Female Sterilisation

Advanced slide kit complementing the soon available WHO training tool www.fptraining.org

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**Female Sterilisation**

To enable teachers to understand and explain:

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Introduction

- **Definition**: permanent pregnancy prevention by occluding the fallopian tubes
- **Epidemiology**
  - 19% of all women 15-49 years worldwide
  - Latin America and the Caribbean 26%; Asia 23.4%; Europe 3.8%; Africa 1.7%
  - Female-to-male ratio 3 to 1
- **Frequency related to**
  - Age
  - Race
  - Education
  - Time of life
- **Indication**: patient's (and partner's) desire
- **Restrictions** (in many countries there are legal restrictions)
  - Age
  - Mental illness or disability


Female sterilisation can be defined as permanent pregnancy prevention for women, by occluding the fallopian tubes, called tubal ligation. Female sterilisation is the most common contraceptive method worldwide, used by 19 percent of all women ages 15 to 49 years. Reliance on female sterilisation is highest in Latin America and the Caribbean and Asia, and lowest in Europe and Africa. Worldwide, the female-to-male sterilisation ratio is 3 to 1. In general, the frequency of female sterilisation is related to factors like age, race, education, and time of life.

The only indication for sterilisation is the patient's and eventually also her partners' desire for permanent contraception. Restrictions include age and mental illness or disability. In many countries there are legal restrictions on these items,
Surgical planning

- Pregnancy is key factor in determining
  - Timing
  - Surgical approach (abdominal, laparoscopic or hysteroscopic)
  - Setting (inpatient or ambulatory)
  - Tubal occlusion method
- Decision should also be based upon
  - Patient preference
  - Surgical history
  - Medical comorbidities
  - Access to services
  - Experience gynaecologist
  - Costs
  - Insurance coverage


Surgical planning for female sterilisation is predominantly related to pregnancy. Pregnancy determines the timing of the procedure and the surgical approach, abdominal, laparoscopic or hysteroscopic. The surgical approach determines the setting: inpatient for laparotomy and laparoscopy, and ambulatory for hysteroscopy. The surgical approach also determines the tubal occlusion method. Decisions on these items should also be based upon patient preference, surgical history, medical comorbidities, access to services, experience gynaecologist, costs, and insurance coverage.
Postpartum sterilisation is typically performed at the time of caesarean delivery through the caesarean laparotomy incision, or within the first 24–48 h after vaginal delivery, through an infra-umbilical incision.

Postpartum sterilisation is suitable for women who express, before or during their pregnancy, a desire for sterilisation. Women who have an early pregnancy failure or an unwanted pregnancy may opt for this procedure, which is then called postabortion sterilisation.

In the absence of significant health and safety concerns, every effort should be made to provide postpartum sterilisation during the patient’s stay in hospital, not only for her convenience but especially to avoid deferring the procedure, as this might result in an unplanned pregnancy. However, postpartum sterilisation may have to be deferred due to obstetric complications such as eclampsia, sepsis or haemorrhage, concern about neonatal health, or even logistical issues (e.g. availability of operating theatre and staff).

The method of tubal occlusion via laparotomy generally involves excision of a segment in the midline of the fallopian tube, termed a partial salpingectomy. Most widely used are the Pomeroy and Parkland methods, which differ only in whether the tubal stumps are secured together or separately. Today, complete bilateral salpingectomy is more and more performed, due to the allegedly decreased risk of ovarian cancer.

Filshie clips may also be used, although failure rates for postpartum sterilisation with the titanium clip has been reported to be higher, ranging from no failures to 8.4%.

Distal fimbriectomy alone is not recommended, because of higher failure rates, presumably related to the risk of patent residual tubal lumens.
### Interval sterilisation

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<td>(Mini)laparotomy</td>
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<td>If there are other indications such as abnormal bleeding, pelvic pain, or pelvic organ prolapse</td>
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<td>Minor morbidities lower (0.26% vs 0.82%)</td>
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Interval sterilisation is defined as sterilisation performed outside the postpartum period, which is defined as six weeks after birth. Interval sterilisation is the only option for non-pregnant women. Options for a surgical approach for interval sterilisation are predominantly laparoscopy or hysteroscopy, which both can be done as outpatients’ procedures, sometimes (mini)laparotomy especially in developing countries, or even hysterectomy if there are other indications such as abnormal bleeding, pelvic pain, or pelvic organ prolapse.

For pregnant women, the decision between a postpartum or interval sterilisation procedure should be based primarily on woman’s preference, but may also be subject to logistical issues in the provision and availability of postpartum sterilisation.

The clinical relevance of differences in efficacy is negligible, but the percentage of major and minor morbidities is a bit lower for interval procedures.
Preferred laparoscopic tubal ligation techniques are:
- Bipolar electrosurgery, which employs reusable instrumentation and therefore has a lower cost, but may carry a greater risk of ectopic pregnancy.
- Titanium Filshie clip and the silicone Falope ring, as they minimise tubal damage, resulting in an increased potential for improved reversibility; however, they should not be used in women with known tubal disease. The Filshie clip is to be preferred above the Falope ring, as it is associated with a lower risk of mesosalpingeal injury and less post-procedural pain.
- Complete salpingectomy, which is technically more difficult and may have an increased risk of complications in women with significant pelvic adhesions and endometriosis or abnormal anatomy. It is associated with an increased surgical time of approximately 10 min.

To be avoided are:
- Excision of the proximal isthmus, as it may result in fistula formation at the interstitial end of the tube.
- Excision of the distal portion of the tube, as it may increase the risk of injuring adjacent structures.
- Distal fimbriectomy, as this has been associated with higher risk of sterilisation failure.
Advantages
- Successful at first attempt 99%
- Immediately effective: no need for additional contraception or confirmative imaging
- Procedure possible at time evacuation for abortion
- Successful reversal
- Subsequent procedures possible

Immediate complications
- Bleeding tube or mesosalpinx (clip 0.2% vs ring 2.5%)
- Injury to nearby structures (infundibulopelvic ligament)
- Conversion to laparotomy (0.15%)
- Postoperative pain (ring > electrosurgery, decrease with topical 0.5% bupivacaine)

Delayed complications
- Ectopic pregnancy (at 10 years after sterilisation)
  - Bipolar 17.1/1000 procedures
  - Titanium clip 2.0/1000 procedures
  - Postpartum partial salpingectomy 1.5/1000 procedures
- Device migration or expulsion of Filshie clip and Falope ring

Advantages of the laparoscopic procedure are that it is successful at first attempt in 99% of cases, and immediately effective, so there is no need for additional contraception or confirmative imaging after 3 months. Laparoscopic sterilisation can safely be performed at the time of a uterine evacuation for induced or spontaneous abortion. The success rate of reversal is high and subsequent pelvic procedures (e.g. some types of endometrial ablation) remain possible.

Immediate complications from laparoscopic sterilisation may include:
- Bleeding from the tube or mesosalpinx due to excessive traction during surgery, or from trauma during placement of occlusive devices. This risk is lower during application of the clip compared with the silicone band.
- Injury to nearby structures such as the infundibulopelvic ligament by excessive electrosurgery, in the case of salpingectomy, which might compromise ovarian blood flow.
- Conversion from laparoscopy to laparotomy due to complications specific to the laparoscopic technique, although the rate is low.
- Postoperative pain, which is associated more with the tubal ring than with electrosurgery and the clip. A 5 ml drip of 0.5% bupivacaine along the tube prior to tubal occlusion has been found to decrease postoperative pain.

Delayed complications are:
- Ectopic pregnancy, the rate of which is highest with bipolar electrosurgery, but lower with Filshie clip and postpartum partial salpingectomy.
- Device migration or expulsion of the clip via the urethra, bladder, vagina or rectum are uncommon events and are not associated with failed tubal occlusion or other significant morbidity. Falope rings are often seen to be peritonealised and still attached to the mesosalpinx, or are even found elsewhere in the pelvis, but there are no reports of failure or adverse outcomes related to migration.

Until recently, only one hysteroscopic sterilisation device was available: the microinsert system Essure. In 2017, German pharmaceutical manufacturer Bayer AG has pulled its 10-year old permanent contraception implant Essure from all markets except the USA, based on “commercial reasons”. This follows years of controversy, thousands of complaints, and extensive media coverage about problems of varying intensity, including postimplant miscarriage, puncturing of organs, dizziness, extreme pain, cramping, bloating, thinning hair, fatigue, and depression. In some cases, patients have been left with no alternative but to undergo a full hysterectomy to remove the device. In conclusion, the Essure hysteroscopic sterilisation can not be offered in Europe anymore.

In a large retrospective cohort study (Ref 3), the pregnancy rate at two years as compared with LS, was higher (2.4% compared with 2.0%). However, in the group of women who received a hysterosalpingogram after hysteroscopic sterilisation (66.1%), the pregnancy rates were similar as those who underwent laparoscopic sterilisation (1.8% compared with 2.0%) and less pregnancies were ectopic (1.3% vs. 3.9%). After undergoing hysteroscopic sterilisation, more women were diagnosed with menstrual dysfunction (26.8% compared with 22.3%), and more women underwent hysteroscopic surgeries (13.8% compared with 6.4%), but fewer women were diagnosed with pelvic pain (21.0% compared with 25.6%) and fewer women underwent intra-abdominal gynecologic surgeries (7.7% compared with 8.1%), including hysterectomy (10.9% compared with 14.3% at 5 years).

In a French cohort study (Ref 4), the use of hysteroscopic sterilisation was significantly associated with lower immediate risk of surgical complications (0.13% vs 0.78%) and medical complications (0.06% vs 0.11%); and higher risk of gynecological complications with 4.83% vs 0.69% for sterilisation failure and 5.65% vs 1.76% for gynecological reoperation over 1 year; these differences persisted over 3 years, although attenuated. Hysteroscopic sterilisation was associated with a lower risk of pregnancy within the first year of the procedure but was not significantly associated with a difference in risk of pregnancy by the third year (adjusted HR, 1.04; 95% CI, 0.83-1.30; adjusted RD, 0.01 per 100 person-years; 95% CI, −0.04 to 0.07). Risk of medical outcomes was not significantly increased over 1 year or over 3 years.
Preoperative counselling couple

- Full range of contraceptive options (male contraception, LARCs)
- Risks and benefits different procedures
- Efficacy and costs
- Permanent sterility
  - Reversal options limited, IVF
- Medical history
  - Increased surgical or anaesthetic risk
  - Comorbidities (including chronic pain syndrome)
- Patient’s capacity for decision-making


All counselling about female sterilisation should preferably be done with the couple, and begin with a description of the full range of contraceptive options, including vasectomy, as well as long-acting reversible methods. Counselling may be started antepartum to diminish the number of unfulfilled requests after delivery. Counselling also includes description of the risks and benefits of the different procedures, and their efficacy and costs. The patient’s expectations regarding permanent sterility should be discussed, including the limited options for reversal in case of regret, and that future pregnancy may be possible only by IVF.

The patient's medical history should be explored to reveal any factors which may make sterilisation more difficult, or increase surgical or anaesthetic risks such as morbid obesity, intra-abdominal adhesions or significant medical comorbidity. For women with history of a chronic pain condition, laparoscopic sterilisation is preferred above a hysteroscopic procedure.

Of utmost importance is that clinicians do their best to ascertain the patient's capacity for decision-making. When appropriate, the clinician should also seek counsel of the patient's family and caregivers.

Ref 1-4
In general, for all current female sterilisation methods, the contraceptive failure rate in the first year of use is 0.5%.
With increasing years, the sterilisation failure rates of all methods increase. It is important to tell your patients that, in general, for all current female sterilisation methods the cumulative contraceptive failure rate over 10 years is almost 2%, although this percentage may vary depending on the occlusion method used.

According to the CREST study, laparoscopic sterilisation failure rates over 10 years vary from 7.5 per 1000 women for postpartum partial salpingectomy and the old-fashioned unipolar electrocautery, to 20.1 for interval partial salpingectomy, 24.8 for bipolar electrocautery, and 17.7 for the Falope ring.

According to an evidence-based Markov model to estimate the probability of pregnancy over 10 years, the cumulative pregnancy rates per 1000 women for bipolar coagulation, silicone rubber band application, and hysteroscopic sterilization were 30, 24, and 96, respectively. (Ref 10).

No clear 10-years figures are available for the Filshie clip, but a random-effects analysis of pooled RCTs and observational studies showed no difference in the failures rates between the Pomeroy method and Filshie clips, when resorted to for postpartum sterilisation (odds ratio 0.76; 95% CI 0.30 – 1.95).
Presumed mechanisms for failure resulting in unintended pregnancy following surgical sterilisation include:

- Luteal phase pregnancy, which has been estimated to occur in 0.23–1.7% of interval sterilisation procedures.
- Wrong structure occluded or resected.
- Incomplete tubal occlusion from a defective device, improper positioning or incomplete desiccation.
- Tuboperitoneal fistula formation and spontaneous recanalisation of the tubal lumen.
Potential post-sterilisation effects

- **Menstrual function**
  - Decreased flow, duration and pain, more irregularly

- **Ovarian reserve**
  - Not affected (no earlier onset of menopause)

- **Persistent pelvic pain**
  - Increased after Essure (n=458; 8.1% <3 weeks; 4.2% >3 months)
  - 6-fold increase in women with any kind of chronic pain syndrome

- **Sexual function**
  - Unchanged or improved (unless sterilisation regret)

- **Hysterectomy**
  - Increased (women more likely to seek surgery for treatment)
  - Due to patient’s preference?

- **Breast cancer**
  - Not increased

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Sterilisation appears to be associated primarily with improvements of menses, such as a modest decrease in the volume of flow and duration of menstrual bleeding, as well as less menstrual pain; but there are also some adverse effects, such as an increase in cycle irregularity. However, other aetiological factors of these menstrual changes may be due to stopping a previous hormonal method, or simply ageing of the woman.

Studies of hormone levels and ovarian reserve have demonstrated no significant changes after sterilisation, or inconsistent effects. Also, following tubal ligation by electrocoagulation no changes in hormones were found. There is therefore no strong evidence at this time that women undergoing sterilisation will experience earlier onset of menopause.

There are numerous reports of persistent pelvic pain in women following placement of microinserts by hysterectomy, including dysmenorrhea, dyspareunia, ovulatory pain and other pain. A retrospective analysis of almost 500 women reported pelvic pain within the first 3 months in 8.1% of patients, and persistent pelvic pain after 3 months in 4.2%. There was a sixfold increase in the risk of both acute and chronic pain in women with a previous diagnosis of a chronic pain condition such as chronic pelvic pain, chronic low back pain, chronic headache or fibromyalgia.

Sexual function appears unchanged or improved after female sterilisation compared with non-sterilised women. post-sterilisation regret is the only factor that appears to be a predictor of decreased sexual interest and pleasure.

Within 5 years following sterilisation, women had a higher likelihood of undergoing hysterectomy, compared with women whose partners had a vasectomy or women who were not sterilised. Most experts suggest that women who chose surgical sterilisation in the past may now be more likely to seek medical treatment of late gynaecological disorders such as pelvic pain and menstrual complaints.

Some concern had been raised regarding an increase in the risk of breast cancer following sterilisation. However, this has not been found in analyses of comparative studies.
Rates of regret after sterilisation vary widely among studies, due to significant regional, population and methodological differences. Rates of request for reversal appear more consistent, with most studies finding rates between 1% and 4%.

Young age at time of sterilisation is the strongest predictor, not only of sterilisation regret but also of seeking information about sterilisation reversal, obtaining a reversal, or undergoing a post-sterilisation IVF procedure. However, there is no established threshold of an age that is too young to undergo sterilisation. Rather, the risk of regret appears to decrease incrementally with increasing age. This is nicely shown in the CREST study, in which the cumulative 14 year probability of requesting reversal was 40.4% among those sterilised between the ages of 18 and 24, 15.6% among those 25–30, 8.2% among those 31–35, and 4.4% among those over the age of 35. The 14 year cumulative risk of regret was 20.3% among women ≤30 years and 5.9% among women >30 years.

These figures should be clearly explained during counselling, as sometimes unplanned events happen in life, such as divorce or the death of a child, and the probability of finding a new partner and wanting to have children with him are simply higher in younger women.

Despite relatively high rates of regret, the number of women who actually undergo a reversal procedure or IVF remains quite low, being 2.1% among women aged ≤30 years at the time of sterilisation and 0.2% among women >30 years. This is due to the many barriers to obtaining a tubal reversal or IVF, including limited availability, the need to undergo an invasive procedure, and the expense.

The probability of ongoing pregnancy after tubal reversal is age-related, with estimated ongoing pregnancy rates of 63% for women under aged 35, 44% between the ages of 35 and 40, and only 5% for women over 40 years old.

Next to age, other significant risk factors for regret from the 14 year cumulative CREST data include:

- Non-white race, with an adjusted risk ratio of 1.3.
- Being unmarried or being in an unstable relationship at the time of sterilisation, compared with married women or women in a stable relationship.
- Postpartum sterilisation after vaginal and caesarean delivery, compared with interval sterilisation.
- Sterilisation 2–3 years after the birth of the youngest child, compared with women with 8 years or more since their last delivery, or no previous births.
- National health insurance, compared with women with private insurance.

Factors that have been inconsistently associated with regret include conflict between spouses regarding the sterilisation decision, low socioeconomic status, low educational attainment, low labour force activity, and living in a rural area.

And, most importantly, factors not associated with regret include parity, as well as nulliparity, and postabortion sterilisation.
Opportunistic bilateral salpingectomy (1)

- Removal of the entire fallopian tube
  - For primary prevention of epithelial carcinoma of the fallopian tube, ovary, or peritoneum
- Rationale: tubal neoplasia is the primary lesion in high-grade serous pelvic carcinomas
  1. Tubal ligation is associated with a decrease in ovarian cancer risk in:
     - average risk women (HR 0.76, 95% CI 0.64-0.90)
     - high risk women (OR 0.81, 95% CI 0.74-0.89)
  2. Ovarian cancer risk BRCA1 = 40%-60%, BRCA2 = 20%-30%.
     Bilateral salpingo-oophorectomy in these women revealed:
     - Risk reduction >80%
     - Occult tubal carcinomas and preinvasive lesions 5%-15%
     - No (pre)malignant lesions in ovaries
  3. Tubal involvement in ovarian carcinoma 75%
  4. Pre-invasive lesions found in tubes of healthy women

Ref 1-20


Current advice in general practice is to routinely discuss the option of opportunistic bilateral salpingectomy with the patient when bilateral tubal ligation is being considered, and review the theoretical potential for increased effectiveness, the reduced risk of needing subsequent surgery for ectopic pregnancy or hydrosalpinx, and the reduced risk of ovarian cancer.

Based on a PubMed/MEDLINE review of the literature for original studies, opinion articles, and meta-analyses published between 2010 and 2016, bilateral salpingectomy has been found to decrease the risk of any ovarian cancer by 42% to 78%, compared with 13% to 41% for bilateral tubal ligation.

Although operative time is increased with bilateral salpingectomy compared with bilateral tubal ligation, and operation risk is increased in women with significant pelvic adhesions, endometriosis, or abnormal anatomy, and reversal is impossible, no differences in surgical complication rates or ovarian reserve between the 2 procedures have been demonstrated.
Summary female sterilisation

- Pregnancy is key factor in determining timing, surgical approach and occlusion method
- Interval sterilisation can be performed by laparoscopy and minilaparotomy
- Unwanted pregnancy after sterilisation occurs in around 2% of women
- 1 in 3 unwanted pregnancies after sterilisation is ectopic
- Laparoscopic sterilisation is immediately effective, can be done at time evacuation for abortion, and is mostly reversible, but needs general anaesthesia
- Bilateral salpingectomy should be discussed if tubal ligation is being considered
- Young age is most important factor of sterilisation regret
Male Sterilisation

Advanced slide kit complementing the soon available WHO training tool www.fptraining.org
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male sterilisation

To enable teachers to understand and explain:

- Introduction
- Procedures and techniques
- Postoperative care
- Confirmation of sterility
- Contraceptive failure rates
- Contraindications
- Complications
- Associated morbidity concerns
- Counselling
- Vasectomy reversal
- Summary
Introduction

- Most effective mode of male contraception
- Interruption or occlusion of the vas deferens
- Can be performed by urologists, GPs and general surgeons
- Outpatient setting
- Local anaesthesia
- Safer, less costly, shorter recovery time than tubal ligation
- Lower acceptance due to misperceptions?
- Not immediately effective


Vasectomy is the most effective available mode of male contraception. The procedure involves interruption or occlusion of the vas deferens and is typically performed in an outpatient setting under local anaesthesia. The operation can be performed by urologists, experienced family physicians, or general surgeons. Compared with tubal ligation, vasectomy is safer, less costly, and has a significantly shorter post-procedure recovery time. In fact, vasectomy is the most cost-effective method of permanent contraception.

Nonetheless, worldwide, tubal ligation is performed three times more often than vasectomy. This suggests that lower acceptance of vasectomy may be attributed to a variety of reasons, including misperceptions of the procedure and its side effects. Moreover, vasectomy requires the male partner's willingness to undergo the procedure, and assumes that the woman will not have any other male partners.

Similar to hysteroscopic sterilisation, it is not effective right away and requires back-up contraception until azoospermia is confirmed.
The most common technique involves transection of the vas deferens. The conventional approach involves bilateral scrotal incisions, through which the vas deferens is mobilised and transected. With the no-scalpel technique, instead of incisions a puncture is made through the scrotal skin overlying the vas deferens and widened only enough to externalise the vas deferens for transection. The no-scalpel approach is not more effective, but associated with less bleeding, infection, and pain.

Generally, a segment 10–15 mm in length is removed; it may be sent for pathological confirmation, which can be helpful in the event of vasectomy failure. The length of vas that should be removed to prevent recanalisation is controversial, as rates of recanalisation more likely reflect the technique used to manage the vasal ends.

Intraluminal fulguration of 1.5 cm of the prostatic end of the vas, with fascial interposition between the prostatic and testicular vasal ends, appears to be the most effective method. The rationale for leaving the testicular end open is that sperm leakage from the testicular cut end prevents inspissation, increased epididymal pressure and epididymal rupture, and allows a small sperm granuloma to form. In general, using ligatures or clips should be avoided.
After surgery, the dressing and scrotal support should be maintained for at least 48 h. An ice pack intermittently applied to the scrotum for 48 h also helps decrease discomfort and swelling.

Significant post-procedure pain is common in up to 30% of patients, but is usually self-limited. Paracetamol or ibuprofen usually provides sufficient analgesia.

Postoperative instructions should be reviewed with the patient. Mild pain, swelling and bruising are normal for the first 2–3 days. The patient should phone if there is increasing pain, bleeding from the incision site, fever or significant scrotal swelling.

Bed rest or quiet activity is recommended for the first 24 h following a vasectomy. The patient may return to light work in 2–3 days, but should refrain from heavy work, sports or lifting for 1 week. Sexual activity should be avoided for 1 week.

The patient and his partner should be reminded to use an alternative method of contraception until semen analysis has confirmed the absence of sperm in the ejaculate.
Confirmation of sterility

- The time to achieve azoospermia declines with increasing number of ejaculations
- Generally after three months or 20 ejaculations
- Single sample
- Follow-up test 1-2 months later
- Non-motile sperm, clinically insignificant?
  - Low sperm count (<10,000/ml)
  - All sperm immotile
  - ≥ 7 months after vasectomy
  - ≥ 24 ejaculations


The time to achieve azoospermia declines with increasing number of ejaculations following vasectomy, and increases with patient age. Generally, 80 percent of patients are azoospermic after three months and 20 ejaculations, and a single sample is sufficient to confirm sterility.

If there are motile sperm at the three month check-up, a follow-up test is performed one to two months later. Vasectomy is considered a failure, if motile sperm are confirmed on this follow up examination, and the patient should be advised to use alternative contraception and potentially undergo a second procedure.

A small proportion of patients, however, do not achieve complete azoospermia, but consistently have non-motile sperm. This is probably clinically insignificant, and these men can be given cautious assurance of success, provided they have: a low sperm count (<10,000/mL), all sperm are immotile, seven months have elapsed from vasectomy, and there have been a minimum of 24 ejaculations.

Efficacy rates are comparable to those of female sterilisation.

Long-term data for the efficacy of vasectomy are limited, and outcomes depend on whether there is confirmation of azoospermia.

Pregnancy rates at 1 year with confirmed azoospermia have been reported to be as low as 0.02%, and as high as 0.74%, in retrospective surveys of women in whose partners assessment of sperm count was not documented. In this latter group, the pregnancy rate was 1.1% at 2, 3 and 5 years.
Coagulation disorders, or presence of a local congenital or acquired anatomic abnormality (e.g. previous scrotal injury, varicocele, hydrocele, scrotal mass, cryptorchidism, inguinal hernia), are relative contraindications to vasectomy.

Other contraindications to vasectomy include the presence of scrotal hematoma, genitourinary, groin or systemic infection, and sperm granuloma; however, the procedure can often be performed if these issues are resolved.
Vasectomy is generally regarded as the safest method of permanent sterilisation. Mortality rates are estimated at 0.5/100,000, major complications at 1 in 1250, and minor complications between 1% and 6%. In one review, vasectomy was estimated to have 12 times lower mortality and 20 times lower major morbidity than tubal ligation.

Complications following vasectomy include haematoma, infection, sperm granuloma and persistent post-vasectomy pain. Haematoma rates and infection rates are lower with the no-scalpel procedure than with the incisional technique.

A sperm granuloma may form when sperm leaks from the testicular side of an open-ended vas. These granulomas are rarely symptomatic and may be protective to the testis and epididymis against increased pressure. Most granulomas will ultimately resorb, but they have been implicated in increased rates of post-vasectomy pain.

The incidence of ‘troublesome’ post-vasectomy pain is reported by about 15% of men, with pain severe enough to impact quality of life in 2%. The cause of most post-vasectomy pain syndromes is chronic congestive epididymitis. Other causes include the formation of sperm granuloma or nerve entrapment at the vasectomy site.

Therapeutic measures include the administration of NSAIDs and warm baths, local nerve blocks or steroid injections, excision of a palpable granuloma, and ultimately vasectomy reversal or complete epididymectomy.

Vasectomy failure can be due to technical errors, techniques used, recanalisation in about 0.2% of patients, or unprotected intercourse before azoosperma is documented.
Concerns have been raised over potential links between vasectomy and a variety of unproven health consequences, such as cardiovascular disease. However, several studies in humans have found no increased risk of cardiovascular disease following vasectomy.

Whether a prior vasectomy increases a man’s risk of getting prostate cancer is controversial, but most evidence suggests that the risk is low. A systematic review and meta-analysis of 53 cohort, case-control, and cross-sectional studies published in 2017 could not find an association between vasectomy and high-grade, advanced-stage, or fatal prostate cancer. There was a weak association between vasectomy and any prostate cancer that was closer to the null with increasingly robust study design. The authors conclude that this association is unlikely to be causal and should not preclude the use of vasectomy as a long-term contraceptive option.

The risk of testicular cancer is not increased among vasectomised men.

Vasectomy disrupts the blood–testis barrier, resulting in anti-sperm antibodies in 60–80% of patients. There is no association between anti-sperm antibodies and other immune-complex mediated diseases, such as lupus erythematosus, scleroderma, rheumatoid arthritis, or other diseases such as asthma, diabetes mellitus, thyrotoxicosis, multiple sclerosis, myasthenia gravis, inflammatory bowel disease, testicular atrophy or ankylosing spondylitis.

However, a case–control study found a twofold increased risk of kidney stones in men aged 45 years or younger (RR 1.9, 95% CI 1.2–3.1), but not in men older than 45 years. The physiological mechanism for this increased risk is unknown.

Some recent studies are reassuring regarding the relationship between vasectomy and sexual life. One study found that sexual problems are no more prevalent among vasectomised men than they are among non-vasectomised men, and another study reported that vasectomy was not associated with decreased sexual frequency. A third study showed the positive impact of vasectomy on sexual satisfaction of couples.
The clinician should be informed by the patient about:
- Contraception method(s) used.
- Social/family status: whether in a stable relationship, number and ages of children (if any), acceptance of procedure by partner, future family intent.

The patient should be informed by the clinician about:
- The nature of the procedure.
- The potential risks and benefits.
- The failure rates.
- That the procedure results in permanent sterility.
- Alternative contraceptive options.
- The need for interim contraception for a minimum of 3 months.
- A semen analysis prior to assuming sterility.
- The need for ongoing use of condoms to protect against STIs if not in a committed, monogamous relationship.

2. Sharlip ID. What is the best pregnancy rate that may be expected from vasectomy reversal? J Urol 1993; 149: 1469.


As might be expected, the strongest predictive factor for a vasectomy reversal is an unstable relationship. Men without children, and men who were older than 30 years at the time of vasectomy, were less likely to request a reversal in the future. There was no correlation with a patient's religion, number of marriages or occupation.

Vasectomy can be reversed successfully in 50–70% of men, using microsurgical techniques. Key determinants of success are the method of vasectomy and the duration of obstruction. For example, open-ended vasectomy reduces the risk of testicular and epididymal damage, and therefore increases reversal success, in contrast with sealing of the testicular side.

Rates decline with increasing time between vasectomy and reversal. A large retrospective study found patency rates of >5%, and a pregnancy rate of approximately 75%, for men who underwent vasectomy less than 3 years prior to reversal. Both rates decreased in a linear fashion as the duration of obstruction increased. After 15 years, the patency rate was 71% and the pregnancy rate was 30%. An important reason for the discrepancy between patency rate and pregnancy rate is the development of antisperm antibodies, which may cause agglutination and immobilisation of the sperms.
### Summary Male Sterilisation

- Vasectomy is the safest and most cost-effective method of permanent contraception
- It can easily be performed in an outpatient setting under local anaesthesia
- There are only few contraindications and few complications
- There is no increased risk of cardiovascular disease, prostate cancer or testicular cancer
- There is no relationship with decreased sexual life
- Nonetheless, worldwide, vasectomy is performed three times less than tubal ligation
- Therefore, more counselling efforts must be made by caregivers to clear persistent misperceptions of the vasectomy procedure and its side effects

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