonist	Different formulations; most common is leuprolide acetate 11.25 mg given every 12 weeks usually for a maximum duration of 6 months	Nearing 100% efficacy in menstrual suppression[27–30] (might have increased bleeding with initiation because of transient increase in gonadotropins and steroid hormones)	Ideal for patients requiring suppression for a short period of time (such as during chemotherapy); prolonged use not advised because of issues with bone density and menopausal symptoms; length of treatment can be extended with use of add-back therapy[31–33]

BTB, breakthrough bleeding; COC, combined oral contraceptive; GnRH, gonadotropin-releasing hormone; IUD, intrauterine device; PO, oral; VTE, venous thromboembolism.

COCs, physical or intellectual disability is not a direct contraindication in these patients. These medications can be used in cyclic fashion or in continuous fashion as discussed previously. If the patient is currently receiving antiepileptic medications such as lamotrigine or valproate, it is important to counsel that serum levels of these medication might decrease with concurrent use of estrogen, thus increasing the risk of seizure activity.[40] Similarly, antiepileptic medications that are cytochrome P450 enzyme-inducing accelerate conversion of estrogen and progesterone to inactive metabolites and decrease serum concentrations leading to issues with decreased contraceptive efficacy and breakthrough bleeding.[40] Table 3 shows common antiepileptic medications used and their interaction with COCs.[40,41] If a patient is wheelchair-bound or otherwise has limited mobility, there is controversy about the risk of venous thromboembolism (VTE) with use of COCs. There is additional concern with use of transdermal patches in patients with limited mobility because studies have shown a twofold increased risk of VTE with use of patches compared with COCs.[42] However, the patch might be ideal in patients with issues swallowing or with malabsorptive

gastrointestinal disorders.[35] The vaginal ring might be difficult to place in some individuals with physical disabilities, and on occasion caregivers/partners can assist with placement.[34] In patients with developmental and physical disabilities, however, careful consideration of patient autonomy and privacy as well as caregiver comfort should be undertaken before considering caregiver placement of the vaginal ring.

Intramuscular depo-medroxyprogesterone injections given every 12 weeks remains an option for patients, with excellent amenorrhea rates. The dosing interval can be shortened if patients have issues with breakthrough bleeding toward the end of the 12-week dosing schedule. Concern in this specific patient population are twofold: first is the issue of long-term bone health because studies have shown decreased BMD in adolescent patients using DMPA compared with adolescent patients using COCs or no contraception.[43–45] However, BMD values were shown to be stable after 12 months of use and did rebound after discontinuation.[43–45] Therefore, with discussion of risk and benefit, continuation of DMPA is a viable option in patients

Table 2
Medications with Highest Risk of Causing Hyperprolactinemia[39]

Class of Drug	Name of Drug
Antipsychotics (typical)	Phenothiazines (chlorpromazine, thioridazine, mesoridazine, trifluoperazine, fluphenazine, perphenazine) Thioxanthenes (thiothixene) Butyrophenones (haloperidol)
Antipsychotics (atypical)	Risperidone Molindone
Antidepressants	Tricyclics (clomipramine) MAO inhibitors (pargyline, clorgiline)

MAO, monoamine oxidase.

Table 3
Drug-Drug Interactions between Combined Oral Contraceptives and Antiepileptic Medications

AED	AED Efficacy Reduced by COC[40]	COC Affected by AED[41]
phenobarbital	Unknown	Yes
phenytoin	Unknown	Yes
carbamazepine	Unknown	Yes
topiramate	Unknown	Yes
valproate	Yes	No
gabapentin	Unknown	No
lamotrigine	Yes	No
levetiracetam	No	No

AED, antiepileptic drug; COC, combined oral contraceptive.

with disability if DMPA is functioning well for menstrual suppression. Dual energy x-ray absorptiometry (DEXA) evaluation can be conducted once in patients who have prolonged DMPA use to assess the effect of the medication on BMD.[35] This should especially be considered in patients who might be immobile or wheelchair-bound because their risk of decreased BMD might be further heightened by prolonged DMPA use.[35] The second concern with DMPA use focuses on weight gain. Studies show that patients with weight gain in the first 6 months are at continued risk of significant weight gain with further DMPA use.[46] Weight gain can be particularly challenging for those who self-transfer or need the assistance of caregivers for transfers.[34,35]

The levonorgestrel IUD presents an excellent form of menstrual suppression in this patient population with good amenorrhea rates as well as lack of daily or every 12 week medication delivery. In addition, drug interactions are low, which is a relative benefit because this patient cohort is often taking multiple other medications. Studies have shown that progesterone-containing IUDs do not affect the concentrations of antiepileptic medications and therefore do not affect their efficacy making them an ideal option for patients with seizure disorders.[47,48] In individuals with physical disability, placement might need to be done with anesthesia because of issues such as contractures, which might hinder in-office placement. Patients with developmental disability have a wide range of presentations and some might tolerate an in-office placement with reassurance and guidance and others might require placement with sedation. Although pre-procedure ultrasound examination is not necessary in adolescents, in patients who require anesthesia for placement, preplacement ultrasound examination might be helpful to ensure appropriate uterine cavity length before the procedure to avoid unnecessary anesthesia exposure.

Although it is often requested by parents or caregivers for alleviation of symptoms and because of fear of pregnancy, surgical management is not indicated as initial treatment for menstrual suppression in this patient population. Endometrial ablation is associated with high rates of failure to achieve amenorrhea in adolescents and cannot be used as a form of contraception or sterilization.[34] Intrauterine scarring, contractures, and cervical stenosis occurring after ablation can lead to further complications including hematometra and postablation syndrome.[49] Furthermore, pregnancy subsequent to ablation has increased risk of issues such as preterm birth and pathologic adherence of the placenta in the placenta accreta spectrum.[50,51] Hysterectomy as initial management of menses is also not recommended. The risks of hysterectomy outweigh the benefits especially in light of multiple forms of effective medical management, which are now readily available.[34] However in rare cases, if all options for management of menses have been exhausted and the decision is taken to proceed with surgical management, there needs to be a thorough discussion with patients and guardians about the irreversible nature of hysterectomy, the surgical risk involved with the procedure, and the fact that it will not prevent sexual abuse nor decrease the risk of sexually transmitted infections.[34] In addition, there should be a discussion and careful observation of state laws surrounding sterilization and consent especially in the case in which the patient is a minor or has an intellectual and developmental delay. In addition, discussion with an ethics committee should also be considered before proceeding with surgical procedures for menstrual management.

Oncology Patients

Oncology patients represent another unique population who might benefit from menstrual suppression. Although the incidence of a cancer diagnosis in patients ages 15-19 is rare (20 in 100,000), the complications are significant.[52,53] Patients are at risk of abnormal uterine bleeding from thrombocytopenia, which might be a result of their cancer or from treatments such as chemotherapy, radiation, or pretreatment regimens for stem cell or bone marrow transplantation.[35] To avoid risk of heavy bleeding in an already immunocompromised patient population, discussion with patients about menstrual suppression before initiation of treatment plans is advised.

In a survey of providers in the Pediatric Bone and Marrow Transplant Consortium, GnRH agonists have become the preferred method of menstrual suppression used by pediatric oncologists.[54] Short-acting formulations are preferred with the goal of only using the medication when thrombocytopenia (which could lead to heavy menstrual bleeding) is expected. After a transient increase in gonadotropins and estrogen for 2 weeks after initiation, which might lead to increased bleeding, GnRH agonists function as an excellent form of menstrual suppression by inducing a hypoestrogenic state.[52] Leuprolide acetate (LA) is a frequently used GnRH analogue in this population with studies showing 96% amenorrhea rates, but triptorelin has also been used in studies with similar success.[27,28] With regard to timing, studies have shown starting LA 1 month before planned initiation of treatment yields the lowest rates of failure.[27] Although this study used a dose of 3.75 mg LA every 28 days with amenorrhea in 29 of 30 patients, other studies have shown similar success rates with different dosing regimens.[29,30] The use of 11.5 mg every 3 months intramuscular injections continues to be popular because of the prolonged period between need for injections, and this medication can also be delivered subcutaneously or intravenously if intramuscular injection is contraindicated.[29,52] Because of the hypoestrogenic state induced by GnRH agonists, if the duration of suppression is expected to be longer than 6 months, add-back therapy should be strongly considered with careful consideration of the risks and benefits.[31–33] Add-back therapy is commonly conducted with norethindrone acetate 5 mg/d, which has been shown to have positive effects on BMD, decreases in vasomotor symptoms, and decrease of the overall low risk of progesterone-only methods in patients with complex medical conditions.[31–33] However, combination norethindrone acetate (5 mg/d) and conjugated equine estrogen (0.625 mg/d) add-back appears to be a more effective form of add-back therapy for increasing BMD compared with norethindrone acetate alone.[32] Other medications such as

transdermal estrogen can also be options for delivery of estrogen.

GnRH agonists became popular for use in this population because of thoughts that they might confer some fertility preservation benefit. It is important to keep in mind that although useful in the prevention of menstrual bleeding, the use of GnRH agonists for fertility preservation remains controversial and experimental and thus these medications should not be used for the express purpose of fertility preservation.[55–58] Referral to oncofertility specialist is recommended for patients undergoing gonadotoxic treatment for discussion of fertility preservation options.[55]

Common strategies for menstrual suppression can also be used in oncology patients. The patient's oncology team might have concerns regarding the use of COCs in this patient population because of the increased risk of venous thromboembolic events as well as liver toxicity in bone marrow and stem cell transplantation patients.[35,59,60] Patients with active malignancy are known to have a 7 times higher risk of developing VTE; however the risk of pregnancy and bleeding requiring transfusion might outweigh the VTE risk depending on the individual patient.[61] The US Medical Eligibility Criteria for Contraceptive Use specifically mentions only breast, ovarian, cervical, and endometrial cancers, however, all hormonal contraceptive methods were listed as category 1 or 2 for which there is either no risk or the advantages of using the medication generally outweigh the risks. The exceptions are in breast cancer patients because of concern of hormonally active breast cancer and IUD initiation in cervical and endometrial cancer patients because of concern of seeding with insertion.[62]

Although there are no large-scale studies in this specific patient population, after a discussion with the patient and their oncology team about risks and benefits, COCs can be used effectively as a form of menstrual suppression. Amsterdam et al in a retrospective chart review of 33 adult patients undergoing bone marrow transplantation reported that 18 patients were receiving some form of COC pill as a first-line treatment for management of heavy menses.[63] All but 1 of these patients achieved resolution of their symptoms showing that COCs can be used effectively in this patient population.[63]

Progesterone-only methods can also be used for menstrual management in this population. DMPA is an option for oncology patients for menstrual suppression during chemotherapy; however, Meirow et al did show that those receiving DMPA had higher rates of needing acute management for bleeding than those receiving GnRH agonists.[28] Although the use of the levonorgestrel IUD for the management of heavy menses is well established, no specific long-term studies about use of the levonorgestrel IUD have been conducted in this particular population.[15,64] However, in a case study it was reported that the continued use of the levonorgestrel IUD during stem cell transplantation resulted without complications of pelvic infection or heavy bleeding even when the patient developed severe pancytopenia.[65] Similarly, the etonogestrel implant has also not been studied but it remains a less ideal choice for menstrual suppression because of the known incidence of menstrual irregularity.

Transgender Patients

The adolescent transgender and gender nonbinary patient who was assigned female at birth represents another unique patient population who might desire menstrual suppression. For patients who present before the onset of menarche, puberty suppression with the use of GnRH agonists is an option. Working along with a qualified mental health care provider (MHP) with expertise in child and adolescent developmental psychology and psychopathology who can confirm the diagnosis of gender dysphoria/gender nonconformity is essential to assess eligibility for therapy. The Endocrine Society Clinical Practice Guidelines state that if the patient is pubertal (at least Tanner stage 2) puberty suppression can be initiated.[66] If initiated in time, these patients will not experience thelarche or menarche. Subsequently, usually at age 16, with the supervision of a qualified MHP, those who identify as male can choose to initiate testosterone therapy.[66] However, a significant number of patients present after the onset of menarche because puberty and menses can be a moment of initial or increased feelings of gender dysphoria.[67] If these patients are too young to discuss testosterone therapy, have yet to work with a qualified MHP, and desire to avoid monthly menses, initiation of menstrual suppression can be an important step in improving distress due to menses.

In addition, the desire to keep menstruation controlled in this patient population becomes especially important because transgender patients face issues with safety and access to public restrooms. In a recent survey of transgender and gender nonbinary patients, 66% of participants who are still menstruating reported feeling unsafe or very unsafe using men's public restrooms.[67] It is therefore not uncommon that patients who have not undergone puberty suppression often present initially for gynecologic care specifically for menstrual suppression. In the same survey, 95% of participants were aware of options for menstrual suppression and 40% had taken medication for menstrual suppression.[67]

When discussing options for menstrual management, estrogen-containing hormonal options are often avoided by transgender men because of the feelings of gender dysphoria surrounding the use of an estrogen-containing medication. However, there are no overt medical contraindications to the use of estrogen-containing oral contraceptives. They might often prefer to proceed with progesterone-only oral medications or DMPA injections because these do not require a procedure; however, some patients will decline progesterone-containing methods as well as it is also a "female" hormone. In addition to menstrual suppression, because of its known effect of decreasing estrogen levels, DMPA can also be used in this patient population as a form of puberty suppression if GnRH agonists cannot be obtained because of cost.

Placement of the levonorgestrel IUD again shows excellent efficacy; however, patient preference plays a key role in the decision to proceed with IUD placement. Some transgender and gender nonbinary patients prefer the idea of not having to take daily medication and if sexually active prefer the increased contraceptive efficacy. Other patients report

dysphoria with acknowledging the presence of an IUD. Some patients who do desire the IUD for menstrual suppression will request placement under anesthesia because a pelvic exam can oftentimes be traumatic.

In addition to the previously mentioned methods, testosterone when initiated in transgender men is another method of menstrual suppression. In a study conducted in Japan of 138 transgender men who took 3 different doses of intramuscular testosterone enanthate ranging from 125 mg every 2 weeks to 250 mg every 2 weeks, cessation of menstruation was noted by 47%-62% in 1 month and by 86%-97% of participants by 6 months of use.[68] In the study, patients who used 250 mg every 2 weeks had the fastest response of cessation of menses.[68] Several other studies support this finding that most patients experience cessation of menses 6 months after initiation.[69,70]

These reports also note that high levels of testosterone are not needed to induce menstrual cessation in most patients. A study by Ahmad and Leinung showed that patients who received an average dose of 40.1 ($\pm$ 8.2) mg/wk of testosterone experienced cessation in 6 months.[69] Some patients did require higher dose to achieve menstrual cessation; however the average dose was still 56.1 ($\pm$ 12) mg/wk.[69] Patients use several different formulations of testosterone; however, in a study of 45 transgender men randomly assigned either intramuscular injection of testovorin-depot, testosterone gel, or intramuscular testosterone undecanoate, time to amenorrhea ranged from 30 to 41 weeks and was not found to differ between the 3 formulations with all participants reporting amenorrhea by 1 year.[71]

It is important that all transgender patients be counseled that although testosterone does function well for menstrual suppression, it does not function as a contraceptive method with reports of pregnancy with concurrent use of testosterone.[72] Patients who are sexually active and report penetrative vaginal intercourse have a chance of unintended pregnancy and should therefore be counseled on contraceptive options.[72] Currently no contraceptive method is contraindicated in patients using cross-sex hormone therapy and although we do not recommend a specific contraceptive method, we highly encourage comprehensive contraceptive counseling including long-acting reversible contraception methods and allowing patients to make an informed decision about their contraceptive options. In addition, unlike progesterone-based medications, testosterone also might not prevent endometrial hyperplasia. A recent study of hysterectomy samples in the transgender men who were receiving testosterone revealed active endometrium in most cases of hysterectomy despite amenorrhea, showing that testosterone might not prevent endometrial hyperplasia.[73]

Conclusion

Adolescents require menstrual suppression for a wide array of issues ranging from personal preference to control of chronic pelvic pain to issues with gender dysphoria. In most patients standard counseling can be conducted with use of hormonal contraceptive options as first-line management for patients. However, with special populations additional considerations as well as additional management options need to be discussed to provide the best management of menstrual bleeding.

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