

## THE IMPACT OF OBSTRUCTIVE INTERVAL AND SPERM GRANULOMA ON OUTCOME OF VASECTOMY REVERSAL

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### ABSTRACT

**Purpose:** We studied the impact of the interval from vasectomy to reversal and presence of sperm granuloma on outcomes of reversal.

**Materials and Methods:** A total of 213 microsurgical vasectomy reversals performed by a single surgeon were stratified according to obstructive intervals of less than 5 years, 5 to 10 years, 10 to 15 years and greater than 15 years. The effects of obstructive interval on patency and pregnancy rates were assessed using multivariate logistical regression. The impact of sperm granuloma on patency and pregnancy was assessed using the chi-square test.

**Results:** Patency did not change with increasing obstructive intervals as can be seen with 91% patency at less than 5 years, 88% at 5 to 10 years, 91% at 10 to 15 and 89% at greater than 15 years. There was no difference in pregnancy rates (89%, 82% or 86%) at obstructive intervals of 0 to 5, 5 to 10 or 10 to 15 years, respectively. Pregnancy rates were significantly lower (44%,  $p < 0.05$ ) with obstructive intervals greater than 15 years. Men with at least unilateral sperm granuloma had patency of 95% vs 78% without granulomas, a trend which did not quite reach statistical significance ( $p = 0.07$ ). There was no difference in pregnancy rates with or without granulomas.

**Conclusions:** Vasectomy reversal patency rates are high regardless of time since vasectomy. Pregnancy rates are lower more than 15 years after vasectomy. Sperm granuloma had a favorable impact on patency. Our data indicate that for obstructive intervals less than 15 years vasectomy reversal yields much higher pregnancy rates than in vitro fertilization and intracytoplasmic sperm injection, and that even for intervals greater than 15 years reversal outcomes equal or exceed those of in vitro fertilization and intracytoplasmic sperm injection.

**KEY WORDS:** vasectomy, vavovavostomy, pregnancy rate, granuloma

The number of vasectomies performed each year in the United States is about 500,000, and it is estimated that between 2% and 6% of these men will ultimately seek reversal.<sup>1</sup> With the advent of in vitro fertilization and intracytoplasmic sperm injection (IVF/ICSI), which currently results in clinical pregnancy rates of 20% to 45% per initiated cycle,<sup>2</sup> the therapeutic options for couples with male factor infertility have increased. Thus, to provide couples with information to make decisions regarding infertility treatment, particularly in an era of increased cost consciousness, the need exists to establish the success rate of vasectomy reversals as well as to determine potential preoperative predictors for reversal success.

One parameter which has been evaluated for its impact on post-reversal pregnancy rates is the obstructive interval, defined as the length of time from vasectomy to reversal. Although previous studies have agreed that the obstructive interval is inversely related to reversal success, there has been considerable controversy regarding the specific impact of interval on postoperative outcome.<sup>3–5</sup>

A second potential predictor of outcome after vasectomy reversal is the presence of a sperm granuloma at the vasectomy site. The presence of sperm granuloma is associated with better quality intraoperative vasal fluid but has not been consistently associated with improved postoperative patency or pregnancy rates.<sup>4–6</sup> We studied the impact of the obstructive interval and the presence of sperm granuloma on the outcome of vasectomy reversal on a series of reversals

performed by a single surgeon in a tertiary care university setting.

### MATERIALS AND METHODS

**Patients.** We retrospectively reviewed randomly selected vasectomy reversals performed by a single surgeon from 1984 through 2001. Demographic data, patient history and followup were obtained from chart review. Enrollment criteria for the study included first time vasectomy reversals, whereas men who presented for repeat reconstruction were excluded. Only men undergoing bilateral reconstruction were considered. Female factor infertility was excluded from study in all cases. Beginning in alphabetical order from the reversal chart rack, the first 213 couples who met these criteria were selected for study.

**Groups.** Patients were stratified by obstructive interval (defined as the time from vasectomy to reversal, rounded off to the nearest complete year) into those less than 5 years, 5 to 10 years, 10 to 15 years and greater than 15 years. The presence or absence of a sperm granuloma at the vasectomy site was determined by preoperative physical examination and confirmed by histological evaluation of the surgical specimen.

**Surgery.** Vasovasostomy (VV) and vasoepididymostomy (VE) were performed using a multilayer microsurgical approach previously described.<sup>1</sup> The entire vasectomy site including sperm granuloma, if present, was always excised. Suspected sperm granuloma were sent for histological evaluation by a surgical pathologist.

**Postoperative evaluation.** Postoperative evaluation included serial semen analyses beginning at 6 weeks and con-

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tinuing until a pregnancy was achieved or patients were lost to followup. For those men whose partner has yet to conceive, the minimum followup was 6 months. Only naturally conceived pregnancies were included in the calculations, and none of the female partners used assisted reproduction techniques to achieve pregnancy. Only clinical pregnancies with documented heartbeats were included in the study. Pregnancy rates were calculated for the cohort of patients within each obstructive interval. We defined patency as the presence of any sperm (motile or nonmotile) with tails in the ejaculate.

**Statistical analysis.** The effect of obstructive interval on vasal patency and postoperative pregnancy rates was assessed using multivariate logistical regression. The impact of sperm granuloma on patency and pregnancy was assessed using the chi-square test. Statistical analysis was performed using SAS 8.2 software (SAS Institute, Inc., Cary, North Carolina).

RESULTS

The characteristics of the patient population according to obstructive interval are shown in table 1. Neither the mean age of the men nor of the female partners differed among the intervals. There was no significant difference in the type of reconstruction performed within the groups; that is, the percentage of men in each interval who underwent at least a unilateral VE was equivalent.

Patency and pregnancy rates were determined according to obstructive interval (table 2). Vasal patency did not change with increasing obstructive interval: 91% at less than 5 years, 88% at 5 to 10 years, 91% at 10 to 15 years and 89% for more than 15 yrs. There was also no difference in pregnancy rate at obstructive intervals of 0 to 5, 5 to 10 or 10 to 15 years. However, pregnancy rates were significantly lower (44%,  $p < 0.05$ ) for patients with obstructive intervals greater than 15 years. The pregnancy rate for the entire cohort was 81%. Mean followup was 25 months.

A total of 54 patients (25% of total population studied) underwent at least a unilateral VE during reconstruction, and 18 patients underwent VV/VE, while 36 patients underwent a bilateral VE. Patients who underwent bilateral VV had a significantly higher patency rate (95%) than patients who had unilateral VV and VE (83%) and patients who had bilateral VE (83%,  $p < 0.05$ ), as shown in table 3. However, pregnancy rates did not differ significantly among the procedures performed.

A total of 28% (76) patients had evidence of at least a unilateral sperm granuloma on physical examination before treatment (all of which were subsequently confirmed histologically). Of these 76 men, 65 underwent a bilateral VV, while 5 had a VV/VE and 6 men a bilateral VE. After reversal patients with a palpable sperm granuloma had a patency of 95% vs 78% for patients without a sperm granuloma, a trend which did not quite reach statistical significance ( $p = 0.07$ ). There was no significant difference in pregnancy rates with or without sperm granuloma (83% vs 78%).

DISCUSSION

The patency rate after vasectomy did not significantly change with increasing obstructive interval even at intervals

TABLE 2. Impact of obstructive interval on postoperative outcomes

Obstructed Interval (yrs)	No. Pts	No. With Vasal Patency (%)	No. Clinical Pregnancies (%)
Less than 5	45	41 (91)	40 (89)
5-10	85	75 (88)	70 (82)
10-15	56	51 (91)	48 (86)
Greater than 15	27	24 (89)	12 (44)

TABLE 3. Outcome according to procedure performed

Reconstruction Type	No. Performed	No. Vasal Patency Rate (%)	No. Pregnancies Achieved (%)
VV/VV	159	151 (95)	132 (83)
VV/VE	18	15 (83)	13 (72)
VE/VE	36	30 (83)	29 (81)

greater than 15 years. This finding conflicts with previous vasectomy reversal studies which consistently reported an inverse relationship between patency and obstructive interval.<sup>3-5</sup> These results may reflect our policy of routinely performing VE in the face of intravasal azoospermia (except when copious clear fluid is present) as well as the use of newer VE techniques with higher reported patency rates.<sup>1, 7-11</sup>

The difference in patency rates between the VV and VE procedures is similar to that reported previously from our institution.<sup>12, 13</sup> In the present study the frequency of VE procedures was similar (approximately 25%) among obstructive intervals, thus our outcomes cannot be attributed solely to differences inherent in the reconstructive approach.

The pregnancy rate after vasectomy reversal at our institution remained constant (at 82% to 89%) for obstructive intervals less than 15 years. This absence of an inverse relation between pregnancy rate and obstructive interval up to 15 years, as well as the high pregnancy rate during the interval, differs from prior reversal studies.<sup>3-5</sup> Pregnancy rates were significantly lower (44%) in our series for patients with obstructive intervals greater than 15 years, which concurs with results from previous studies.<sup>3-5</sup>

A discrepancy between patency and pregnancy rates after reconstruction was noted across all obstructed intervals in our series. This disparity widened with increasing interval, from 2% for obstructed intervals less than 5 years to 45% for intervals greater than 15 years. The difference between patency and pregnancy rates which has been noted in previous studies may be the result of female factors, antisperm antibodies,<sup>14</sup> a time dependent post-vasectomy germ cell damage<sup>15, 16</sup> or post-vasectomy epididymal dysfunction.

The frequency of palpable sperm granulomas in our series (28%) was in accord with prior reports.<sup>17</sup> Previous studies have demonstrated an association between the presence of sperm granuloma and the intraoperative finding of better quality vasal fluid.<sup>6, 17</sup> This beneficial effect of sperm granuloma is thought to be due to a "pop off valve," pressure releasing effect of the granuloma on the proximal duct system.<sup>18</sup> That is, the increase in intratubular pressure which occurs after vasectomy may induce rupture of the epididymis and subsequent epididymal obstruction.<sup>19, 20</sup> Formation of a granuloma at the vasectomy site, reflecting leakage of sperm and a subsequent decrease of intratubular pressure, may thus prevent epididymal obstruction. This potential protection of the epididymis may be reflected by our experience in that the subset of patients with a sperm granuloma had a lower incidence of unilateral or bilateral VE (11 of 76 or 14%) than patients without a sperm granuloma (43 of 137 or 31%).

In spite of the presumed benefit of sperm granuloma, previous studies have failed to demonstrate an improvement in patency or pregnancy rates in the presence of a granuloma.<sup>4, 5</sup> Likewise, although our study demonstrated a trend toward increased patency associated with sperm granuloma, this

TABLE 1. Patient characteristics by obstructive interval

Obstructive Interval (yrs)	No. Pts	Mean Age		% Pts With 1 or More VE
		Males	Female Partners	
Less than 5	45	39	34	18
5-10	85	41	33	29
10-15	56	44	32	25
Greater than 15	27	49	34	26

association did not reach statistical significance ( $p = 0.07$ ). Moreover, there was no difference in pregnancy rates with or without sperm granuloma.

#### CONCLUSIONS

The results of our study may be useful in counseling patients seeking post-vasectomy fertility. The information here concerning the chance for successful vasectomy reversal is particularly relevant when considering the current alternative to reversal, IVF/ICSI, using aspirated sperm. Our data indicate that for obstructive intervals less than 15 years vasectomy reversal yields much higher pregnancy rates than IVF/ICSI, and that even for intervals greater than 15 years reversal outcomes equal or exceed those of IVF/ICSI. Reversal is a more cost-effective option regardless of the interval since vasectomy, especially for couples seeking more than 1 child post-vasectomy.

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