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Performing vasectomy to ensure future vasovasostomy success

By Kathleen Hwang, MD,Tony Mammen, MD,Raymond A. Costabile, MD

Put the cart before the horse: Four vasectomy considerations that affect future reversal

Dr. Mammen

Vasectomy is a commonly performed outpatient surgery for permanent male sterility and, in the United States, is most often performed by urologists. More than 500,000 vasectomies are performed in this country annually (*J Urol* 1999; 161:1835). To date, there are no effective, reversible medical male contraceptives, and the standard approach for desired male sterility has been surgery.

Dr. Hwang

Approximately 5% of men who undergo vasectomy eventually will consider vasectomy reversal, and this demographic appears to be increasing (*J Urol* 1999; 161:1835; *Urology* 2001; 58:1021-4). The motivation behind vasectomy reversal generally stems from failed and re-established personal relationships. Divorce rates in North America for first, second, and third marriages are 41%, 60%, and 73%, respectively (*Enrichment Journal* 1999 Summer Issue). Of men who divorce, 83% will subsequently remarry. It is apparent that vasectomy reversal will likely increase in importance for restoring fertility in today's young adult male population. While vasovasostomy is technically feasible for most candidates who wish to undergo reconstruction, many variables can predict a successful outcome.

Dr. Costabile

Vasovasostomy is a technique proven to restore fertility in men who previously underwent vasectomy. Patency rates based on viable sperm noted in seminal fluid analysis (SFA) as well as pregnancy rates are improved with microsurgical vasectomy reversal (MVR) technique versus macrosurgical vasovasostomy (McGuire, EJ, ed. *Advances in Urology*, Chicago: Year Book Medical Publishers, 1988: 193-230).

Gerald L. Andriole, MD

While vasectomy reversal techniques vary, the principles of multilayer microscopically assisted anastomosis of the vas deferens remain constant. The goal of vasectomy reversal is to ensure patency of the vas deferens and permit the flow of sperm and testicular and epididymal fluids to the ejaculatory duct. Patency rates for MVR approach 90%, but these rates have remained relatively constant over the last 2 decades.

The question is, how do we further improve patency rates following vasovasostomy? The answer may lie in specific technical variations at the time of vasectomy, as this article will discuss. We outline four specific aspects of vasectomy technique designed to aid the urologic microsurgeon in performing MVR with greater potential for success.

Interval between vasectomy and reversal

The success of microsurgical vasectomy reversal progressively worsens as the interval of time from vasectomy increases. The Vasovasostomy Study Group reviewed the results of vasectomy reversal in 1,247 men and showed a clear relationship between the time interval between vasectomy and subsequent microsurgical reversal and the rate of return of sperm on SFA and pregnancy (*J Urol* 1991; 145:505-11). If the interval of obstruction following vasectomy was less than 3 years, the rate of sperm appearance on SFA and rate of eventual pregnancy were 97% and 76%, respectively; if the length of the interval was from 3 to 8 years, the rates were 88% and 53%, respectively. If the interval length was from 9 to 14 years, the rates were 79% and 44%, respectively; and if the interval was 15 or more years long, the rates were 71% and 30%, respectively. Thus, an important factor to consider is the time interval between vasectomy and the request for vasectomy reversal.

The median duration of a first marriage is 7.2 years, with subsequent marriage occurring 5.8 years after the divorce (*Monthly Vital Statistics Report*, March 22, 1995, vol. 43). This would indicate that, on average, a man would seek vasectomy reversal between 6 and 13 years after vasectomy. While urologists cannot influence when a man will seek vasectomy reversal, information can be distributed prior to vasectomy outlining the relationship between the obstructed interval and ultimate success of vasectomy reversal.

Excising a portion of the vas

A second procedural issue at the time of vasectomy that can influence the success of MVR is excision of a portion of the vas deferens. While some may argue that excision of the vas deferens and pathologic examination of the excised segment is necessary from a legal standpoint, AUA policy states that excision is not mandatory (AUA Board of Directors, February 1993, reaffirmed October 2007). Post-procedure azoospermia is the sole criterion of successful sterilization (*J Androl* 2006; 27:637-40). Furthermore, no literature indicates that excision of a portion of the vas deferens correlates with "improved" sterilization.

The excision of a lengthy (>1-cm) segment of vas deferens is associated with the need for a higher scrotal incision, possibly up to the lower inguinal region, with the potential for anastomotic tension with MVR. Vasectomy reversal can be far more difficult when a lengthy portion of vas deferens has been excised, with concomitant increases in operative time, length of incision, and postoperative pain (*Fertil Steril* 2006; 86[supp 4]:S268-71).

While vasectomy reversal success has not correlated with the length of vas segment removed at vasectomy, it has been our experience that MVR is more difficult when a long segment has been removed. It is therefore best to perform vasectomy with excision of either a minimal segment or no segment of vas deferens to best facilitate subsequent reversal.

Location of transection

A third technical issue with vasectomy that can influence the success of MVR is the portion of the vas deferens where transection is performed. No standard currently exists as to where the transection of the vas deferens should occur.

Cross-sectional depictions of

Successful sterilization following vasectomy occurs with transection of the male excurrent duct system from the epididymis to the ampulla at the ejaculatory duct. Anatomic cross-sections of the vas deferens illustrate significant luminal changes and an increase in wall thickness of the vas deferens along its course from the convoluted vas deferens to the straight portion of the vas. Changes in diameter and concentricity can be noted a few centimeters distal from the epididymis and convoluted portion of the vas deferens (figure). Experts in microsurgery agree that anastomosis is least problematic when the lumen of the vas is largest and most concentric, as opposed to the lumen in the epididymis and proximal convoluted vas.

excurrent duct system

The section of the vas deferens where transection occurs contributes to sperm quality as assessed at the time of vasectomy reversal. Prospective studies show that the length of testicular vas deferens present at the time of MVR has a direct correlation with the presence of seminal fluid containing intact sperm at the time of reversal. A testicular length of vas deferens less than 2.7 cm correlates with seminal fluid without intact sperm 85% of the time, and a testicular length of over 2.7 cm is associated with intact sperm in the fluid 94% of the time. For each centimeter increase in testicular remnant length, the probability of whole sperm being present increases fourfold (*J Urol* 1994; 151: 892-4).

From technical and functional standpoints, ligation of the vas deferens at the time of vasectomy should be performed approximately 3 cm distal from the cauda of the epididymis in the straight portion of the vas deferens.

Method of luminal obstruction

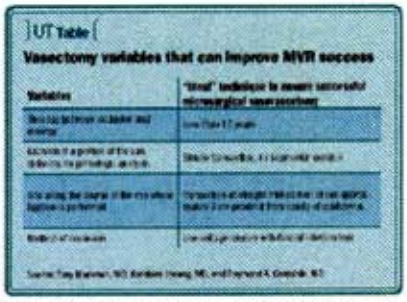
The final procedural consideration when performing vasectomy to facilitate potential reversal is the method of luminal obstruction. Options include simple ligation, ligation with fascial interposition, use of high-or low-voltage cautery, chemical occlusion techniques, and use of surgical clips versus suture to close the lumen.

Meta-analysis has shown no significant difference between ligation of the vas deferens and the use of surgical clips to occlude the vas. In addition, the use of spermicidal chemical irrigation of the vas does not provide any greater probability of post-vasectomy azoospermia (Cochrane Database 2007; Syst Rev. 2: CD003991). One randomized, controlled trial did demonstrate a statistically significant reduction of vasectomy failure when fascial interposition was used after standard ligation technique (*BMC Med* 2004; 2:6). A prospective study on the efficacy of cautery use for vas occlusion showed that the technique is, indeed, highly effective and offers a very low complication rate, although no comparison arm was used in this study (*BMC Urol* 2004; 4:10). All occlusive modalities for vasectomy carry similarly high efficacy in terms of post-procedure azoospermia. To date, no specific studies on occlusion technique as a predictor of MVR success have been performed.

Simple transection of the vas deferens with low-voltage cautery occlusion followed by fascial interposition provides successful vasectomy and may result in minimal inflammatory reaction. It is logical to conclude that minimizing the inflammatory reaction near the vas deferens will create the optimum condition in which to perform MVR.

Conclusions

Given the dramatic statistics on U.S. divorce rates and rates of remarriage, demand for MVR is expected to increase. To improve success rates of MVR, it is logical to move toward standardization of vasectomy technique to maximize technical ease of reversal. Several key procedural variables at the time of vasectomy for optimizing sperm presence in semen after vasectomy reversal have been outlined in this article (table). Because these variables can be controlled, it is important for the urologist performing vasectomy to be aware of the very real potential need for future reversal following vasectomy and to consider guidelines for providing men with the most favorable chance of reversal if their personal lives so dictate.


UT Table

Vasectomy variables that can improve MVR success

Variables	"Ideal" technique to ensure successful microsurgical vasovasostomy

Vasectomy variables that can improve MVR success

Series Editor

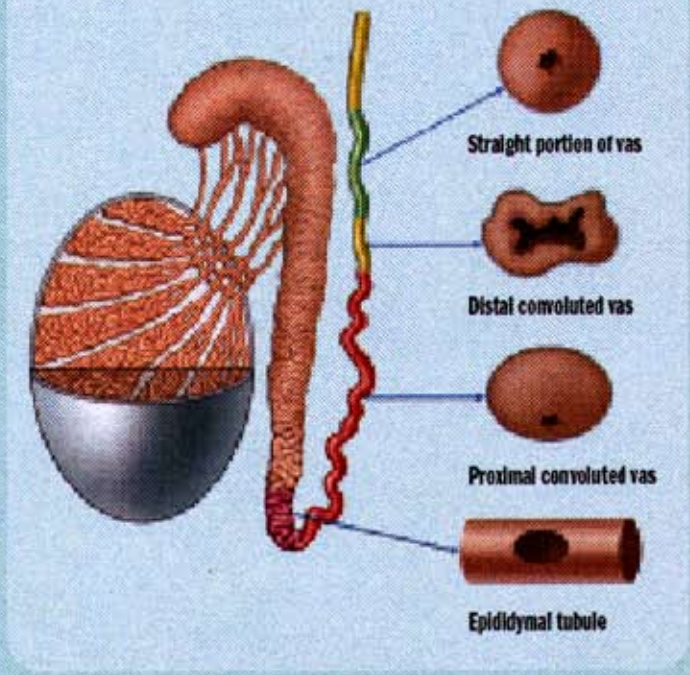
Gerald L. Andriole, MD, is professor of surgery and chief, division of urologic surgery, Washington University School of Medicine, St. Louis. He is also the director of the Urologic Research Center at Barnes-Jewish Hospital.

Dr. Mammen is a fellow in andrology, **Dr. Hwang** is a resident in urology, and **Dr. Costabile** is Jay Y. Gillenwater Professor of Urology and vice chairman, department of urology, University of Virginia School of Medicine, Charlottesville.

Dr. Mammen
Dr. Hwang
Dr. Costabile

UT Figure

Cross-sectional depictions of excurrent duct system



Area shaded in red indicates high level of difficulty when performing microsurgical vasectomy reversal. Areas shaded in yellow indicate medium level of difficulty. Area shaded in green indicates lowest difficulty and is the recommended portion at which to perform vasectomy. (Illustration by Rong-Zeng Li, MD)

Source: Tony Mammen, MD, Kathleen Hwang, MD, and Raymond A. Costabile, MD

Gerald L. Andriole, MD

UT Table

Vasectomy variables that can improve MVR success

Variables	"Ideal" technique to ensure successful microsurgical vasovasostomy
Time lag between occlusion and reversal	Less than 10 years
Excision of a portion of the vas deferens for pathologic analysis	Simple transection, no segmental excision
Site along the course of the vas where ligation is performed	Transection at straight mid-portion of vas approximately 3 cm proximal from cauda of epididymis
Method of occlusion	Low-voltage cautery with fascial interposition

Source: Tony Mammen, MD, Kathleen Hwang, MD, and Raymond A. Costabile, MD

Cross-sectional depictions of excurrent duct system
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