Review of Female Sterilization

OB/GYN Grand Rounds
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Objectives

- Compare and contrast methods of tubal ligation and occlusion
- Review risks of sterilization
- Review benefits of sterilization
Overview

- Approximately 600,000 tubal occlusions performed in the United States annually
- Of the 38.4 million women aged 15–44 years surveyed who use contraception, sterilization is the most common (30.2% of married couples use tubal occlusion, 17.1% vasectomy)
- More than ½ of all tubal occlusions are performed in the early postpartum period (8–9% of all hospital deliveries)
- Tubal ligation can be performed postpartum, postabortion, or as an interval procedure.
Various obstacles prevent as many as 50% of women from getting the postpartum tubal ligation they desire (young age, lack of available ORs and anesthesia, hospital policy, insurance requirements, federal and state laws and regulations, intrapartum or postpartum maternal or neonatal complications)

Consequently, as high as 46.7% of women who requested PPTL during their PNC and did not receive it will have an unintended pregnancy within 1 year of delivery.
History of tubal ligation

- 1842: First proposed by James Blundell
- 1880: First tubal sterilization performed by Samuel Smith Lungren of Toledo, OH after a C/S
- 1895: Duhrssen performed first tubal ligation via colpotomy with a double ligature
- 1910s–1960s: Multiple methods of tubal ligation described
- 1937: Laparoscopy for tubal ligation first proposed, first described in 1941 and gained popularity in the 1970s
- 1961: Minilaparotomy for interval sterilization first described by Uchida
- 1972: US federal courts removed legal restrictions for tubal ligations performed without medical necessity
- Early 1970s: Jaroslav Hulka developed spring clip for laparoscopic application and Yoon developed Falope ring
- 1981: Filshie titanium and silicone clip developed (approved in the US in 1997)
- 2002: Essure approved by FDA
ampullary

interstitial

isthmic

infundibular

fimbrial
Methods of Tubal Ligation and Occlusion

- Colpotomy
- Postpartum Minilaparotomy
- Laparoscopy (Electrocautery)
- Laparoscopy (Tubal Devices)
- Transcervical/Hysteroscopy
Colpotomy (1895)

Posterior vaginal fornix excised to enter peritoneal cavity

Segment of tube to be removed delivered through posterior vaginal incision

Tube double-ligand

Segment (dome) excised
Madlener (1919)
Irving (1924)
Kroner (1935)
Proximal portion of tube placed on opposite side of round ligament

Ligation of tube

End of proximal tube sutured to uterus

Round ligament

Tube divided
Parkland (1960s)
<table>
<thead>
<tr>
<th>Technique</th>
<th>Popularity*</th>
<th>Tubal Destruction</th>
<th>Failure and/or Pregnancy Rate</th>
<th>Reversal Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uchida</td>
<td>1+</td>
<td>50%</td>
<td>Rare</td>
<td>Very poor</td>
</tr>
<tr>
<td>Fimbriectomy</td>
<td>1–2+</td>
<td>40%</td>
<td></td>
<td>Poor</td>
</tr>
<tr>
<td>Irving</td>
<td>1+</td>
<td>30%</td>
<td></td>
<td>Poor</td>
</tr>
<tr>
<td>Pomeroy</td>
<td>5+</td>
<td>3–4 cm</td>
<td>2–4:1000 women</td>
<td>Good</td>
</tr>
<tr>
<td>Aldridge</td>
<td>Rarely done</td>
<td>None</td>
<td>Significant</td>
<td>Excellent</td>
</tr>
</tbody>
</table>

*Arbitrary scale of 1 (least popular procedure) to 5 (most common procedure).
Electrocautery
Hulka Spring Clip

Hulka 1972
Fallope Ring (1974)

- Fallope ring applicator
- Grasping prongs
- Knuckle of tube drawn into tube applicator while band is advanced over it
- Band in place on knuckle of fallopian tube
Filshie Clip (1981)
(approved 1996)
Essure (2002)

- Essure is a 4 cm microinsert composed of stainless steel inner coil encased in polyester fibers with a Nitinol (Nickel and Titanium) outer coil.
- Works by causing an inflammatory reaction with fibroplastic proliferation within the polyester fibers.
- Has equal if not superior efficacy to laparoscopy in minilaparotomy techniques of tubal occlusion.
Advantages
- No entry into peritoneal cavity
- No general anesthesia
- Low risk
- Low cost
- Low resource recruitment
- Good for obese pts or pts with adhesive disease

Disadvantages
- Need to use alternative contraceptive for 3 months until confirmatory HSG (3.5% patency at 3 months, 0% at 6 months in trial population)
- Not to be done postabortive or postpartum period
- Decreased success in pts with h/o STIs
- Complications:
  - Tubal perforation (1%–3%)
  - Improper coil placement (0.5%–3%)
  - Expulsion (0.4%–2.2%)
  - Vasovagal syncope
Of 50,000 women, 64 unintended pregnancies

No unintended pregnancies in trial in patients with confirmatory HSG

Successful placement in initial trial 90%, subsequent trial 96.9%

Depending on pt population, 13%–71.1% will get HSG required by FDA at 3 months
Factors to Consider for Selecting Tubal Occlusion Method

- Patient’s medical health
- Tolerance to office procedures
- Ability to adhere to f/u testing
- Safety of abdominal surgery and general anesthesia
- Health insurance limitations
Risks of Female Sterilization

Failure
Regret
Ectopic Pregnancy
U.S. Collaborative Review of Sterilization

Prospective multicenter observational study of 10,685 women conducted in 1996 by CDC

Conclusion of review found that the failure rate of laparoscopic and minilaparotomy approaches was higher than previously reported

5 year cumulative failure rate of 13/1000 (previous trials report copper IUD 14/1000, Mirena 5–11/1000)

*5 year failure rate for Essure: 1.64
Reasons for failure:
- Surgical error (30–50%)
- Tubal fistula (more common with electrocautery especially prior to routine use of amp meter)
- Spontaneous reanastomosis
- Luteal phase pregnancy
- Equipment failure (defective electrical current, faulty clips)
- Electrocautery failures due to not allowing desiccation to reach endosalpinx
- Separation of tubal segments did not occur with ring devices and fistula formed

Failures after 1 year are unlikely due to technical error
Women who have completed childbearing are candidates for female sterilization.

Women at risk for regret:
- Young age (<30)
- Unstable relationship
- Low parity
- Less information about the procedure
- Less access to information or support for use of alternative contraceptive method
- Decision made under pressure from a spouse
- Decision made because of medical indication
Regret

- Based on prospective analysis of CREST study data, cumulative probability of regret over 14 years was 12.7% (20.3% for women <30, 5.9% for women >30)
- Women <30 are 3.5–18 times more likely to request information about reversal (40.4% over 14 years for women age 18–24) and 8 times more likely to undergo reversal or evaluation for IVF
- Cumulative probability of regret decreases as the interval between delivery and sterilization increases
- Number of living children not associated with a request for reversal information
- Postabortion sterilization not associated with increased regret when compared to interval sterilization
Ectopic Pregnancy

- Women who have undergone sterilization procedures have a lower ectopic risk than noncontraceptive users.
- There is a substantial risk that any post-sterilization pregnancy will be ectopic (~1/3).
- 10 year cumulative probability of 7.3/1000 procedures.
- Greater probability for women <30 (except for PPTL).
- Risk does not diminish with increased time interval from procedure.
Life-table cumulative probability of ectopic pregnancy among women who had undergone tubal sterilization, according to time since sterilization. US Collaborative Review of Sterilization

<table>
<thead>
<tr>
<th>Method</th>
<th>Years since sterilization</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Bipolar coagulation</td>
<td>0.5 (0.0–1.3)</td>
</tr>
<tr>
<td>Unipolar coagulation</td>
<td>0.0</td>
</tr>
<tr>
<td>Silicone rubber band application</td>
<td>0.6 (0.0–1.5)</td>
</tr>
<tr>
<td>Spring clip application</td>
<td>1.3 (0.0–3.1)</td>
</tr>
<tr>
<td>Interval partial salpingectomy</td>
<td>4.9 (0.0–11.6)</td>
</tr>
<tr>
<td>Postpartum partial salpingectomy</td>
<td>0.0</td>
</tr>
<tr>
<td>All methods</td>
<td>0.7 (0.2–1.2)</td>
</tr>
</tbody>
</table>

Box 1. Components of Presterilization Counseling

- Permanent nature of the procedure, not intended to be reversible
- Alternative methods available, particularly long-acting reversible contraception and vasectomy
- Details of the procedure, including risks and benefits of anesthesia
- The possibility of failure, including ectopic pregnancy, with sterilization and other methods
- The need to use condoms for protection against sexually transmitted infections, including HIV
- The need to use an alternative form of contraception after hysteroscopic sterilization until hysterosalpingogram confirms tubal occlusion
- Completion of informed consent process
- Local regulations regarding interval from time of consent to procedure
- Effect of sterilization on future health insurance coverage (eg, noncontraceptive uses of hormonal contraceptives, reversal, or infertility services)

Benefits of Female Sterilization and Noncontraceptive Effects

- Ovarian Cancer
- Pelvic Inflammatory Disease
- Menstrual Abnormalities
Noncontraceptive effects

- Laparoscopic tubal occlusion reduces the incidence of ovarian cancer (relative risk 0.29–0.69) including in BRCA population.
- Reduces the spread of infectious organisms from the lower genital tract to the peritoneal cavity and protects against PID and salpingitis (does not protect against STIs).
- Approximately 2× increase in functional ovarian cysts.
- 80% of women experience no change in sexual interest or pleasure.
- In women who report a change in sexual interest or pleasure, 80% report a positive change.
Menstrual Abnormalities

- Tubal occlusion has little or no effect on menstrual patterns
- No link between tubal occlusion and menorrhagia or intermenstrual bleeding
- According to CREST data, women who have had sterilization procedure are more likely to have decreased bleeding and menstrual pain but increased cycle irregularity
- Data conflicting for hysteroscopic sterilization
References

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