Comparison of Outcomes of Vasovasostomy Performed in the Convoluted and Straight Vas Deferens

Sutchin R. Patel and Mark Sigman*,†

From the Division of Urology, Brown Medical School, Providence, Rhode Island

Purpose: We compared postoperative semen analysis parameters and patency rates of vasovasostomy performed in the convoluted vs straight portion of the vas deferens.

Materials and Methods: Records of patients that underwent bilateral vasovasostomy in the straight and convoluted vas deferens by a single surgeon were retrospectively analyzed. Patient age, partner age, obstructive interval, gross and microscopic appearance of the intraoperative fluid aspirated from the testicular portion of the vas deferens, and postoperative semen analysis results were examined. Patency was defined as any sperm in the postoperative ejaculate and was compared for the 2 groups.

Results: A total of 42 and 64 patients underwent bilateral straight vasovasostomy and convoluted vasovasostomy, respectively. Mean patient age for straight and convoluted vasovasostomy was 38.5 and 40.3 years, respectively. Mean obstructive interval for straight vasovasostomy and convoluted vasovasostomy was 7.7 and 8.6 years, respectively. No significant differences in the postoperative semen analysis parameters of volume, total count, sperm density, motility or total motile count were found between the 2 groups. The patency rate was 98.1% and 97.3% for convoluted vasovasostomy and straight vasovasostomy, respectively, and was not statistically different.

Conclusions: Although vasovasostomy in the convoluted vas deferens is considered technically more challenging than in the straight vas deferens, patency rates and postoperative semen analysis parameters for convoluted vasovasostomy and straight vasovasostomy are comparable.

Key Words: vasovasostomy, vas deferens, semen

It is estimated that up to 6% of men who undergo vasectomy will eventually seek vasectomy reversal.[1] Vasectomy reversal may be performed via anastomosis of the abdominal end of the vas deferens to the testicular end of the vas deferens (vasovasostomy) or to the epididymis (vasoepididymostomy). The decision to proceed with vasovasostomy vs vasoepididymostomy will depend primarily on the microscopic appearance of the fluid expressed from the testicular end of the vas deferens. The success of vasovasostomy depends on multiple factors including the obstructive interval time, surgeon experience and the age of the female partner. Few studies have examined the location of vasovasostomy as a predictor of success. Vasovasostomy performed in the convoluted vas deferens is known to be technically more challenging than anastomosis of the vas deferens in the straight portion. The thin muscular wall and discrepancy in luminal size of the testicular and abdominal end in the convoluted vas deferens may contribute to the technical difficulty. Sandlow et al examined 42 patients that underwent bilateral convoluted vasovasostomy and 6 patients that underwent unilateral CVV when the contralateral side had an atrophic testis and found a patency rate of 88% and a natural pregnancy rate of 48%.[2] No studies to date have compared the success rates of vasovasostomy performed in the convoluted vs the straight portion of the vas deferens.

Submitted for publication May 18, 2007.

Study received institutional review board approval.

* Correspondence: Division of Urology, Brown Medical School, 2 Dudley St., Suite 185, Providence, Rhode Island 02905 (telephone: 401-421-0710; FAX: 401-421-0796; e-mail: Mark_Sigman@Brown.edu).

† Financial interest and/or other relationship with Bristol Myers Squibb.

For another article on a related topic see pages 376 and 381.

MATERIALS AND METHODS

We retrospectively analyzed patients that underwent consecutive bilateral vasovasostomies performed at the convoluted vas deferens (CVV) and consecutive bilateral vasovasostomies performed at the straight vas deferens (SVV). All surgeries were performed by a single surgeon (MS). Institutional review board approval was obtained for the study. The site of each anastomosis was documented in the operative note by the surgeon. The convoluted vas deferens was defined as the portion of the vas deferens with a tortuous course. Intraoperative intravasal fluid was examined and the gross and microscopic appearance (using 400 × wet mount light microscopy) was recorded. For patients undergoing vasovasostomy, the gross appearance of the intravasal fluid was categorized as translucent fluid or opaque fluid. The microscopic appearance was categorized as whole sperm, sperm heads with short tails, sperm heads or no sperm parts. Vasovasostomy was performed if any sperm or sperm parts were identified in the intravasal fluid. Vasovasostomy was also performed if no sperm or sperm parts were identified in the intravasal fluid but the fluid was clear and copious. The

DOI:10.1016/j.juro.2007.08.169

TABLE 1. *Microscopic appearance of intravasal fluid*

	No./Total No. CVV (%)	No./Total No. SVV (%)
Whole sperm/whole sperm	10/64 (15.6)	12/42 (28.6)
Whole sperm/short tails	12/64 (18.8)	4/42 (9.5)
Whole sperm/sperm heads	4/64 (6.3)	4/42 (9.5)
Whole sperm/no sperm	4/64 (6.3)	1/42 (2.4)
Short tails/short tails	5/64 (7.8)	7/42 (16.7)
Short tails/sperm heads	8/64 (12.5)	3/42 (7.1)
Short tails/no sperm	1/64 (1.5)	1/42 (2.4)
Sperm heads/sperm heads	15/64 (23.4)	8/42 (19.0)
Sperm heads/no sperm	3/64 (4.7)	1/42 (2.4)
No sperm/no sperm*	2/64 (3.1)	1/42 (2.4)

* No sperm were found bilaterally but clear and copious fluid was present.

decision to perform a convoluted vs straight vasovasostomy anastomosis was determined by the location of the previous vasectomy.

Exclusion criteria for our study were patients with intravasal azoospermia without copious clear fluid who thus underwent vasoepididymostomy, patients undergoing unilateral vasovasostomy or vasovasostomy where 1 side involved the convoluted vas deferens and the contralateral side involved the straight vas deferens, and all patients with a prior vasectomy reversal.

The surgical technique was either a microsurgical modified 2-layer technique with 9-zero nylon suture or a microsurgical full 2-layer technique with 10-zero mucosal and 9-zero outer layer. Six to 8 mucosal sutures were routinely placed. The modified 2-layer technique was used until approximately 1998 after which point the full 2-layer technique was used. The site of the anastomosis did not affect the choice of the technique. The convoluted vas was not unwound to straighten it but was cut in situ before anastomosis.

Postoperative semen analyses were obtained at 6 weeks and at 6-week intervals thereafter until pregnancy was achieved or the patient was lost to followup. Sperm densities were calculated and the specimen with the highest sperm density for each patient was used for analysis. Patency was defined as any sperm in the postoperative semen specimen. Means were calculated for patient age, partner age, obstructive interval, semen volume and percent motility. For table presentation medians were calculated for nonnormally distributed data (sperm density, total sperm count and total motile count). These nonnormally distributed data were log transformed to normalize data distribution for statistical analysis. Means were compared using t tests while ratios (patency rates, frequency of whole sperm, frequency of whole motile sperm) were compared with Fisher's exact test and chi-square analysis. Given the sample size, the power of the study was 84% at an alpha of 0.05 to detect a 15% difference in patency rates. Simulation modeling was used to determine the probability of finding the observed patency rates if the true patency rates differed by 15%. Statistical analysis was performed with WINKS software (TexaSoft, Cedar Hill, Texas).

RESULTS

A total of 64 patients underwent bilateral CVV and 42 underwent bilateral SVV. Mean patient age was 40.3 and 38.5 years for CVV and SVV ($p = 0.118$). The mean age of female partner for the 2 groups was 33.7 and 33.3 for CVV and SVV ($p = 0.705$). The mean obstructive interval was 8.6 and 7.7 years for CVV and SVV ($p = 0.573$). Of the 64 patients undergoing bilateral CVV, 53 patients (82.8%) had postoperative semen analysis. Of the 42 patients undergoing bilateral SVV, 37 patients (88.1%) had postoperative semen analysis.

Upon examining the gross appearance of the intravasal fluid, the fluid was opaque in appearance in 50.0% of CVV cases and 45.2% of SVV cases. Patency was not found to correlate with the gross appearance of the intravasal fluid. Of the 46 patients with translucent fluid in at least 1 side, patency was 100%, while the patency rate was 95% in the 42 patients with opaque intravasal fluid bilaterally ($p = 0.435$). Table 1 summarizes the microscopic appearance of intravasal fluid. The percent of patients with intravasal whole sperm on either side were 46.8% and 50% for CVV and SVV, respectively ($p = 0.753$). Intravasal motile whole sperm on either side were found in 39% of CVV and 40% of SVV ($p = 0.884$).

In patients with postoperative semen analysis, no statistically significant difference was found in semen volume, total count, sperm density, motility or total motile count between the 2 groups (table 2). The percentage of patients with sperm density greater than various thresholds was similar between the CVV and SVV groups (see figure). The patency rates for bilateral CVV and SVV were 98.1% (52 of 53 patients) and 97.3% (36 of 37 patients), respectively, which were not significantly different ($p = 0.656$). Simulation modeling determined that the chance of observing these patency rates if the true patency rates differed by 15% was 0.69%. If patency was defined as the presence of motile sperm in the ejaculate, then the patency rates for the 2 groups were 98.1% (CVV) and 91.9% (34 of 37 patients, SVV) which were also not significantly different ($p = 0.302$).

DISCUSSION

The success of vasovasostomy depends on multiple factors including the obstructive interval time, female partner age and surgeon experience.[3] Intraoperative factors such as the quality of intravasal fluid and the presence of sperm granuloma have also been shown to predict the success of vasovasostomy.[4,5] The multi-institutional results from the Vasovasostomy Study Group regarding the outcome of 1,166 bilateral vasovasostomies showed a patency rate of 87% and a pregnancy rate of 53%.[6] The authors of the study observed that the most important factors in predicting a successful outcome during vasectomy reversal was the obstructive interval time and that other parameters such as intravasal fluid quality and previous partner pregnancies were also important. The site of vasovasostomy anastomosis was not

TABLE 2. *Postoperative semen analysis*

	CVV	SVV	p Value
No./total No. pts with postop semen analysis (%)	53/64 (88.1)	37/42 (82.8)	—
Mean vol (ml)	3.2	3.0	0.612
Median total count ($\times 10^6$)	94.3	118.8	0.750
Median sperm density (million/ml)	38.0	40.0	0.945
Mean motility (%)	38.3	40.3	0.678
Median total motile count ($\times 10^6$)	32.4	41.6	0.957
No./total No. patency rate (%)	52/53 (98.1)	36/37 (97.3)	0.302