Overview of female permanent contraception

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INTRODUCTION

Female permanent contraception (also referred to as sterilization and tubal ligation) can be performed using several different procedures and techniques that prevent pregnancy by occluding or removing the fallopian tubes. It is indicated for females who are certain they have completed childbearing and do not wish to use a reversible contraceptive method or consider vasectomy of their male partner. Permanent contraception procedures vary by timing, surgical route (laparotomy, mini-laparotomy, or laparoscopy), and technique (tubal occlusion, partial or complete salpingectomy).

This topic is an overview of female permanent contraception. Specific types of permanent contraception, including postpartum permanent contraception and interval permanent contraception, as well as other types of contraception are discussed in detail separately. Hysteroscopic permanent contraception is no longer available for clinical use and is therefore not included in this topic.

- (See "Female interval permanent contraception: Procedures".)
- (See "Postpartum permanent contraception: Procedures".)
- (See "Contraception: Counseling and selection".)

In this topic, we will use the terms "patients" or "females" when discussing the counseling and treatment for permanent contraception procedures. However, we encourage the reader to consider the specific counseling and treatment needs of transgender and gender-expansive individuals. Terminology that some individuals may find more fitting includes "pregnancy-capable individuals" or "assigned female at birth."

EPIDEMIOLOGY

Prevalence — Female permanent contraception is the world's most common method of family planning; in 2019, it was used by 23.7 percent of all contraceptive users, for a total of 219 million females worldwide [1]. Reliance on female permanent contraception is highest in Central and Southern Asia (21.8 percent) and Latin America and the Caribbean (16 percent) and lowest in Africa and Europe where rates are less than 5 percent. All regions, except in Central and Southern Asia, have seen a decline in female permanent contraception between 1994 and 2019, with the overall prevalence of female permanent contraception decreasing from 13.7 to 11.5 percent.

Female permanent contraception is also a commonly used method of birth control in the United States; between 2017 and 2019, 18 percent of contracepting females used a permanent method [2]. Overall, rates of permanent contraception in the United States have decreased over the last two decades, probably because of the increased use of long-acting reversible contraceptive methods, which are more effective and cheaper than permanent methods [3].

Demographic factors — Factors that are associated with increased use of permanent contraception include:

- Increasing age.
- Increasing parity.
- Currently or previously married.
- Public insurance or no insurance.
- Hispanic females not born in the United States and non-Hispanic Black females.
- Cognitive disabilities; individuals with self-reported cognitive disabilities undergo permanent contraception at higher rates and at younger ages than individuals with physical or other disabilities or with no reported disability [4].
- Lower levels of education and income [4,5].

CANDIDATES

Indications and contraindications — The only indication for female permanent contraception is the patient's preference to have a permanent method of contraception for pregnancy

prevention. The choice is made by the patient, but the decision requires thorough counseling about alternatives (eg, long-acting reversible contraception, vasectomy), permanent sterility, and the risk of regret. (See 'Counseling and informed consent' below.)

There are no absolute medical conditions that contraindicate female permanent contraception; however, there may be factors that make patients more suitable to a particular route of permanent contraception or other contraceptive options. (See 'Assessing surgical risk' below and 'Timing and surgical approach' below.)

United States regulatory issues — There are legal restrictions regarding permanent contraception in some health care settings.

- **Age** – In the United States, federal funding prohibits permanent contraception for females under the age of 21 and those who are deemed to be mentally incompetent (see 'Vulnerable populations' below). There is some variation by state, with some individual states funding permanent contraception procedures for females 18 to 21 years old. Clinicians should be aware of their state regulations.

  The restrictions against permanent contraception of younger patients generally do not apply to those with private insurance.

- **Timing of consent** – For females in the United States who have federally funded health insurance, the Medicaid consent form must be reviewed, signed, and dated between 30 and 180 days prior to the permanent contraception procedure. Some states may allow this waiting period to be reduced to 72 hours; each provider should be aware of local or institutional policies related to the federal sterilization consent form [6].

COUNSELING

Counseling patients who are considering permanent contraception includes shared decision making with the patient regarding alternatives to permanent contraception, discussing risks and benefits of the procedure, and establishing patient expectations, particularly those that impact the risk of regret.

Counseling and informed consent — The preoperative counseling and informed consent process should include a detailed discussion with the patient of the issues included here; this discussion should be documented in the medical record. There should be no coercion or bias in the offering or choosing of permanent contraception [7].

- **Permanence** – Tubal ligation should be considered a permanent procedure, and the patient should be aware that reversal of permanent contraception is often not feasible, is generally expensive, and is not routinely covered by health insurance. Future pregnancy may be possible using in vitro fertilization (IVF), but this is also expensive and not typically covered by insurance. (See "Reproductive surgery for female infertility", section on 'Tubal reanastomosis'.)

- **Regret** – Most patients are satisfied with their decision to undergo a permanent contraception procedure, but some patients experience regret. This is discussed in detail below. (See 'Regret after permanent contraception procedures' below.)

- **Efficacy** – In general, the cumulative 10-year failure rate of female permanent contraception is 1 to 2 percent [8], which is comparable to the failure rate of either vasectomy or long-acting reversible contraception (LARC (table 1)) [9-13]. Higher rates (up to 2 to 3 percent within the first year following the procedure) have been reported [14]. Many patients are unaware of the comparable efficacy between LARC, vasectomy, and female permanent contraception. These alternatives should be discussed with all patients as part of routine contraception counseling. (See "Female interval permanent contraception: Procedures", section on 'Efficacy'.)

- **Risks and benefits of other contraceptive methods** – Presumably, patients who are considering permanent contraception desire a contraceptive method that is highly effective and does not require frequent dosing. Thus, LARC or vasectomy are the most likely alternatives.

  - **Comparison with LARC** – LARC is not permanent and involves a minor office procedure that must be repeated once the device reaches its expiration date in approximately 5 to 20 years, depending on the device type. Additionally, there may be significant noncontraceptive benefits of a progestin-releasing device, such as reduced menstrual flow, decreased dysmenorrhea, and endometrial protection. (See "Intrauterine contraception: Background and device types", section on 'Noncontraceptive benefits' and "Etonogestrel contraceptive implant", section on 'Noncontraceptive benefits'.)

  - **Comparison with vasectomy** – If permanent contraception is desired and the patient is in an ongoing sexual relationship with a male partner, the option of vasectomy should be addressed. Vasectomy, which is an outpatient procedure done without anesthesia, has lower morbidity and mortality rates than female permanent contraception via mini-laparotomy or laparoscopy [15]. Vasectomy is also the most cost-effective method of permanent contraception [16]. Given its safety and efficacy

profile [7,17], vasectomy should be the preferred method of permanent contraception for individuals in a heterosexual relationship but is significantly underutilized with only 8.2 percent of females between the ages of 15 to 44 relying on vasectomy for contraception [18]. Vasectomy requires the male partner's willingness to undergo the operation and assumes that the patient will not have any other male partners. Conflict between spouses regarding the permanent contraception decision was shown to be a strong risk factor for regret and request for reversal of both procedures [19]. In contrast to female permanent contraception procedures, vasectomy is not effective right away and requires back-up contraception until azoospermia is confirmed. (See "Vasectomy".)

- **Risk of ectopic pregnancy** – Female permanent contraception methods and intrauterine devices (IUD) are associated with an increased risk of ectopic pregnancy in the rare cases when the method fails. In the United States Collaborative Review of Sterilization (CREST), a landmark study of outcomes following female permanent contraception procedures, approximately 1 in 3 pregnancies that occurred in the setting of female permanent contraception was ectopic [8,20]. This rate is similar to the rate of ectopic pregnancy in users of the levonorgestrel IUDs but greater than the rate in TCu380A copper IUD users (see "Intrauterine contraception: Management of side effects and complications", section on 'Pregnancy'). There are no data on ectopic pregnancy risk associated with bilateral salpingectomy for female permanent contraception, though this risk should theoretically be zero if the fallopian tubes are completely removed. (See "Female interval permanent contraception: Procedures", section on 'Ectopic pregnancy'.)

- **Timing and surgical planning** – Providers must offer an alternative form of contraception until surgery is performed. Unplanned pregnancies can occur while the patient waits for her operation. (See 'Timing and surgical approach' below and 'Postpartum permanent contraception' below.)

- **Surgical and anesthetic risks** – (See "Female interval permanent contraception: Procedures", section on 'Complications' and "Postpartum permanent contraception: Procedures", section on 'Complications'.)

- **Lack of prevention from sexually transmitted infections (STIs)** – Permanent contraception does not prevent the transmission of STIs. (See "Prevention of sexually transmitted infections", section on 'Male condom use'.)

Special considerations when counseling patients with mental illness or disability are discussed below. (See 'Vulnerable populations' below.)

Regret after permanent contraception procedures — Most patients are satisfied with their decision to undergo a permanent contraception procedure, but some patients experience regret. Rates of regret after permanent contraception vary widely among studies, ranging from 2 to 26 percent [15,21].

It is unclear the extent to which the available data on rates of permanent contraception regret represent true differences as there are significant regional, population, and methodologic differences across studies, including how regret was ascertained or measured, time since permanent contraception, and whether incidence or prevalence in a population was measured. In surveys, higher rates of regret appear more common in the United States than in Europe and in resource-limited countries. Despite variations in expressed regret, rates of request for reversal appear consistent, with most studies reporting rates between 1 and 4 percent [22].

If a provider has any concern about the patient's understanding of the permanence of the procedure, the risk of regret, or is concerned that the patient is not making the decision independently or is being coerced, additional measures such as a social worker referral may be appropriate. Each individual provider must ensure that, in counseling patients with any of the risk factors below, the patient demonstrates understanding of how these issues might change over time and potentially impact future desire for permanent contraception.

Risk factors for regret — Much of the following data regarding regret were derived from the CREST study [15]. However, a subsequent study has challenged some of these findings, as detailed below [23].

- **Young age** – Studies have shown young age at the time of a permanent contraception procedure to be a strong predictor for regret, seeking information about permanent contraception reversal, obtaining a reversal, or undergoing a post-permanent contraception IVF procedure [24]. Studies that included very young females (eg, ages 18 to 24) showed the highest risk of regret and/or request for reversal in this age group [25]. The risk of regret appears to decrease incrementally with increasing age [26,27].

  Young age as a predictor of regret is consistent across a large number of studies [22,24], with the CREST study demonstrating a 14-year cumulative risk of regret among females ages ≤30 and >30 years of 20.3 and 5.9 percent, respectively [15]. In addition, those ages ≤30 were 7.6 times more likely (95% CI 3.2-18.3) to undergo tubal reversal than those sterilized at an age >30.

  A subsequent retrospective study using data from 2015 to 2019 and including 1549 patients who underwent permanent contraception (median age 29 years) challenges the finding of age at time of permanent contraception as a risk factor for regret. In this study

the cumulative rate of regret was 10.2 percent. In unadjusted analysis, those undergoing the procedure between the ages of 21 and 30 compared with >30 years experienced higher rates of regret (12.6 versus 6.7 percent) [23]. However, after controlling for age at the time of the study, age at time of permanent contraception was no longer statistically significant. In multivariate analysis, the only remaining predictor of regret was current age, with regret being inversely related to time since procedure. For example, for patients >30 years, the rate of regret at 0 to 5 compared with 11 to 15 years after the permanent contraception procedure was 9 versus 3 percent; similarly, for patients 21 to 30 years, the rate of regret at 0 to 5 compared with 11 to 15 years after the permanent contraception procedure was 16 versus 13 percent.

- **Black race** – In the CREST study, Black females who were ≤30 years at the time of the permanent contraception procedure had among the highest cumulative rates of regret (29.5 percent) over the 14-year study period [15]. In the subsequent retrospective study including 1549 patients mentioned above, there was a trend toward increased rates of regret in Black patients compared with White patients (18.8 versus 8.6 percent); however, this was not statistically significant [23]. The authors note that the relationship between race and regret continues to deserve further study, as Black populations have historically experienced reproductive coercion as well as poor access to and denial of sterilization procedures.

- **Single marital status** – Being unmarried at the time of a permanent contraception procedure was found to have an adjusted RR of 1.3 (95% CI 1.1-1.6) in CREST [15]. Young females ages 18 to 30 were also more likely to cite divorce or remarriage as a reason for regret than those older than 30 (23.9 versus 8.0 percent). Being unmarried or remarried is also associated with seeking reversal [21,26,28]. It is also important to note that, as marital patterns and the social value of marriage change with time, the impact of marriage versus non-marriage, as it was defined in the CREST data, might be a less valuable risk factor than some other assessment of relationship stability.

- **Delay after childbearing** – For those having an interval permanent contraception procedure, in the CREST data, regret appeared to decrease as time increased between the birth of the youngest child and the procedure [15]. Patients who had an interval permanent contraception procedure two to three years after the birth of their youngest child had an adjusted RR of 1.4 (95% CI 1.1-1.8) as compared with those having it at eight years or more, or with no previous births.

  Patients who undergo an immediate postpartum permanent contraception procedure have an increased risk of regret. This is discussed in detail below. (See 'Postpartum

permanent contraception' below.)

Factors not associated with regret

- **Parity** – Most studies have found that parity, including nulliparity, is not a significant risk factor for regret or request for reversal when age is controlled [21,23,28]. In the CREST five-year follow-up data, there were no differences in regret by the number of living children, and, in fact, the cumulative probability of regret at 14 years was lowest among individuals with no previous births [15,29].

  While providers may feel some discomfort about permanent contraception for nulliparous patients, there is strong evidence that these patients do not experience greater regret, and we feel that it is not appropriate to withhold permanent contraception or counsel nulliparous patients any differently.

- **Postabortion permanent contraception** – Postabortion permanent contraception was found not to be associated with risk of regret in the CREST data (odds ratio [OR] 1.2, 95% CI 0.7-2.1) or in several other studies from the United States and Europe [21].

Factors that have been inconsistently associated with regret include low socioeconomic status, low educational attainment, low labor force activity, and living in a rural area. In many studies, these risk factors were no longer significant when age at permanent contraception was taken into account [21].

Permanent contraception reversal — Despite relatively high rates of regret, the number of patients who actually undergo a reversal procedure or IVF remains quite low. This may not be a good measure of regret because there are many barriers to obtaining a tubal reversal or IVF, including limited availability, need to undergo an invasive procedure, and expense. In CREST, the likelihood of obtaining reversal for females ≤30 and >30 years of age at the time of permanent contraception was 2.1 and 0.2 percent, respectively [25]. (See "Reproductive surgery for female infertility", section on 'Tubal reanastomosis'.)

Potential noncontraceptive effects — Permanent contraception has been associated with the following:

- **Postablation tubal sterilization syndrome** – Patients who have had permanent contraception and subsequently undergo endometrial ablation can experience cyclic or intermittent pelvic pain, which is referred to as postablation tubal sterilization syndrome. This is discussed in detail separately. (See "Overview of endometrial ablation", section on 'Permanent contraception'.)

- **Increased rates of hysterectomy** – Patients with permanent contraception have higher rates of hysterectomy. Most experts agree that biologic factors do not explain this association and suggest that these individuals may be more likely to seek surgery for treatment of later gynecologic disorders [30]. Within five years following permanent contraception, individuals in CREST and in a large Kaiser Permanente cohort had a higher likelihood of undergoing hysterectomy compared with those whose partners had a vasectomy or were not sterilized. The risk of hysterectomy in CREST was not associated with the type of technique used for permanent contraception, age at permanent contraception, history of prior pelvic surgery, or other gynecologic conditions [31]. Among individuals in the Kaiser cohort, there was a suggestion of increased risk of pelvic pain and menstrual complaints following tubal ligation; however, higher risk of hysterectomy was not associated with occlusion methods that destroyed more tissue, creating an argument against a biologic effect of the permanent contraception procedure [32].

- **Possible decreased rates of endometrial cancer** – Patients with permanent contraception may have a decreased risk of developing endometrial cancer. In a meta-analysis of eight cohort and case-controlled studies, tubal ligation was associated with lower rates of endometrial cancer (pooled unadjusted OR 0.58, 95% CI 0.42-0.79) [33]. However, there was huge heterogeneity across the studies, and confounding appeared to contribute substantially to the observed effect.

  When endometrial cancer does occur, patients who have had a tubal ligation appear to be diagnosed at a lower stage and have a lower risk of metastatic disease [34]. The mechanism for this protective effect is unknown; one hypothesis is that endometrial cells are unable to pass through the obstructed tube and enter the peritoneal cavity.

There is little or no association between permanent contraception and the following:

- **Menstrual function** – Significant adverse effects, including dysmenorrhea, cycle irregularity, and heavy uterine bleeding, have not been demonstrated in multiple studies. In CREST, female permanent contraception was associated with a modest decrease in the volume of flow and duration of menstrual bleeding, and less menstrual pain; however, there was an increase in cycle irregularity [30]. In a cross-sectional study, permanent contraception appeared to be associated with an increase in menstrual flow, but the effect was limited only to those with a prior cesarean birth [35].

- **Ovarian reserve** – There is no strong evidence that patients undergoing permanent contraception will experience earlier onset of menopause. Studies of hormone levels and ovarian reserve have demonstrated no significant changes or inconsistent effects after

permanent contraception. In a cross-sectional study comparing follicle-stimulating hormone, luteinizing hormone, and estradiol levels in the early follicular phase, no statistically significant difference was found between patients with and without a history of prior tubal ligation [35]. Studies specifically evaluating ovarian reserve following tubal ligation by electrocoagulation found no changes in hormone levels at 3 months after the procedure [36,37] or at 10 months; although a decrease in antral follicle count and ovarian volume has been observed, no corresponding changes in serum hormone levels were noted [38].

- **Sexual function** – Sexual function appears unchanged or improved after female permanent contraception compared with those not undergoing such procedures. Post-permanent contraception regret is the only factor that appears to be a predictor of decreased sexual interest and pleasure [39,40].

- **Breast cancer** – There does not appear to be an association between tubal permanent contraception and breast cancer risk. (See "Factors that modify breast cancer risk in women", section on 'Tubal ligation'.)

TIMING AND SURGICAL APPROACH

The decisions regarding timing (interval, postpartum, postabortion) and surgical approach are made based on patient preference, recent pregnancy, surgical history, and medical comorbidities.

Interval permanent contraception procedure — Interval permanent contraception is any permanent contraception procedure performed outside of the postpartum period.

Interval tubal permanent contraception can be accomplished by several surgical approaches; however, laparoscopic methods are used most commonly in the United States and other resource-rich countries. This is due in part to the availability and maintenance of laparoscopic equipment [41]. Options for a surgical approach for interval permanent contraception are outlined here, but the details about the procedures are discussed separately. (See "Female interval permanent contraception: Procedures".)

- **Laparoscopy** – Laparoscopy is the most common surgical approach. Laparoscopic methods typically include the placement of clips or rings on the tubes, electrosurgery, or salpingectomy. (See "Female interval permanent contraception: Procedures", section on 'Tubal occlusion techniques'.)

- **Mini-laparotomy** – This approach is often used in resource-limited countries.
- A **vaginal approach** with colpotomy or culdoscopy is rarely used [42].
- **Hysteroscopy** – No methods of hysteroscopic permanent contraception are currently available. (See "Hysteroscopic female permanent contraception", section on 'Device types'.)
- In some settings, **hysterectomy** has been used for permanent contraception. If, after evaluation, there are indications for hysterectomy, such as abnormal bleeding, pelvic pain, or pelvic organ prolapse, some patients might find permanent contraception to be a secondary benefit of hysterectomy. However, we do not believe that permanent contraception alone is a sufficient indication for hysterectomy with its greater risk and cost.

Postpartum permanent contraception — Patients who express a desire for permanent contraception during their pregnancy may be candidates for either a postpartum permanent contraception or an interval procedure. While there may be small statistical differences in efficacy and safety between postpartum and interval permanent contraception, the clinical relevance of these differences is negligible.

In the United States, it is estimated that over 50 percent of permanent contraception procedures performed each year are in the postpartum period [5]. Most postpartum permanent contraception procedures are performed via laparotomy, either through the laparotomy incision at the time of cesarean birth or via mini-laparotomy following vaginal delivery. (See "Postpartum permanent contraception: Procedures".)

- **Benefits** – For pregnant patients who are certain that they desire permanent contraception, every effort should be made to provide in-hospital postpartum permanent contraception. The advantages of immediate postpartum permanent contraception include:
  - Patient convenience.
  - Lack of need for postpartum contraception. If postpartum permanent contraception is not provided in the hospital, an alternative form of contraception must be offered. Contraception should be started upon discharge since waiting until the first postpartum visit can result in an unintended pregnancy. (See "Postpartum contraception: Counseling and methods".)
  - Avoidance of unintended pregnancy. The risks of unplanned and undesired pregnancy must be strongly considered if postpartum permanent contraception is deferred.

Studies show that approximately 50 to 60 percent of postpartum permanent contraception requests go unfulfilled [43-49], which, in one study, resulted in a pregnancy rate of 47 percent within one year [50]. Some of these pregnancies could be high risk, thus exposing the patient to risks that could have been avoided by prompt postpartum permanent contraception.

- **Barriers** – Barriers to obtaining a postpartum tubal ligation include:
  - Obstetric complications (eg, postpartum hemorrhage, preeclampsia), neonatal concerns, and logistical issues (eg, lack of availability of operating room or anesthesia). If it cannot occur at the time of delivery, the operation can often be done before the mother is discharged.
  - Clinician biases resulting in disparities in health care [43-49,51]. Patients with unfulfilled postpartum permanent contraception requests are more likely to be younger, African American, obese, have high-risk pregnancies, have delivered vaginally, or requested permanent contraception later in pregnancy.
  - The Medicaid consent form. Several studies have shown that a significant proportion of unfulfilled postpartum permanent contraception requests are due to instances in which the federal requirements have not been met [43-49,51,52]. As discussed above, in the United States, for patients covered by Medicaid, the federal sterilization consent form must be correctly signed and dated between 30 and 180 days prior to the procedure and be available at the time of the procedure (see 'United States regulatory issues' above). In a single-institution study, only 52 percent of patients received their requested postpartum permanent contraception procedure, and of those with unfulfilled requests, almost one-half (44 percent) were unfulfilled due to lack of valid federally mandated consent [51].
- **Counseling and consent** – The general principles regarding counseling a pregnant patient for permanent contraception are similar to counseling a nonpregnant patient and are described above (see 'Counseling and informed consent' above). Specific issues in pregnancy include:
  - Counseling about the permanence of this procedure needs to occur during prenatal visits, not just at the time of delivery.
    - The decision then needs to be reaffirmed before operating, typically at the time of surgical consent.

- Despite previous expressed desire for permanent contraception, factors that may alter the patient's certainty for permanent contraception at the time of delivery may include preterm delivery, other pregnancy complications that may affect the health of the neonate, or changes in socioeconomic or relationship status.

- For those who have federally funded health insurance, the federal permanent contraception consent form must be reviewed, signed, and dated prior to the permanent contraception procedure; therefore, the discussion should not be deferred to the end of pregnancy. (See 'United States regulatory issues' above.)

- Patients who undergo postpartum permanent contraception have an increased risk of permanent contraception regret and are more likely to experience regret than those undergoing interval permanent contraception or those who have had no previous births [15,21]. (See 'Regret after permanent contraception procedures' above.)

  Compared with patients with no previous births or those undergoing permanent contraception at least eight years after the birth of their youngest child, those who underwent postpartum permanent contraception had risk ratios of 1.6 (95% CI 1.2-2.1) after vaginal birth and 2.0 (95% CI 1.5-2.8) after cesarean birth. High cumulative risks of regret were seen when young patients underwent postpartum permanent contraception, with cumulative rates of regret of 20.3 percent after cesarean and 23.7 percent after vaginal birth [15].

Postabortion permanent contraception — Postabortion permanent contraception is typically performed via laparoscopy immediately following uterine evacuation and is a safe and effective method of postabortion contraception [53]. However, given that most abortions are performed in the outpatient setting, other forms of contraception, such as long-acting reversible contraception or the oral contraceptive pill, are used more frequently. (See "Contraception: Postabortion", section on 'Contraceptive options'.)

PREOPERATIVE EVALUATION

The preoperative evaluation and preparation for female permanent contraception may vary by procedure. This section includes issues that apply to all patients planning permanent contraception.

General principles of preoperative evaluation and preparation for gynecologic surgery are discussed in detail separately. (See "Overview of preoperative evaluation and preparation for gynecologic surgery".)

Assessing surgical risk — The clinician should review the patient's medical history to assess appropriateness for permanent contraception and potential preference for the type of procedure. Factors that may make permanent contraception via laparoscopy or mini-laparotomy more difficult or increase surgical or anesthetic risks include:

- **Severe obesity**.
- **Risk factors for intraabdominal adhesions** – These include prior abdominal surgery, history of prior pelvic inflammatory disease or other intraabdominal infection, history of a ruptured appendix, and endometriosis.
- **Significant medical comorbidity** – Medical consultation should be obtained for patients with any significant comorbidity, such as cardiac, pulmonary, renal, or neurologic dysfunction, which could worsen with surgery or anesthesia.

While none of these factors are absolute contraindications to permanent contraception, patients with significant surgical or anesthetic risk may be advised to consider partner vasectomy or long-acting reversible contraception. (See "Contraception: Counseling and selection" and "Intrauterine contraception: Candidates and device selection" and "Etonogestrel contraceptive implant" and "Vasectomy".)

Pregnancy testing — When planning interval permanent contraception, the provider should take precautions to ensure that the patient is not pregnant at the time of permanent contraception (table 2).

For patients who are not having an immediate postpartum or postabortion procedure, preoperative use of another form of reliable contraception is generally recommended to ensure they are not pregnant at the time of permanent contraception. Even if a person is not interested in using another method in the long term, many will be willing to use another method in the short term to aid in procedural planning.

If pregnancy cannot be excluded by history, a urine or serum human chorionic gonadotropin test is helpful. Pregnancy testing should be performed on the day of the procedure. However, there is still a small risk (0.23 to 1.70) of luteal phase pregnancy if the procedure is performed after the estimated date of ovulation [22,54-56]; patients should be counseled about this risk.

SPECIAL CLINICAL ISSUES

Vulnerable populations — Decisions regarding permanent contraception among patients with mental illness or disability may pose an additional set of challenges. The American College of

Obstetricians and Gynecologists provides guidance for providers on how to deal with these situations [7]. Clinicians must remember that their ethical duty is to do no harm and be aware of both the potential for coercion of vulnerable patients as well as the inappropriateness of blanket denials for permanent contraception because of disabilities. Clinicians must also be aware that there are differing federal, state, and local laws that pertain to permanent contraception in individuals with limited decision-making capacity. For example, federal funds may not be used for permanent contraception of those deemed "mentally incompetent" or institutionalized.

Clinicians must try to ascertain patients' own desires and wishes regarding childbearing as well as their capacity for decision making. In situations of chronic mental illness in which decision-making capacity may be variable over time, the clinician should do their best to evaluate such patients at a time when their mental state and medications are optimized. When appropriate, the clinician should also seek counsel from the patient's family and caregivers. Standards for legal competence are complex, and requirements for court approval are variable as well. Clinicians must be aware of local laws and regulations. We recommend that clinicians seek ethical and legal counsel in any situation in which there is not complete agreement between the patient, caregivers, and provider; in any guardianship arrangement; or in any situation in which the patient is not able to be involved in the consent process. (See "Assessment of decision-making capacity in adults".)

Ovarian cancer prevention — Complete salpingectomy has been proposed as a strategy to reduce the risk of ovarian, tubal, and peritoneal cancers. This is based on increasing evidence that some ovarian cancers are actually primary fallopian tube malignancies. This has led to the proposal to prophylactically remove fallopian tubes in patients who are otherwise undergoing tubal ligation or hysterectomy. This option is discussed in detail separately. (See "Opportunistic salpingectomy for ovarian, fallopian tube, and peritoneal carcinoma risk reduction" and "Female interval permanent contraception: Procedures", section on 'Salpingectomy'.)

PROCEDURE TECHNIQUES

- (See "Female interval permanent contraception: Procedures".)
- (See "Postpartum permanent contraception: Procedures".)
- (See "Hysteroscopic female permanent contraception".)
- (See "Contraception: Counseling and selection".)

SOCIETY GUIDELINE LINKS

Links to society and government-sponsored guidelines from selected countries and regions around the world are provided separately. (See "Society guideline links: Contraception".)

INFORMATION FOR PATIENTS

UpToDate offers two types of patient education materials, "The Basics" and "Beyond the Basics." The Basics patient education pieces are written in plain language, at the 5th to 6th grade reading level, and they answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials. Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are written at the 10th to 12th grade reading level and are best for patients who want in-depth information and are comfortable with some medical jargon.

Here are the patient education articles that are relevant to this topic. We encourage you to print or e-mail these topics to your patients. (You can also locate patient education articles on a variety of subjects by searching on "patient info" and the keyword(s) of interest.)

- Basics topic (see "Patient education: Permanent birth control for women (The Basics)")
- Beyond the Basics topic (see "Patient education: Permanent birth control for women (Beyond the Basics)")

SUMMARY AND RECOMMENDATIONS

- **Epidemiology** – Female permanent contraception (also referred to as sterilization or tubal ligation) can be performed using several different procedures and techniques. It is the most common method of contraception worldwide, used by 24 percent of all contraceptive users. (See 'Introduction' above and 'Epidemiology' above.)
- **Counseling** – Patients considering permanent contraception should also be counseled about long-acting reversible contraception (LARC) and vasectomy. Efficacy rates of LARC and vasectomy are comparable to female permanent contraception (table 1). (See 'Counseling and informed consent' above.)

- In general, LARC is likely to be chosen by patients who have not completely ruled out the possibility of a future pregnancy, prefer a minor office procedure, do not mind having the procedure repeated once the device expires, and/or who have heavy uterine bleeding and may benefit from progestin therapy.

- Vasectomy appears to be the safest method of permanent contraception.

- Counseling and informed consent for female permanent contraception should include a detailed discussion of efficacy, the permanent nature of the procedure, risk of regret, limited options for reversal, risk of complications, and the risk of ectopic pregnancy if method failure occurs. (See 'Counseling' above.)

- **Regret** – Risk factors for regret following permanent contraception from early studies include young age, Black race, marital status (unmarried), postpartum timing for permanent contraception, and insurance status. A more recent review suggests that the only significant factor for regret is current age, and that regret decreases over time since the procedure. Parity and postabortion timing of permanent contraception are not associated with regret. (See 'Regret after permanent contraception procedures' above.)

- **Potential noncontraceptive effects** – Permanent contraception has been associated with postablation tubal sterilization syndrome, increased rates of hysterectomy, and decreased rates of endometrial cancer. There is little or no association between permanent contraception and menstrual symptoms, including dysmenorrhea or heavy uterine bleeding. There appears to be no impact on sexual function, ovarian reserve, or incidence of breast cancer. (See 'Potential noncontraceptive effects' above.)

- **Postpartum procedure** – Pregnant patients who express a desire for permanent contraception prenatally may be candidates for immediate postpartum permanent contraception. A postpartum procedure is usually safe, convenient, and avoids an unplanned pregnancy if the procedure is deferred. (See 'Postpartum permanent contraception' above.)

- **Pregnancy testing** – Prior to interval permanent contraception, an existing pregnancy should be excluded. (See 'Pregnancy testing' above.)

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GRAPHICS

Sterilization failure rates compared with long-acting reversible contraceptives

Contraceptive method	Pregnancies per 1000 procedures (follow-up interval in years)		
	1 to 2 years	3 to 5 years	7 to 12 years
Female permanent contraception			
Postpartum permanent contraception			
Postpartum partial salpingectomy	1.2 (1)	6.3 (5)	7.5 (10)
Postpartum titanium clips (Filshie clips)	17 (2)	–	–
Interval permanent contraception			
Interval partial salpingectomy	7.3 (1)	15.1 (5)	20.1 (10)
Interval titanium clips (Filshie clips)	4 (2)	–	–
Silicone rubber band (Falope ring)	3 (1 to 2)	10 (5)	17.7 (10)
Electrosurgery*	–	3.2* (5)	–
Hysteroscopic permanent sterilization(Essure)	–	2.5 (5)	–
Vasectomy	1.5 (1)	–	–
Long-acting reversible contraception			
IUDs			
LNG 52/5 (Mirena)¶	2 (1)	7 (5)	11 (7)
LNG 52/3 (Liletta)Δ	1.4 (1)	5.9 (3) / 9.2 (5)	–
LNG 19.5/5 (Kyleena)◇			
LNG 13.5/3 (Skyla)§	4.1 (1)	9 (3)	–
TCu380A copper IUD (ParaGard)	8 (1)	–	14 (7); 22 (12)
Etonogestrel implant	0.5 (1)	–	–

(Nexplanon)			

LNG: levonorgestrel; IUD: intrauterine device.

* With three contiguous sites of fulguration along the fallopian tube (a total length of fulguration of approximately 3 cm).

¶ LNG-releasing IUD containing 52 mg LNG at initial placement and with an initial LNG release rate of 20 mcg/day for 5 years (Mirena).

Δ LNG-releasing IUD containing 52 mg LNG at initial placement and with an initial LNG release rate of 18.6 mcg/day for 3 years (Liletta).

◇ LNG-releasing IUD containing 19.5 mg LNG at initial placement and with an initial LNG release rate of 17.5 mcg/day, which declines to 7.4 mcg/day at 5 years (Kyleena).

§ LNG-releasing IUD containing 13.5 mg LNG at initial placement and with an initial LNG release rate of 14 mcg/day for 3 years (Skyla).

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Checklist used to assess the possibility of pregnancy

The provider can be reasonably certain that the patient is not pregnant if the patient has no symptoms or signs of pregnancy and meets ANY of the following criteria:
☐ The patient has not had intercourse since last normal menses.
☐ The patient has been correctly and consistently using a reliable method of contraception.
☐ The patient is within 7 days from the first day of menstrual bleeding.
☐ The patient is within 4 weeks postpartum (for nonlactating patients).
☐ The patient is within the first 7 days postabortion or miscarriage.
☐ The patient is fully or nearly fully breastfeeding, amenorrheic, and less than 6 months postpartum.

A systematic review of studies evaluating the performance of a pregnancy checklist compared with urine pregnancy test to rule out pregnancy concluded the negative predictive value of a checklist similar to the one above was 99 to 100%.

Data from:

1. *Tepper NK, Marchbanks PA, Curtis KM. Use of a checklist to rule out pregnancy: A systematic review. Contraception 2013; 87:661.*
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