

Vasectomy: An Update

PAUL DASSOW, M.D., M.S.P.H., and JOHN M. BENNETT, M.D., M.P.H.,
University of Kentucky College of Medicine, Lexington, Kentucky

Vasectomy remains an important option for contraception. Research findings have clarified many questions regarding patient selection, optimal technique, postsurgical follow-up, and risk of long-term complications. Men who receive vasectomies tend to be non-Hispanic whites, well educated, married or cohabitating, relatively affluent, and have private health insurance. The strongest predictor for wanting a vasectomy reversal is age younger than 30 years at the time of the procedure. Evidence supports the use of the no-scalpel technique to access the vasa, because it is associated with the fewest complications. The technique with the lowest failure rate is cauterization of the vasa with or without fascial interposition. The ligation techniques should be used cautiously, if at all, and only in combination with fascial interposition or cautery. A single postvasectomy semen sample at 12 weeks that shows rare, nonmotile sperm or azoospermia is acceptable to confirm sterility. No data show that vasectomy increases the risk of prostate or testicular cancer. (*Am Fam Physician* 2006;74:2069-74, 2076. Copyright © 2006 American Academy of Family Physicians.)

► **Patient information:**
A handout on vasectomy, written by the authors of this article, is provided on page 2076.

Although vasectomy is the safest and most inexpensive option for permanent sterilization,¹ female sterilization is used about three times as often (27 versus 9.2 percent of couples who use contraception; *Table 1*).² In addition, there was a 3 percent overall decrease in the use of sterilization (male and female) and an increase in the use of less-reliable forms of contraception from 1995 to 2002.^{2,3} Family physicians should be aware of these trends and provide patients with up-to-date information about contraception options.

Patient Selection

Vasectomy reversal is relatively expensive and its success rate is highly variable.⁴ Given these considerations, physicians should counsel men about the permanence of vasectomy and the risk factors associated with reversal requests. Two studies showed that change in marital status was the most common reason for wanting a reversal.^{5,6} A case-control study showed that age younger than 30 years at the time of the vasectomy (odds ratio [OR] = 12.5) and having a spouse who

worked outside of the home (OR = 2.1) were associated with later requests for reversal.⁷ The authors conceded that the latter association likely was multifactorial and culturally based. There was no association between requests for reversal and the patient's religion, occupation, or number of marriages. Having no children at the time of the vasectomy was associated with a lower risk of a reversal request (OR = 0.1).⁷

Knowing the characteristics associated with men who choose vasectomy may assist physicians with patient education. A cross-sectional survey of men (n = 719) who received vasectomies at a nationally representative sample of medical practices showed that being married or cohabitating at the time of the procedure and earning an annual household income of \$25,000 or more were most highly associated with the decision to have a vasectomy (91.4 and 92.9 percent of sterilized men, respectively).⁸ Men who undergo vasectomy also tend to be non-Hispanic whites, be well educated, and have private health insurance.⁸

Racial disparities were notable in black and Hispanic men. Although these groups

SORT: KEY RECOMMENDATIONS FOR PRACTICE

<i>Clinical recommendation</i>	<i>Evidence rating</i>	<i>References</i>
When available, the no-scalpel vasectomy technique is preferred for accessing the vasa.	B	9-11
Ligation and excision should not be used as the sole method of vasal disruption.	A	14
Cautery, with or without fascial interposition, is the preferred method for vasal disruption.	B	13, 17
A single semen sample 12 weeks after vasectomy that shows rare, nonmotile sperm or azoospermia is sufficient to confirm sterility.	B	28, 29

A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, see page 2008 or <http://www.aafp.org/afpsort.xml>.

represent 11.0 and 9.8 percent of the U.S. male population, respectively, the study showed that only 4.5 percent of vasectomies were for black men and 4.8 percent were for Hispanic men.⁸ Therefore, men who choose vasectomy are not a representative sample of the general U.S. male population. It is unknown if these findings represent cultural barriers to male sterilization or financial barriers from lower socioeconomic status.

The study also explored the most important reasons given for choosing a vasectomy over other forms of contraception.⁸ The most common reason for choosing vasectomy was that this method represented the surest way to prevent having more children (49.9 percent), followed by having a wife or partner who disliked other forms of contraception (12.3 percent) and the patient himself disliking other forms of contraception (10.0 percent). When asked why they chose vasectomy over female sterilization, most men responded that vasectomy was simpler and safer.⁸

TABLE 1
Prevalence of Contraceptive Methods

<i>Method</i>	<i>Prevalence (%)*</i>
Oral contraceptive	30.6
Female sterilization	27.0
Male condom	18.0
Vasectomy	9.2
Three-month injectable	5.3
Withdrawal	4.0
Other†	4.0
Intrauterine device	2.0

*—Reported use by couples who used contraception in 2002.

†—Periodic abstinence, diaphragm, and other methods.

Adapted from Mosher WD, Martinez GM, Chandra A, Abma JC, Willson SJ. Use of contraception and use of family planning services in the United States: 1982-2002. Adv Data 2004;350:18.

Technique

Technique options can be divided into three components of vasectomy: accessing the vasa, disrupting the vasa, and closing the surgical site (scrotum).

ACCESSING THE VASA

Accessing the vasa can be achieved with a single or double incision to the scrotum using a scalpel, or with the no-scalpel technique using special instruments. No-scalpel vasectomy has been shown to reduce the risk of complications (i.e., bleeding and infection) compared with the incision technique (Table 2).⁹⁻¹¹ Two randomized controlled trials showed a 1.7- to 6.8-fold reduction in bleeding and hematomas and a 1.6- to 7.5-fold reduction in infections with the no-scalpel technique compared with the incision technique.^{9,11}

TABLE 2
Complication Rates of No-Scalpel and Incision Vasectomy Techniques

Study	Bleeding/hematoma (%)		Infection (%)	
	No-scalpel	Incision	No-scalpel	Incision
Christensen, et al, 2002 ⁹ (RCT)	9.5	15.9	7.1	11.4
Nirapathpongporn, et al, 1990 ¹⁰ (NRCT)	0.3	1.7	0.15	1.34
Sokal, et al, 1999 ¹¹ (RCT)	1.8	12.2	0.2	1.5

RCT = randomized controlled trial; NRCT = nonrandomized controlled trial.

Information from references 9 through 11.

DISRUPTING THE VASA

Disruption of the vasa can be performed numerous ways (*Figure 1*¹²⁻¹⁸). Simple suture ligation with excision likely is the most common method worldwide,¹² although this method has been shown to be less effective than previously reported.¹⁹ In addition, there is increasing concern that ligating the vasa, regardless of technique, often causes tip necrosis and sloughing; this can lead to recanalization of a vasal segment.²⁰ A large randomized trial that included patients in seven countries noted vasectomy failure (i.e., live sperm present 24 weeks after the procedure) in 12.7 percent of men who received suture ligation and excision alone from an experienced physician.¹⁴

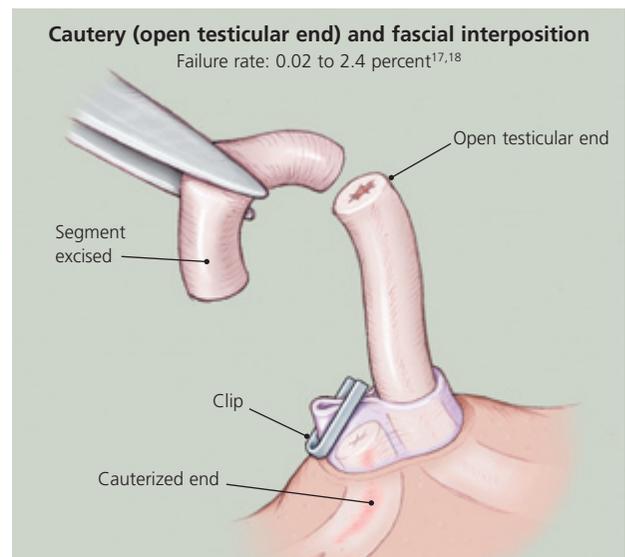
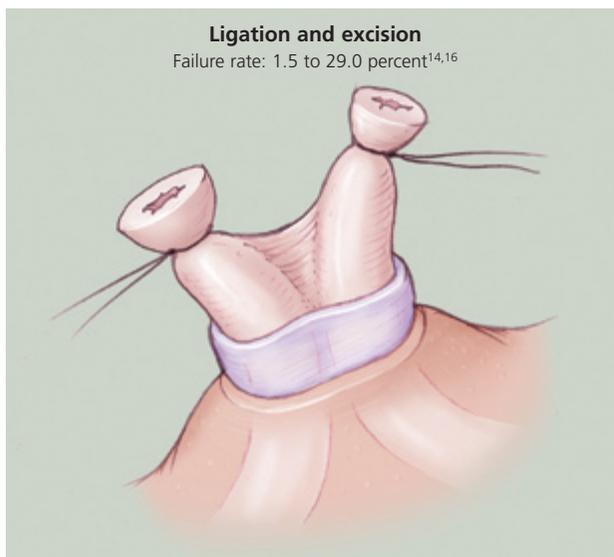
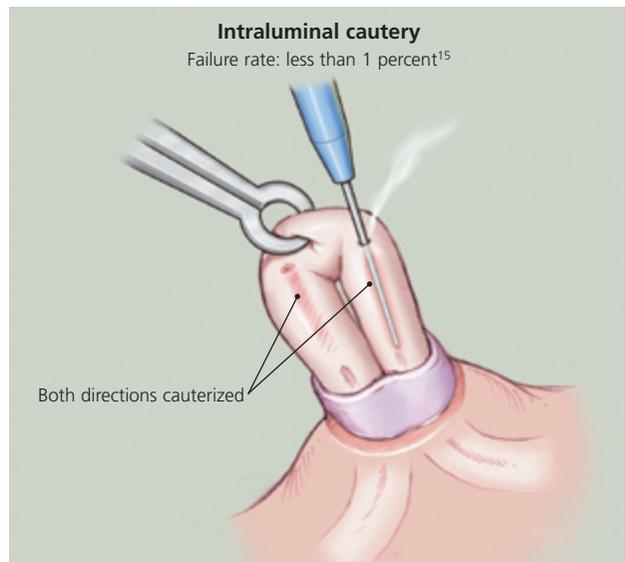
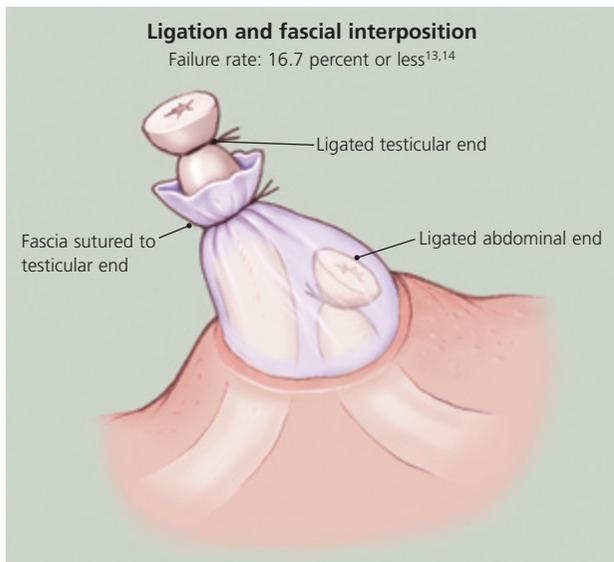
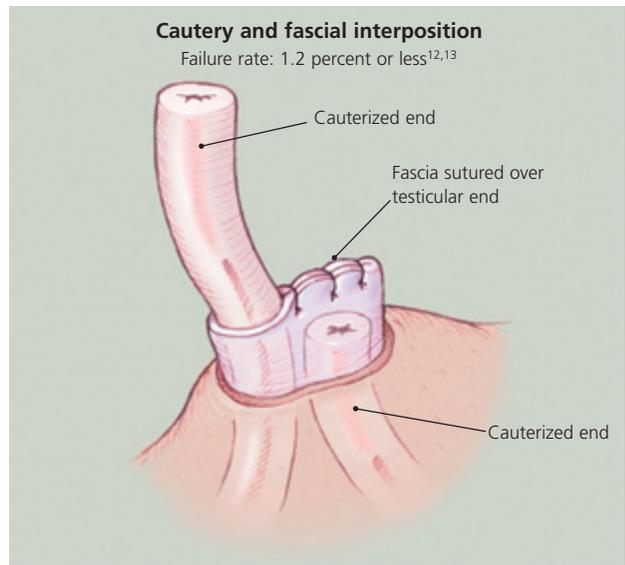
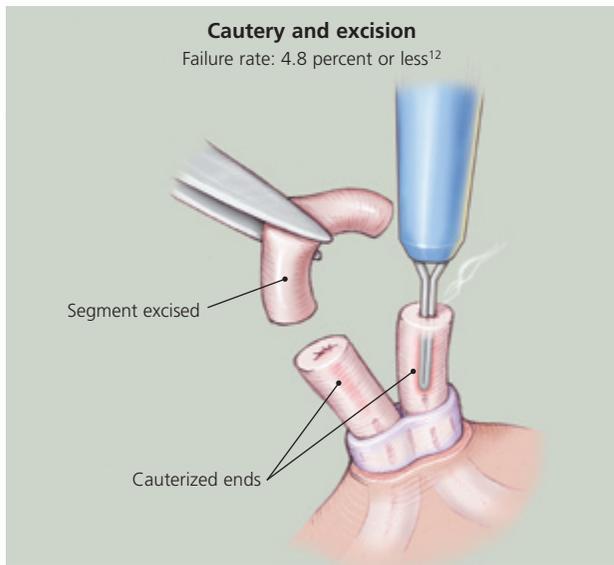
A retrospective Canadian study comparing cautery and fascial interposition with clip ligation and excision reported an 8.7 percent failure rate in patients who received clip ligation and excision.¹⁷ The seven-country study showed that adding fascial interposition to suture ligation and excision decreased the failure rate to 5.9 percent.¹⁴ These data confirm added protection from fascial interposition. The use of cautery, alone or with fascial interposition, appears to significantly decrease failure rates. The Canadian study showed that cautery with fascial interposition had a 0.3 percent failure rate.¹⁷ An observational study reported an early failure rate (i.e., live sperm 12 weeks after vasectomy) of 1 percent with cautery alone.¹³

Intraluminal cautery without separation of the vasa currently is the preferred

method practiced at Marie Stopes International health centers (multinational family planning clinics where 100,000 vasectomies have been performed worldwide).¹⁵ These clinics report a less than 1 percent failure rate with this technique.¹⁵ Two studies have compared thermal and electric cautery.^{18,21} One study showed a nonsignificant increase in failure rates with electric cautery,¹⁸ and the other study showed histologic evidence of more reliable occlusion with thermal cautery.²¹ Although these studies provide some evidence that thermal cautery is more effective than electric, no firm conclusions about optimal route or type of cautery can be made.

Leaving the testicular end open after the vas disruption phase of vasectomy has the theoretical advantage of decreasing post-vasectomy vasal pressure; however, it also causes a sperm granuloma at the open end.²² Early studies reported a significant decrease in chronic pain with this technique, implying that most chronic pain resulted from congestive epididymitis rather than a granuloma.^{22,23} A large retrospective study of 3,761 men who received vasectomies showed no difference in postoperative scrotal pain between open- and closed-ended techniques.¹⁷ Ultimately, physicians should use study data along with their own experience and training to determine which vasal disruption technique is the best option for their patients.

The no-scalpel vasectomy technique has been shown to cause fewer complications than the incision technique.



ILLUSTRATIONS BY DAVID KLEMM

Figure 1. Vasa disruption methods for vasectomy.

Information from references 12 through 18.

SCROTAL CLOSURE

Scrotal closure can be accomplished with clips, clamps, sutures, or cyanoacrylate tissue adhesive. The incision also may be left open to heal by secondary intention. Data comparing these methods are limited; therefore, further data are needed before recommendations regarding closure technique can be made.

Follow-up Care

Follow-up after a vasectomy should include one or more semen samples to ensure that recanalization has not occurred.²⁴ Unfortunately, many men do not comply with this recommendation. A case series reported that less than one half (42 percent) of men who received a vasectomy provided a postvasectomy semen sample. Of those who provided an initial sample, only 25 percent provided a subsequent sample.²⁵

Two studies showed that the median time to loss of sperm motility was three weeks after vasectomy and the median time to azoospermia was 10 weeks.^{26,27} A finding of rare, nonmotile sperm after 12 weeks reliably predicts long-term sterility²⁸; therefore, subsequent monthly samples after 12 weeks is recommended only for those with motile sperm.²⁹ Patients who want earlier confirmation of sterility should be counseled that a second sample is more likely to be needed if the first sample is given before 12 weeks.

Long-term Complications

Some men may be concerned that vasectomy is linked to prostate cancer. However, a population-based, case-control study including men with newly diagnosed prostate cancer showed no association between prostate cancer and vasectomy (relative risk = 0.94),³⁰ and a meta-analysis provided no evidence of an association.³¹ Studies also have shown that there is no measurable association between vasectomy and testicular cancer.^{32,33}

The Authors

PAUL DASSOW, M.D., M.S.P.H., is assistant professor of family medicine and assistant director for predoctoral education in the Department of Family and Community Medicine at the University of Kentucky College of Medicine, Lexington. He is assistant dean for continuing

medical education at the University of Kentucky College of Medicine. Dr. Dassow received his medical degree from Washington University in St. Louis (Mo.) School of Medicine and completed a family medicine residency at Scott Medical Center, Belleville, Ill.

JOHN M. BENNETT, M.D., M.P.H., is assistant professor of family medicine in the Department of Family and Community Medicine at the University of Kentucky College of Medicine. Dr. Bennett received his medical degree at the University of Arkansas for Medical Sciences, Little Rock, and completed a family medicine residency with Area Health Education Centers South Arkansas in El Dorado.

Address correspondence to Paul Dassow, M.D., M.S.P.H., Dept. of Family and Community Medicine, University of Kentucky, K-307, Kentucky Clinic, Lexington, KY 40536 (e-mail: pdass1@email.uky.edu). Reprints are not available from the authors.

Author disclosure: Nothing to disclose.

REFERENCES

- Hendrix NW, Chauhan SP, Morrison JC. Sterilization and its consequences. *Obstet Gynecol Surv* 1999;54:766-77.
- Mosher WD, Martinez GM, Chandra A, Abma JC, Willson SJ. Use of contraception and use of family planning services in the United States: 1982-2002. *Adv Data* 2004;350:1-36.
- Chandra A. Surgical sterilization in the United States: prevalence and characteristics, 1965-95. *Vital Health Stat* 1998;23:1-33.
- Practice Committee of the American Society for Reproductive Medicine. Vasectomy reversal. *Fertil Steril* 2004;82(suppl 1):S194-8.
- Sharlip ID. What is the best pregnancy rate that may be expected from vasectomy reversal? *J Urol* 1993;149:1469-71.
- Hendry WF. Vasectomy and vasectomy reversal. *Br J Urol* 1994;73:337-44.
- Potts JM, Pasqualotto FF, Nelson D, Thomas AJ Jr, Agarwal A. Patient characteristics associated with vasectomy reversal. *J Urol* 1999;161:1835-9.
- Barone MA, Johnson CH, Luick MA, Teutonico DL, Magnani RJ. Characteristics of men receiving vasectomies in the United States, 1998-1999. *Perspect Sex Reprod Health* 2004;36:27-33.
- Christensen P, al-Aqidi OA, Jensen FS, Dorflinger T. Vasectomy. A prospective, randomized trial of vasectomy with bilateral incision versus the Li vasectomy [in Danish]. *Ugeskr Laeger* 2002;164:2390-4.
- Nirapathpongporn A, Huber DH, Krieger JN. No-scalpel vasectomy at the King's birthday vasectomy festival. *Lancet* 1990;335:894-5.
- Sokal D, McMullen S, Gates D, Dominik R, for the Male Sterilization Investigator Team. A comparative study of the no scalpel and standard incision approaches to vasectomy in 5 countries. *J Urol* 1999;162:1621-5.
- Aradhya KW, Best K, Sokal DC. Recent developments in vasectomy. *BMJ* 2005;330:296-9.
- Sokal D, Irsula B, Chen-Mok M, Labrecque M, Barone MA. A comparison of vas occlusion techniques: cautery

- more effective than ligation and excision with fascial interposition. *BMC Urol* 2004;4:12.
14. Chen-Mok M, Bangdiwala SI, Dominik R, Hays M, Irsula B, Sokal DC. Termination of a randomized controlled trial of two vasectomy techniques. *Control Clin Trials* 2003;24:78-84.
 15. Marie Stopes International. Vasectomy—your questions answered. Accessed June 5, 2006, at: http://www.mariestopes.com.au/resource_centre.
 16. Barone MA, Nazerali H, Cortes M, Chen-Mok M, Pollack AE, Sokal D. A prospective study of time and number of ejaculations to azoospermia after vasectomy by ligation and excision. *J Urol* 2003;170:892-6.
 17. Labrecque M, Nazerali H, Mondor M, Fortin V, Nasution M. Effectiveness and complications associated with 2 vasectomy occlusion techniques. *J Urol* 2002;168:2495-8.
 18. Li SQ, Xu B, Hou YH, Li CH, Pan QR, Cheng DS. Relationship between vas occlusion techniques and recanalization. *Adv Contracept Deliv Syst* 1994;10:153-9.
 19. Trussell J, Kowal D. The essentials of contraception: efficacy, safety, and personal considerations. In: Hatcher RA, Trussell J, Stewart F, Cates W Jr, Stewart GK, Guest F, eds. *Contraceptive Technology*. 17th ed. New York, N.Y.: Ardent Media, 1998:211-47.
 20. Schmidt SS. Technics and complications of elective vasectomy. The role of spermatic granuloma in spontaneous recanalization. *Fertil Steril* 1966;17:467-82.
 21. Schmidt SS, Minckler TM. The vas after vasectomy: comparison of cauterization methods. *Urology* 1992;40:468-70.
 22. Shapiro EI, Silber SJ. Open-ended vasectomy, sperm granuloma, and postvasectomy orchialgia. *Fertil Steril* 1979;32:546-50.
 23. Errey BB, Edwards IS. Open-ended vasectomy: an assessment. *Fertil Steril* 1986;45:843-6.
 24. Hancock P, McLaughlin E. British Andrology Society guidelines for the assessment of post vasectomy semen samples (2002). *J Clin Pathol* 2002;55:812-6.
 25. Christensen RE, Maples DC Jr. Postvasectomy semen analysis: are men following up? *J Am Board Fam Pract* 2005;18:44-7.
 26. Cortes M, Flick A, Barone MA, Amatya R, Pollack AE, Otero-Flores J, et al. Results of a pilot study of the time to azoospermia after vasectomy in Mexico City. *Contraception* 1997;56:215-22.
 27. Edwards IS. Earlier testing after vasectomy, based on the absence of motile sperm. *Fertil Steril* 1993;59:431-6.
 28. Chawla A, Bowles B, Zini A. Vasectomy follow-up: clinical significance of rare nonmotile sperm in postoperative semen analysis. *Urology* 2004;64:1212-5.
 29. Badrakumar C, Gogoi NK, Sundaram SK. Semen analysis after vasectomy: when and how many? *BJU Int* 2000;86:479-81.
 30. Cox B, Sneyd MJ, Paul C, Delahunt B, Skegg DC. Vasectomy and risk of prostate cancer. *JAMA* 2002;287:3110-5.
 31. Dennis LK, Dawson DV, Resnick MI. Vasectomy and the risk of prostate cancer: a meta-analysis examining vasectomy status, age at vasectomy, and time since vasectomy. *Prostate Cancer Prostatic Dis* 2002;5:193-203.
 32. Moller H, Knudsen LB, Lyng E. Risk of testicular cancer after vasectomy: cohort study of over 73,000 men. *BMJ* 1994;309:295-9.
 33. Schwingl PJ, Guess HA. Safety and effectiveness of vasectomy. *Fertil Steril* 2000;73:923-36.