

UPDATE – 2022 Canadian Urological Association best practice report: Vasectomy

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Editor's Note: The following is an update of the 2016 Canadian Urological Association vasectomy guideline. The changes introduced are relatively minor, and include:

- Clarified text on the optimal vasectomy occlusion technique, with a statement added about the surgeon being able to choose his/her preferred technique so long as outcomes are good.
- Clarification of the recommendations on the number of post-vasectomy semen analyses.

Introduction

Vasectomy is a safe and effective method of birth control. Although it is a simple elective procedure, vasectomy is associated with potential minor and major complications. The early failure rate of vasectomy (presence of motile sperm in the ejaculate at 3–6 months post-vasectomy) is in the range of 0.2–5% and the late failure rate is in the range of 0.04–0.08%. The no-scalpel vasectomy technique is associated with a lower risk of early postoperative complications and the use of cautery or fascial interposition will reduce the risk of contraceptive failure. As such, detailed preoperative counselling and careful assessment of the post-vasectomy ejaculate (for presence of sperm) is imperative. Failure to provide and document adequate information and counselling to patients may lead to litigation.

The focus of this guideline is the management of men presenting for vasectomy. Specifically, the topics covered include preoperative counselling, vasectomy efficacy and complications, technical aspects of vasectomy, post-vasectomy semen testing, and interpretation-communication of post-vasectomy semen results. By performing an extensive literature review, we have generated an evidence-based consensus on the management of these men and have provided a recommendation grade based on the level of evidence

(Table 1). The objective of this guideline is to help standardize the treatment of men presenting for vasectomy.

1. Preoperative counselling

The procedure should be described during the initial consultation. Men must be informed about wound care and the potential for early complications: infection (0.2–1.5%), bleeding or hematoma (4–20%), and primary (early) surgical failure (0.2–5%) with motile sperm in the ejaculate at 3–6 months post-vasectomy.^{1–4} Men should also be made aware of late complications: chronic scrotal pain (1–14%) and delayed vasectomy failure after azoospermia at four months (0.05–1%).^{1,5,6} Complications, such as bleeding and testicular pain, can often be managed medically but infrequently (<0.1%) these conditions may require a surgical intervention.^{7,8} Exceptionally, surgical management of these complications may lead to testicular atrophy or an orchietomy. Such information should be discussed verbally, and an information pamphlet should also be provided. The patient must be told that the vasectomy should be viewed as a permanent form of contraception with a high probability of reversibility.⁹

Preoperative sperm banking and postoperative vasectomy reversal and sperm retrieval (for subsequent in vitro fertilization) can be discussed if patients are concerned about the permanent nature of the procedure.

Patients can be reassured that the data do not demonstrate a clear association between vasectomy and prostate cancer.¹⁰

No other late complications have been associated with vasectomy (e.g., vascular disease, hypertension, testicular cancer) and, as such, these need not be discussed unless the patient inquires.

Most men are potentially fertile shortly after vasectomy. Moreover, in cases of early re-canalization or technical failure (e.g., missed vas deferens), men will remain fertile. Therefore, couples must be reminded about the rate of primary (early) surgical failure (0.2–5%) and instructed to use

Table 1. Grades of recommendations according to quality of evidence

Grade	Quality of evidence
A	Based on clinical studies of good quality and consistency with at least one randomized trial
B	Based on well-designed studies (prospective, cohort) but without good randomized clinical trials
C	Based on poorer quality studies (retrospective, case series, expert opinion)

Modified from Oxford Centre for Evidence-Based Medicine.

other contraceptive measures until post-vasectomy semen testing has confirmed absence of motile sperm.⁴ A re-do vasectomy is recommended if motile spermatozoa continue to be present in the ejaculate six months after the procedure. Although the relationship between this finding (motile spermatozoa in the ejaculate at six months postoperatively) and subsequent pregnancy has not been established, pregnancies have been attributed to unprotected intercourse during the immediate post-vasectomy period.¹¹

While it is good practice to allow patients time for further reflection on their decision to undergo vasectomy, reconsider alternative contraceptive methods, and seek additional opinions from other healthcare providers, some patients may be fully ready to undergo vasectomy at the end of the initial consultation. In fact, it is logical to assume that many men in Canada seeking vasectomy have obtained information on the procedure from various sources, including the media, internet, friends/family, and/or other healthcare providers. Currently, there is no good data in the literature suggesting that providing a “cool-down” period after initial encounter of vasectomy counselling correlates to better surgical outcomes or better patient satisfaction. Thus, in the absence of valid medical reasons, such as time required to discontinue certain medications (e.g., anticoagulation) or recovery from temporary change of health status (e.g., acute infection), vasectomy may be performed (in most patients) shortly after the initial consultation.

With regards to the age limit of vasectomy, any man with the legal capacity to provide informed consent (this may vary from province to province) may undergo vasectomy. Studies in the U.S. indicate that it is rare for men below the age of 25 to choose vasectomy as a form of contraception.^{12,13} An earlier study indicates that men who undergo vasectomy in their 20s have a 12.5 times greater likelihood of subsequently seeking vasectomy reversal.¹⁴ Although data are lacking for men in their 20s seeking vasectomy, it is prudent to offer more time to these men (to reflect on their decision) prior to performing the surgery. Furthermore, when counselling about vasectomy in young patients, particularly minors and patients with an unclear level of understanding of or motivation to undergo vasectomy, surgeons should be prepared to offer consultations for psychosocial and ethical assessment prior to performing the surgery.

Special consideration should be given when performing vasectomy in men with a clinical varicocele or with prior varicocelectomy. It has been estimated that varicoceles are found in 15% of the general male population, with a higher prevalence in men with primary or secondary infertility. Men who undergo surgical varicocelectomy for repair of a clinical varicocele may be left with only the deferential veins as the sole testicular venous return. In addition, during varicocelectomy, it is also possible to damage the testicular artery(ies), leaving the deferential artery as the principal arterial supply to the testis. Thus, when a vasectomy is performed in men who have undergone or may undergo varicocelectomy in the future, it is strongly advisable to isolate the vas deferens carefully and completely exclude the associated deferential arteries and veins to avoid potential injury to the deferential vasculature and minimize the risk of ipsilateral testicular injury.¹⁵

2. Vasectomy technique (access and occlusion)

The technique of vasectomy has undergone significant modifications over the years. Furthermore, the equipment, materials, and methods of anesthesia have also evolved over the years. Though experienced surgeons may prefer their own approach for vasectomies, it is advisable for surgeons to obtain regular continuing medical education focusing on various issues surrounding vasectomy, from surgical techniques to new studies in the latest peer-reviewed journals and clinical guidelines.

Local anesthesia is sufficient for most patients undergoing a vasectomy; however, anxious patients or those with complicating factors, such as a previous orchidopexy or other scrotal surgery, may require sedation or a general anesthetic. There is controversy regarding the benefit of topical anesthetic before injection of local anesthetic;^{16,17} however, a small, 27–32-gauge needle is thought to be beneficial. Pneumatic injectors have not shown a clear benefit,^{18,19} but may be suitable for patients with a needle phobia. The use of buffered xylocaine has not been studied in vasectomy patients.

Isolation of the vas deferens

Conventional vs. no scalpel vasectomy

The two most common surgical techniques for accessing the vas during vasectomy are the traditional incisional method and the no-scalpel vasectomy (NSV) technique. The conventional incisional technique involves the use of a scalpel to make one or two incisions in the scrotal skin to access the vas deferens; the NSV technique uses a sharp, forceps-like instrument to puncture the skin to access the vas deferens.

A Cochrane review of two randomized controlled trials found that compared to the standard incision technique, the NSV approach is associated with a significantly lower risk of postoperative hematoma (odds ratio [OR] 0.20, 95%

confidence interval [CI] 0.13–0.32), pain during surgery (OR 0.75, 95% CI 0.61–0.93), postoperative scrotal pain (OR 0.63, 95% CI 0.50–0.80), and wound infections (OR 0.21, 95% CI 0.06–0.78).^{20–22} The Cochrane review also found that NSV is a faster procedure than the standard incision technique; however, there was no significant difference in the effectiveness (azoospermic or absence of motile sperm) between the two procedures (1.6% vs. 1.8% early failure rate for the NSV and the conventional scalpel techniques, respectively).²⁰

Recommendation: NSV should be performed because it is associated with a significantly lower risk of postoperative complications (hematoma, pain, infection) than conventional vasectomy (Grade A–B).

Vas occlusion technique

Fascial interposition vs. no fascial interposition

In a randomized controlled trial of over 800 vasectomies, it was shown that the use of fascial interposition during vasectomy is associated with a significantly higher rate of azoospermia at three months than simple ligation and excision without fascial interposition (OR 0.42, 95% CI 0.26–0.70);^{22–24} however, fascial interposition may increase the complication rate of vasectomy.²⁵

Mucosal cautery

In a comparative (case-control) study, cautery of the vas was associated with a lower risk of failure (defined as >100 000 sperm in the ejaculate) than fascial interposition (1% vs. 4.9%, OR 4.8, 95% CI 1.6–14.3).³

Recommendation: Mucosal cautery and/or fascial interposition (with vas ligation and excision) should be performed during vasectomy, as these techniques are associated with the lowest failure rates (Grade B). Nonetheless, surgeons may opt to use their preferred occlusion technique as long they obtain consistently low vasectomy failure rates.

3. Postoperative counselling

After the vasectomy has been performed, men should be instructed about proper wound and scrotal care and short-term physical limitations. Men should be told how to collect the semen sample (completeness, type of container) and reminded of the importance of submitting the sample to the laboratory in a timely fashion (within 30–60 minutes after producing the sample). They should also be told that semen samples should be collected after an abstinence period of two or more days and no more than seven days, and maintained at body temperature before delivery to the laboratory. A list of local laboratories that perform proper post-vasectomy semen analysis should be given to the patient. The

men must be reminded to use other contraceptive measures until post-vasectomy semen testing has confirmed absence of motile sperm.

4. Contraceptive efficacy of vasectomy

The early failure rate of vasectomy (presence of motile sperm in the ejaculate at 3–6 months post-vasectomy) is in the range of 0.2–5% and has been linked to surgeon experience and the technique.²⁵ Both technical failure (e.g., missed vas deferens) and early re-canalization of the vas deferens have been proposed as plausible explanations for early vasectomy failure.

Late vasectomy failure has been reported to be in the range of 0.04–0.08% (approximately 1/2000 cases) and is defined as the presence of motile spermatozoa in the ejaculate after documented azoospermia in two post-vasectomy semen analyses.^{26,27} In most cases, late failure is first identified as a pregnancy and later confirmed by semen analysis (documenting presence of motile spermatozoa).

The reappearance of sperm (often immotile) after documented azoospermia three months post-vasectomy may be much higher than 1/2000 according to the reported identification of spermatozoa in nearly 10% of ejaculates from men undergoing semen assessment prior to vasectomy reversal.²⁸ It is unlikely that the reappearance (or persistence) of immotile sperm years after vasectomy is of clinical significance, as this has not been associated with documented pregnancies.^{29,30}

5. Post-vasectomy semen testing

The post-vasectomy semen analysis should be performed on fresh (unprocessed) semen and on the centrifuged semen to confirm the absence of low numbers of motile sperm. The laboratory should give an estimation of sperm concentration or numbers of spermatozoa observed per high power field ($\times 400$ magnification).^{29–31} It is important to recognize that compliance with post-vasectomy semen testing is a significant issue, with up to 30% of men failing to submit a single sample.^{32,33}

Figure 1 depicts a proposed algorithm for post-vasectomy testing protocol.

One vs. two post-vasectomy samples

Surveys have shown significant variability in the post-vasectomy testing protocols.³⁴ Most agree that a single semen analysis showing azoospermia is sufficient to deem the vasectomy effective.^{31,35} Moreover, a single semen analysis showing rare non-motile sperm (<100 000 non-motile sperm/ml) is also sufficient to deem the vasectomy effective, assuming the analysis is performed by an experienced, reputable lab.

In a study of 5233 vasectomies, Alderman reported that the risk of conversion from azoospermia or rare non-motile sperm

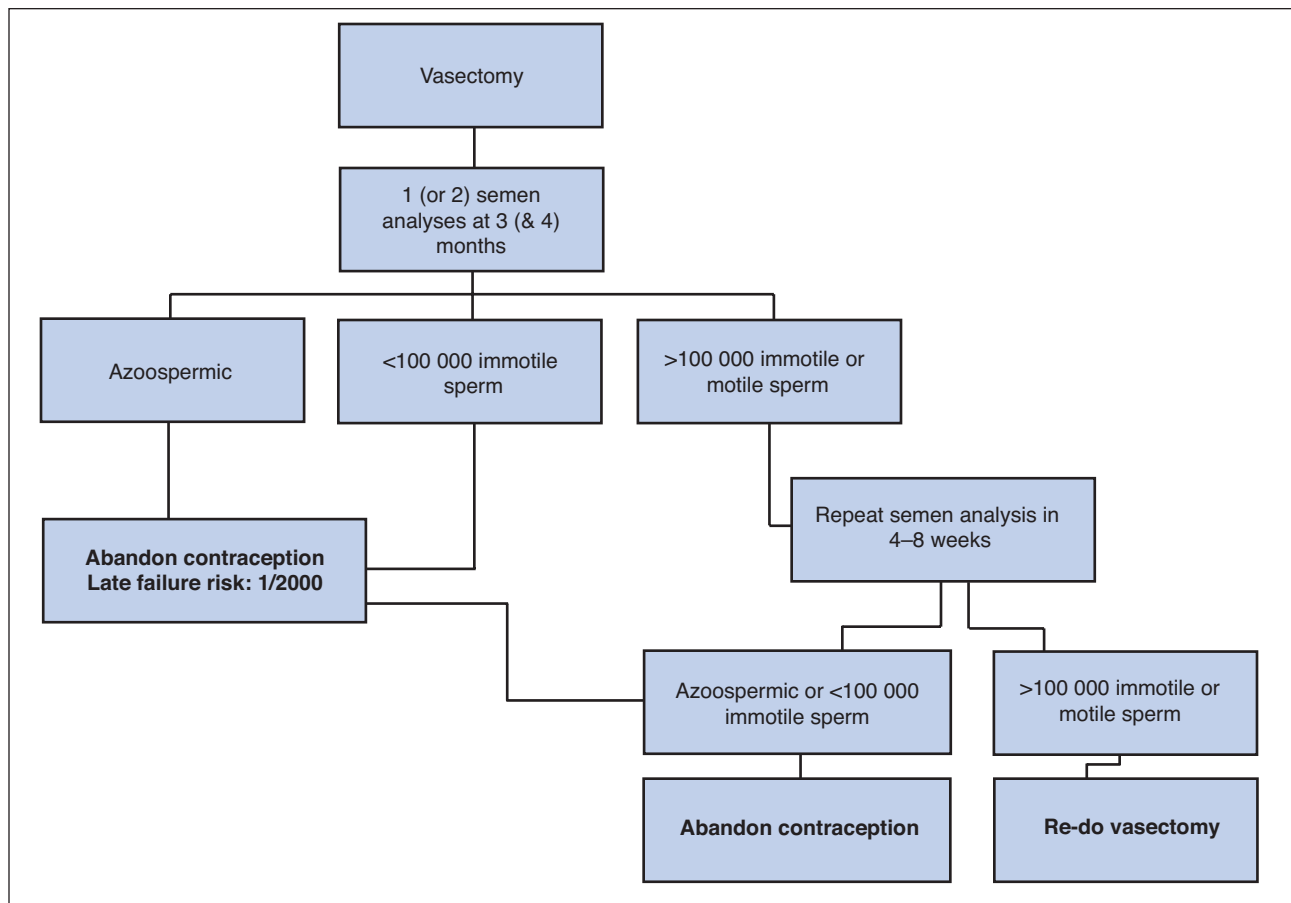


Figure 1. Proposed algorithm for post-vasectomy testing protocol.

to greater numbers of sperm is very rare (approximately 0.1% of cases) and is more commonly followed by conversion to azoospermia.³⁶ Similarly, Barone et al estimated that the predictive value of a single semen analysis with rare non-motile sperm for vasectomy success is 99.7%.³⁷ A second semen analysis should be requested in men with greater numbers of non-motile sperm (>100 000 non-motile sperm/ml) and/or any number of motile sperm on the first semen analysis. Some clinicians may prefer to request two semen samples at the onset, as this may reduce the number of post-vasectomy counselling sessions (e.g., phone calls or office visits); however, this may also decrease the overall compliance.³³

Recommendation: A single semen sample showing azoospermia or rare non-motile sperm (<100 000 non-motile sperm/ml) is sufficient to deem the vasectomy effective. A second semen analysis should be requested in men with a greater number of non-motile sperm (>100 000/ml) or any number of motile sperm on the first semen analysis (Grade C).

Timing of post-vasectomy testing

Although most studies suggest that post-vasectomy testing be conducted at three months after vasectomy, the issue remains debatable, with some studies suggesting earlier examinations and others proposing later examinations.^{33,38,39} The difficulty in establishing a set time point for semen testing stems largely from the variable success of the vasectomy occlusion techniques.²⁵ Azoospermia is achieved much later with the ligation (and excision) compared to the cautery or fascial interposition techniques.^{25,38,40} The argument in favor of waiting at least three months is that this will reduce the number of false-positive samples and minimize the need for repeat laboratory assessment and counselling.³⁹

Recommendation: Post-vasectomy testing should be conducted at three months after vasectomy (Grade C).

6. Interpreting and communicating results

Azoospermia or rare immotile sperm (<100 000 per/ml) as an indication of successful vasectomy

Contraceptive measures may be abandoned after men have produced one azoospermic sample or one semen sample with rare (<100 000/ml) immotile spermatozoa. It is the physician's responsibility (not the laboratory's) to communicate these results to the patient and measures should be taken to ensure that patients are not lost to followup. Physicians must also remind couples about the risk of late failure (approximately 1/2000) despite azoospermia or rare immotile sperm on initial testing.

It is estimated that approximately 20–40% of samples have rare non-motile sperm at three months post-vasectomy, with a lower percentage having non-motile sperm at six months.^{32,39} When there is doubt regarding the analysis, physicians may want to contact the laboratory and confirm that there was no reporting error (i.e., that the sample was incorrectly labeled as “non-motile”). The literature has suggested that the risk of pregnancy occurring from these non-motile sperm is small — perhaps no more than the risk of late pregnancy after two azoospermic semen samples because of spontaneous re-canalization.^{29,30} Similarly, rare non-motile sperm can appear in the ejaculate one or more years after vasectomy with no increased risk of failure (pregnancy or motile sperm). Therefore, repeat semen testing in men with rare non-motile sperm is unnecessary because pregnancy is very unlikely to occur in this setting.

Motile sperm or large numbers of immotile sperm as a measure of failure

If any motile sperm or substantial numbers of immotile spermatozoa (>100 000 sperm/ml) are detected, the physician must inform the patient to continue the use of other contraceptive measures and request that a repeat semen analysis be performed. A repeat vasectomy is indicated when there is persistence of motile sperm or large numbers of non-motile sperm in the ejaculate. No long-term studies have evaluated the risk of pregnancy in this setting.

Recommendation: Persistence of any number of motile sperm or >100 000 sperm/ml on two semen samples is an indication of vasectomy failure (Grade C).

Summary

Vasectomy is a safe and effective method of birth control. The NSV technique is associated with a lower risk of early postoperative complications and the use of mucosal cautery or fascial interposition will reduce the risk of contraceptive

failure. Post-vasectomy testing should consist of analysis of one or two semen samples at approximately three months after vasectomy. The laboratory should examine a freshly produced seminal fluid specimen by direct microscopy and if no sperm are seen, the centrifuged sample should be examined for the presence of motile and non-motile spermatozoa. Other contraceptive measures may be abandoned after the production of one azoospermic ejaculate or one ejaculate with <100 000 immotile spermatozoa. Couples must be counselled (both pre- and postoperatively) about the risks of early and late failure.

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Prior to publication, this guideline was reviewed by the CUA Guidelines Committee and the CUA Board of Directors.

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