

## REPEAT VASECTOMY REVERSAL AFTER INITIAL FAILURE: OVERALL RESULTS AND PREDICTORS FOR SUCCESS

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### ABSTRACT

**Purpose:** We review the treatment outcomes for microsurgical reconstruction following failed vasectomy reversal and identify predictors for success.

**Materials and Methods:** We performed a retrospective review of our experience with microsurgical reconstruction in 41 men who underwent 1 or more prior unsuccessful vasectomy reversal procedures. Of these patients 20 underwent bilateral (16) or unilateral (4) vasoepididymostomy, 11 underwent bilateral (7) or unilateral (4) vasovasostomy and 10 underwent unilateral vasoepididymostomy with contralateral vasovasostomy. Postoperative followup consisted of serial semen analyses and telephone interviews.

**Results:** Patency and pregnancy followup data were available in 33 and 31 patients, respectively. Five couples had ongoing uncorrected female factor infertility problems and were not included in pregnancy rate calculations. Mean obstructive interval was 10.6 years. Overall patency and pregnancy rates were 79 and 31%, respectively. Mean total motile sperm count for patients demonstrating patency at followup was 38.0 million. History of conception with the current partner was predictive of future conception with 4 of 5 nonremarried couples (80%) initiating a pregnancy versus 3 of 18 remarried couples (17%) ( $p = 0.006$ ). Other factors, including smoking history and obstructive interval, did not correlate with postoperative success. Reconstruction with vasovasostomy on at least 1 side trended toward improved patency ( $p = 0.17$ ) and pregnancy rates ( $p = 0.15$ ), although they did not assume statistical significance.

**Conclusions:** Microsurgical reconstruction following failed vasectomy reversal is associated with high patency and moderate pregnancy rates at short-term followup. In our series previous conception with the current partner was predictive of future conception after reconstruction. Urologists performing repeat vasectomy reversal must be familiar with microsurgical techniques, since almost three-quarters of patients will require at least unilateral vasoepididymostomy.

**KEY WORDS:** infertility, male; reanastomoses, vas; surgical procedure, reconstructive

Vasectomy remains one of the most commonly performed procedures in the United States. More than a half million vasectomies are performed annually and it is estimated that 2 to 6% of patients who have undergone vasectomy consider a vasectomy reversal procedure due to a number of different circumstances such as remarriage.<sup>1</sup>

Microsurgical vasectomy reversal has proved to be a highly successful procedure with patency rates of 71 to 97% and pregnancy rates of 30 to 76%, depending on the interval from vasectomy to its reversal.<sup>2,3</sup> Those patients whose obstructive interval was less than 3 years had the highest patency and pregnancy rates. Despite these successes, up to 30% of reversals will fail, either from a compromised vasal anastomosis or an unrecognized secondary epididymal obstruction.<sup>4</sup> Men whose vasectomy reversal fails have several options, including repeat vasectomy reversal procedure, epididymal sperm aspiration with assisted reproductive techniques, adoption or donor insemination.

We present our experience with men who have undergone repeat vasectomy reversal after 1 or more failed attempts, and review the overall patency and pregnancy rates. We also examined a variety of factors, including smoking history, time since vasectomy, prior conception with current partner as well as type of repair (vasovasostomy versus vasoepididymostomy) in an attempt to identify predictors of successful surgical outcome.

### MATERIALS AND METHODS

Between July 1994 and April 1998, 41 men underwent a microsurgical repeat vasectomy reversal procedure by 1 surgeon (E. S. S.) in a urology residency teaching program. Patients underwent unilateral or bilateral vasovasostomy, unilateral or bilateral vasoepididymostomy, or unilateral vasoepididymostomy with contralateral vasovasostomy as indicated by the findings of touch preparations of seminal fluid from the testicular end of the vas deferens. If sperm cells were seen in the fluid from the proximal vas, vasovasostomy was performed. If no sperm cells were seen, microsurgical epididymal exploration was performed. A vasoepididymostomy was performed only if sperm cells were noted in the fluid expressed from the epididymal tubule. The epididymal anastomosis was performed to the lowest level of the epididymis where sperm was identified. The techniques of microsurgical 2-layer vasovasostomy and end-to-side vasoepididymostomy were used in all cases as previously described.<sup>5,6</sup>

The medical records were reviewed retrospectively. The date of vasectomy, date of first vasectomy reversal, history of conception with current partner, history of female factor infertility problems and smoking history were documented. Patients who lived locally had the procedure done on an outpatient basis, while those from out of town spent 1 night in the hospital observation unit. All patients were instructed to submit a semen specimen for analysis 3 months after the

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procedure and quarterly thereafter as indicated. Patency was defined as the presence of sperm in the ejaculate. Patients and partners seen postoperatively in clinic were questioned regarding any pregnancies and deliveries. Telephone interviews were conducted and a questionnaire was mailed to complete the data.

Patients without postoperative semen analyses or pregnancy followup data were not included in the statistical analysis. In addition, couples with ongoing uncorrected female factor fertility problems were excluded from pregnancy rate calculations. Statistical significance was determined by chi-square analysis for nonnumeric data and by Student's t-test for numeric data. For all analyses  $p < 0.05$  was considered statistically significant. The analyses were performed using statistical software.

### RESULTS

Patient characteristics are reviewed in table 1. Of the 41 patients in our series 20 (49%) underwent bilateral (16) or unilateral (4) vasoepididymostomy, 11 (27%) underwent bilateral (7) or unilateral (4) vasovasostomy and 10 (24%) underwent unilateral vasoepididymostomy with contralateral vasovasostomy. Of the 46 epididymal anastomoses 14 were to the cauda, 21 to the corpora and 5 to the caput. In 6 patients the level of the epididymal anastomosis was not documented in the records. In 38 men 1 and in 3, 2 prior attempts at reversals were performed. Mean patient age was 39 years (range 28 to 54). Mean obstructive interval was 10.6 years (range 3 to 27). The interval from vasectomy to first vasectomy reversal attempt was 8.1 years (range 1 to 23) and mean interval from first to second vasectomy reversal procedure was 2.5 years (range 0.5 to 11).

Postoperative results are summarized in table 2. Patency and pregnancy followup data were available in 33 and 31 patients, respectively. Five couples were excluded from pregnancy rate calculations due to ongoing severe female factor fertility problems. Mean followup was 8 months (range 3 to 20). Overall patency and pregnancy rates were 79 and 31%, respectively. Mean total motile sperm count was 38.0 million cells for the entire population, 54.3 million for those undergoing vasovasostomy on at least 1 side and 24.9 million for patients undergoing vasoepididymostomy only ( $p = 0.53$ ). Mean sperm concentration and motility for the entire population were 66.4 million per cc (range 2.6 to 280) and 27% (range 0 to 91), respectively. There was no statistically significant difference in individual semen parameters of count and motility between those who underwent at least 1 vasovasostomy and those who underwent vasoepididymostomy only.

The results were stratified by patient characteristics, such as smoking history, duration of obstructive interval (greater or less than 10 years), type of reconstruction (vasovasostomy on at least 1 side versus vasoepididymostomy alone) and history of conception with current partner, in an attempt to identify predictors of postoperative patency or pregnancy (table 3). Only a history of conception with the current part-

TABLE 1. Patient characteristics and current procedure

Mean age (range)	39	(28-54)
Mean yrs. obstructive interval (range)	10.6	(3-27)
No. prior reversals:		
1	38	
2	3	
No. vasovasostomy (%):	11	(27)
Bilat.	7	(17)
Unilat.	4	(10)
Vasoepididymostomy:	20	(49)
Bilat.	16	(39)
Unilat.	4	(10)
Unilat. vasovasostomy + contralat. vasoepididymostomy	10	(24)

TABLE 2. Surgical outcomes

	Overall	Vasovasostomy on Min. 1 Side	Vasoepididymostomy Only
No. pts.	41	21	20
% Patency	79	88	69
% Pregnancy	31	46	15
Total motile sperm count (million)	38.0	54.3	24.9
Sperm concentration (million/ml.)	60.1	44.7	82.2

TABLE 3. Potential predictive factors for postoperative patency and pregnancy

	% Patency	p Value	% Pregnancy	p Value
Smoking history:		0.37		0.63
Nonsmoker	79		31	
Smoker	63		22	
Obstructive interval (yrs.):		0.38		
Less than 10	84		-	
More than 10	71		-	
History of conception with current partner:				0.006
Yes	-		80	
No	-		17	
Reconstruction type:		0.17		0.15
Vasovasostomy on min. 1 side	88		46	
Vasoepididymostomy Only	69		15	

ner was predictive of future conception with 4 of 5 nonremarried couples (80%) initiating a pregnancy versus 3 of 18 remarried couples (17%) ( $p = 0.006$ ). Although not statistically significant, presence of vasovasostomy on at least 1 side demonstrated a tendency towards higher patency and pregnancy rates ( $p = 0.17$  and  $p = 0.15$ , respectively).

### DISCUSSION

Even in the most experienced hands vasectomy reversal may fail, either from compromised anastomoses or an unrecognized secondary epididymal obstruction.<sup>4</sup> Our study suggests that microsurgical reconstruction following initial failure remains an attractive option for couples with overall patency and pregnancy rates of 79 and 31%, respectively. The followup in our series was a relatively short 8 months and we would expect higher conception rates with further followup. Comparable results for repeat vasectomy reversal have been reported in the literature with patency rates ranging from 64 to 75% and pregnancy rates between 27 and 43% (table 4).<sup>2,7,8</sup> It is interesting that the patency and pregnancy rates do not differ significantly from initial microsurgical vasectomy reversal results of 76% patency and 40% pregnancy if one examines comparable obstructive intervals to the 10.6 years in our series.<sup>2</sup>

The predominant type of surgical reconstruction required remains different between initial and repeat reversal cases due to an apparent higher incidence of secondary epididymal obstruction in the repeat reversal population. Whereas only 4% of men undergoing initial reversal require vasoepididymostomy,<sup>2</sup> 73% of our patients required vasoepididymostomy on at least 1 side. Length of obstructive interval did not

TABLE 4. Repeat vasectomy reversal series

References	% Requiring at		% Overall Patency	% Overall Pregnancy	Mean Followup (mos.)
	Least 1 Vasoepididymostomy	Overall			
Belker et al <sup>2</sup>	33	75	43	-	
Fox <sup>5</sup>	0	64	27	23	
Matthews et al <sup>7</sup>	58	67	30	23	
Current series	73	79	31	8	

correlate with the need to perform epididymal anastomosis at reconstruction. Other repeat reversal series have also reported elevated vasoepididymostomy rates, accounting for between 33 to 58% of total reconstructions.<sup>2,7</sup> In our series vasoepididymostomy was performed if sperm were absent in the proximal vasal fluid, regardless of fluid quality. It has been well established by the Vasovasostomy Study Group that vasal fluid quality in the absence of sperm is predictive of vasovasostomy patency rates for initial reversals with 60% overall, 80% for watery fluid, 75% for opalescent fluid and 26% for creamy fluid.<sup>2</sup> We believe that the patency rates for repeat vasovasostomy are even lower if sperm is absent from the vasal fluid due to secondary epididymal obstruction, a suspicion supported by Fox who reported persistent azoospermia in all patients when no sperm were seen in the proximal vas fluid, irrespective of the gross fluid characteristics.<sup>8</sup>

A variety of parameters were examined in an attempt to identify predictors for reversal success. Presence of vasovasostomy on at least 1 side demonstrated a tendency for improved success, although statistical significance was not achieved. Patients who underwent vasovasostomy on at least 1 side had patency and pregnancy rates of 88 and 46% versus 69 and 15%, respectively, for men undergoing unilateral or bilateral vasoepididymostomy. Similar results have been reported in other series. Matthews et al noted that patients who underwent vasovasostomy on at least 1 side had patency and pregnancy rates of 93 and 43%, respectively, whereas those undergoing vasoepididymostomy only had rates of 47 and 15%, respectively.<sup>7</sup> The Vasovasostomy Study Group reported patency and pregnancy rates for men undergoing vasovasostomy on at least 1 side during the second reversal of 82 and 52%, and 44 and 15%, respectively, for those undergoing vasoepididymostomy only.<sup>2</sup> It seems intuitive, given the greater degree of technical difficulty in performing an epididymal anastomosis versus vasovasostomy and the diminished fertilizing capacity of proximal epididymal sperm,<sup>9</sup> that there be such a difference in patency and pregnancy rates between these 2 procedures. Another factor evaluated in this study was history of conception with the current partner. Our study suggests that previous conception with the current partner is predictive of future conception. These findings may reflect a lower incidence of concurrent female factor infertility in women of proved fertility. In addition, these couples have demonstrated fertilizing compatibility, indicating presumable absence of antisperm antibodies or other problems. However, smoking history did not predict patency or pregnancy results in our study. Other investigators have found similar results in the general infertility population.<sup>10</sup>

Assisted reproduction techniques with percutaneous or open sperm extraction from the epididymis or testis remain a treatment option for failed vasectomy reversals. The advent of intracytoplasmic sperm injection has revolutionized the treatment of male factor infertility and has been applied to the treatment of obstructive and nonobstructive azoospermia.<sup>11</sup> Delivery rates between 14 and 35% for epididymal sperm aspiration and intracytoplasmic sperm injection for a variety of causes of obstructive azoospermia have been reported.<sup>12-14</sup> Despite comparable success rates to repeat vasectomy reversal, cost and safety issues remain a concern for intracytoplasmic sperm injection for initial vasectomy reversal patients. Kolettis and Thomas reported their experience with 55 men undergoing vasoepididymostomy (45 had undergone initial vasectomy reversal) and conducted an outcomes and cost per newborn comparison between their results and those reported in the literature for microsurgical epididymal sperm aspiration with intracytoplasmic sperm injection.<sup>15</sup> They reported patency and pregnancy rates of 85 and 44%, respectively, and the live delivery rate was 36 compared to 29% with microsurgical epididymal sperm aspiration with

intracytoplasmic sperm injection. They concluded that vasoepididymostomy is more successful and more cost-effective than microsurgical epididymal sperm aspiration with intracytoplasmic sperm injection, considering that the cost per newborn with the latter procedure was \$51,024 versus \$31,099 for vasoepididymostomy. One would expect that the cost-effectiveness of a repeat vasectomy reversal procedure in those patients undergoing at least unilateral vasovasostomy would be even higher given the demonstrated higher patency and pregnancy rates in this group. In addition, concerns regarding potential complications of assisted reproductive techniques, such as ovarian hyperstimulation syndrome and the increased incidence of multiple births, would seem to favor the selection of repeat vasectomy reversal over assisted reproductive techniques for patients with failure of an initial vasectomy reversal.<sup>16</sup> However, it is prudent to cryopreserve semen at the time of reconstruction in the event of a surgical failure.

Approximately 73% of our patients required vasoepididymostomy on at least 1 side. It is our opinion that urologists undertaking repeat vasectomy reversal procedures should be familiar with microsurgical techniques, considering the large percentage of cases in which reconstruction mandated epididymal anastomosis.

#### CONCLUSIONS

Microsurgical reconstruction following failed vasectomy reversal is associated with high patency and moderate pregnancy rates. Repeat reversal procedures have comparable success to initial reconstruction in patients with obstructive intervals greater than 10 years. In our series prior conception with the current partner was predictive of future conception after reconstruction. Patients who underwent vasovasostomy on at least 1 side demonstrated a tendency towards higher patency and pregnancy rates than those who underwent vasoepididymostomy only. Urologists performing repeat vasectomy reversal must be familiar with microsurgical techniques, since almost three-quarters of patients will require at least unilateral vasoepididymostomy.

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