Sterilization
A Review and Update

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KEYWORDS

• Sterilization • Tubal • Female • Male • Laparoscopy • Hysteroscopy
• Postpartum • Interval

KEY POINTS

- Sterilization is one of the most frequently used methods of contraception in the United States and worldwide, with a female-to-male sterilization ratio of 3 to 1.
- Female sterilization can be performed using an abdominal approach or via laparoscopy or hysteroscopy.
- The cumulative 10-year failure rate for all methods is 18.5 per 1000 procedures; postpartum partial salpingectomy has the lowest 10-year failure rate and bipolar coagulation the highest.
- Sterilization should be considered a permanent form of contraception. Long-acting reversible methods of contraception, such as the intrauterine device and the implant, are as effective as permanent sterilization, but reversible.
- Vasectomy is a safe and highly effective method of sterilization.

INTRODUCTION

Sterilization is one of the most frequently used methods of contraception worldwide. The recent National Survey of Family Growth reveals that among women aged 15 to 44 years in the United States, 15.5% rely on female and 5.1% rely on male sterilization.[1] Use of sterilization varies by age and race/ethnicity. Among women aged 35 to 44 years, nearly one in three rely on female sterilization, compared with less than 1% of women age 15 to 24 years. Of non-Hispanic black women, 21.3% rely on female sterilization, compared with 18.8% of Hispanic women, and 14.0% of non-Hispanic white women. The latest National Survey of Family Growth also found that the use of female sterilization declines with greater educational attainment.

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Since 1995, a decline in rates of female sterilization has been noted.[2] This is hypothesized to be a result of demographic, economic, social, and cultural factors, such as delayed childbirth and improved access to and use of long-acting reversible contraceptive methods.[2] Despite the decline, female tubal sterilization is one of the most commonly performed gynecologic surgeries, after cesarean section and abortion.[3]

Female sterilization can be performed using an abdominal approach or via laparoscopy or hysteroscopy. Sterilization approach will vary based on timing. It can be performed immediately postpartum, or as an interval procedure, unrelated to a pregnancy. Approximately 50% of female sterilizations are performed immediately postpartum. Sterilization follows 8% to 9% of live births, most often at the time of cesarean delivery.[2] Since 1995 and the adoption of laparoscopy, interval sterilizations have become more common and have shifted the procedure from the inpatient to the ambulatory setting.[4] Because of the ease of sterilization in the ambulatory setting, there has been a dramatic increase in the number of interval procedures performed in the United States, from a rate of 0.4 sterilizations per 1000 unsterilized women in 1980 to a rate of 6.4 sterilizations per 1000 unsterilized women at its peak in 1996.[2] The choice and time of sterilization are affected by individual patient preference, medical assessment of acute risk, access to services, and insurance coverage. Current methods of female sterilization include mechanical occlusion of the fallopian tubes, coagulation, and tubal excision.

Much of what is known about sterilization risks, failure rates, and regret comes from the US Collaborative Review of Sterilization (CREST) Study. This was a large prospective cohort study in US academic medical centers that enrolled over 12,000 women who underwent sterilization and then followed the women for more than 10 years. In the CREST study, the cumulative 10-year failure rate for all methods was 18.5 failures per 1000 procedures.[5] Failure rates for each specific sterilization method can be found in Table 1.

FEMALE STERILIZATION: LAPAROSCOPY

Laparoscopic sterilization has a number of advantages and disadvantages (Table 2). It is typically performed as an ambulatory surgery, with women going home a few hours

Table 1
Sterilization failure rate by type of procedure performed; ectopic pregnancy risk

Method	Failures, Year 1 Per 1000 Procedures	Failures, Year 10 Per 1000 Procedures	Ectopic Pregnancies, Year 10 Per 1000 Procedures
Bipolar	2.3	24.8	17.1
Monopolar	0.7	7.5	1.8
Silastic rings	5.9	17.7	7.3
Hulka clips	18.2	36.5	8.5
Postpartum partial salpingectomy	0.6	7.5	1.5
All methods	5.5	18.5	7.3

Data from Peterson HB, Xia Z, Hughes JM, et al. The risk of pregnancy after tubal sterilization: findings from the U.S. Collaborative Review of Sterilization. Am J Obstet Gynecol 1996;174:1161–8; and Peterson HB, Xia Z, Hughes JM, et al. The risk for ectopic pregnancy after tubal sterilization. N Engl J Med 1997;336:762–7.