

# Patency following vasectomy reversal

## Temporal and immunological considerations

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### ABSTRACT

**Objectives:** To evaluate the postoperative patency rates of microsurgical vasovasostomy and vasoepididymostomy at various vasectomy reversal time intervals, and to assess the implications of anti-sperm antibodies on results.

**Methods:** Three hundred and eighty-two patients underwent unilateral or bilateral vasectomy reversal between January 1997 and April 2001 at the Health Clinic, Highgate and Manor House Hospitals, London, United Kingdom. Patients were divided into 4 groups according to the time interval between vasectomy and reversal; less than 5 years, 5-10 years, 10-15 years, and more than 15 years. Data collected included patient's age at time of vasectomy reversal, seminal fluid analysis at 3, 6 and 12 months after surgery, and the presence or absence of anti-sperm antibodies before vasectomy reversal.

**Results:** Mean patient age at the time of reversal was 44.6 years. The mean vasectomy reversal time interval was 12.8 years. Overall patency rate of the patients groups was 62.9% with positive sperm in the ejaculate in 85.3% in the less than 5 years group, 75.3% in the 5-10 years group, 50.3% in the 10-15 years group and 26.9% in the more than 15 years group. Anti-sperm antibodies were positive in 31 patients (9.1%), of whom 12 patients (38.7%) were positive for sperm in the ejaculate.

**Conclusion:** Microsurgical vasectomy reversal produces satisfactory patency rates to couples that consider reestablishing their fertility even more than 15 years after vasectomy. The presence of anti-sperm antibodies is associated with negative effects on sperm count, motility, and percentage of abnormal forms.

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Fertility management options for men with seminal tract obstruction due to vasectomy consist of vasectomy reversal or sperm extraction with in-vitro fertilization or intracytoplasmic sperm injection. Several studies have established the cost-effectiveness of vasectomy reversal over up-front assisted reproductive techniques.<sup>1-4</sup> With microsurgical vasovasostomy or vasoepididymostomy, the patency rate can be as high as 80-99% with a natural pregnancy rate of 40-60%.<sup>5-8</sup>

The aim of this study was to evaluate the patency rate of vasectomy reversal at various vasectomy

reversal time intervals using microsurgical technique, and to assess the prevalence of serum anti-sperm antibodies in vasectomized patients, and their effect on semen parameters after successful vasectomy reversal surgery.

**Methods.** The records of 382 patients who underwent vasovasostomy and vasoepididymostomy from January 1997 to April 2001 by a single surgeon were retrospectively reviewed. The study was carried out at the at the Health Clinic,

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Highgate and Manor House Hospitals, London, United Kingdom. Preoperatively, all patients had complete history and clinical examinations, and tests for serum anti-sperm antibodies using agglutination techniques,<sup>9</sup> sperm immobilization<sup>10</sup> and the indirect immunobead tests.<sup>11</sup> Surgery was performed under general anesthesia. The decision to perform vasovasostomy or vasoepididymostomy was made intraoperatively. After dividing the vas, just proximal to the vasectomy site, the epididymis was gently compressed to express some seminal fluid. An embryologist examined the seminal fluid under light microscope in the operating room. When sperm was present in the specimen, vasectomy reversal was performed microsurgically using inert Ethilon 10/0 sutures. For tension free approximation, extra length was obtained by mobilizing, and clearing the ends of the vas. The inguinal canal was occasionally opened to achieve this if a long part of the vas had been removed. The testis had to be brought out of the scrotum to find the vas if it had been divided close to it. Approximately 8 interrupted sutures were inserted to bring the mucosa together and as many muscle stitches were used to complete the anastomosis. If no sperm was present in the specimen, the epididymis was explored and, if found to be obstructed, an end to side tubule anastomosis or an end to side intussusception vasoepididymostomy was performed at the lowest level of the epididymis where sperm have been noted. A microsurgical 2 layer technique was used. The same procedural method was applied to the contralateral side. Thus, some patients had bilateral vasovasostomy or bilateral vasoepididymostomy and others had unilateral vasovasostomy with contralateral vasoepididymostomy. Seminal fluids analysis was performed postoperatively at 3, 6 and 12 months. Patients were divided into 4 groups according to the time interval between vasectomy and vasectomy reversal; less than 5 years, 5-10 years, 10-15 years, and more than 15 years. Patency was defined as the presence of sperm in the ejaculate in at least one postoperative semen sample. Patients with less than 6 months of follow-up were excluded from the patency rate analysis unless they had sperm in their semen samples.

For statistical analysis spermatozoa concentration was expressed as mean  $\pm$  SEM. Comparisons between semen parameter means were made using student's t-test. Contingency analysis by least square ( $\chi^2$ ) was performed to compare qualitative data. Significance was assumed at  $p<0.05$ .

**Results.** The mean patient age at the time of reversal was 44.2 years (range 25-57 years). The mean vasectomy-reversal time interval was 12.8 years (range 1-22 years). Bilateral vasovasostomy was performed in 267 patients (79.4%), while 24 patients (7%) underwent vasoepididymostomy and

49 patients (14.4%) underwent unilateral anastomosis. These results do not represent all patients, as 42 patients absconded from follow-up, and from seminal analysis.

Two hundred and fourteen patients were positive for patency making an overall patency rate of 62.9%. The time that elapsed from vasectomy to vasovasostomy had some effect on the results. In patients who underwent reversal within 5 years of vasectomy, 35 out of 41 of these patients had sperm in the ejaculate (85.3%). The patency rate was 75.3% for vasectomy-reversal time intervals of 5-10 years, 50.3% for 10-15 years, and 26.9% for more than 15 years. **Table 1**, shows the patency rate according to the time interval between vasectomy and reversal.

Anti-sperm antibodies were positive in 30 patients (8.8%). Of these, 11 patients (36.6%) were positive for sperm in the ejaculate at 3 months postoperatively. **Table 2**, gives a summary of semen parameters at 3 months after reversal in the 203 patients without anti-sperm antibodies and 11 patients with preoperative anti-sperm antibodies. There was a statistically significant tendency towards oligo-astheno-teratozoospermia in patients with preoperative positive results on screening for anti-sperm antibody in their sera. Further analysis demonstrated that the odds ratio was 3.28 (95% confidence interval 1.42-7.67.  $p<0.018$ ) for the operation being successful in patients with negative anti-sperm antibody results in comparison to those with positive anti-sperm antibody results. Only 68

Table 1 - Patency rates according to vasectomy-reversal time intervals.

| Vasectomy-reversal time intervals and site | Positive ejaculate sperm | n of reversals | Success rate (%) |
|--|--------------------------|----------------|------------------|
| <b>&lt;5 years</b>                         |                          |                |                  |
| Unilateral                                 | 7                        | 5              |                  |
| Bilateral                                  | 34                       | 30             |                  |
| <b>Total</b>                               | <b>41</b>                | <b>35</b>      | (85.3)           |
| <b>5-&gt;10 years</b>                      |                          |                |                  |
| Unilateral                                 | 21                       | 11             |                  |
| Bilateral                                  | 117                      | 93             |                  |
| <b>Total</b>                               | <b>138</b>               | <b>104</b>     | (75.3)           |
| <b>10-15 years</b>                         |                          |                |                  |
| Unilateral                                 | 24                       | 9              |                  |
| Bilateral                                  | 111                      | 59             |                  |
| <b>Total</b>                               | <b>135</b>               | <b>68</b>      | (50.3)           |
| <b>&gt;15 years</b>                        |                          |                |                  |
| Unilateral                                 | 7                        | 2              |                  |
| Bilateral                                  | 19                       | 5              |                  |
| <b>Total</b>                               | <b>26</b>                | <b>7</b>       | (26.9)           |

Table 2 - Semen parameters at 3 months after vasectomy reversal in 11 men with and 203 men without pre-operative serum anti-sperm antibodies.

| Parameter   | ASA negative (n=23)<br>mean $\pm$ SD | ASA positive (n=11)<br>mean $\pm$ SD | p value<br>using t-test |
|---|--------------------------------------|--------------------------------------|-------------------------|
| Sperm count ( $10^6/\text{ml}$ )                    | $30.79 \pm 20.76$                    | $18.12 \pm 4.35$                     | 0.044                   |
| Motility (%)  | $17.79 \pm 11.22$                    | $7 \pm 13.14$                        | 0.002                   |
| Abnormal forms (%)                                  | $57.14 \pm 8.51$                     | $63.17 \pm 7.13$                     | 0.022                   |
| White blood cells/HPF                               | $2.14 \pm 1.60$                      | $2.28 \pm 0.96$                      | 0.774                   |
| ASA - anti-sperm antibodies, HPF - high power field |                                      |                                      |                         |

Table 3 - Changes in sperm count, morphology and 2-hour motility of 68 patients over 12 months post vasectomy reversal.

| Parameter | Count (mil/ml)<br>n (%) | Morphology (normal)<br>n (%) | Motility (2 hours)<br>n (%) |
|-----------|-------------------------|------------------------------|-----------------------------|
| Improved  | 30 (44.1)               | 27 (39.7)                    | 24 (35.2)                   |
| Same      | 24 (35.2)               | 31 (45.5)                    | 29 (42.6)                   |
| Worse     | 14 (20.5)               | 10 (14.7)                    | 15 (22)                     |

patients were followed up to 12 months. **Table 3** details the changes in sperm count, morphology, and 2 hour motility over 12 months following reversal.

**Discussion.** Most men opt for vasectomy reversal due to a relationship with a new partner, death of a child or change of their mind, and desire to have more children.<sup>12</sup> Some surgeons still believe that there are no significant advantages in using microsurgery over standard traditional methods of reversal. However, the outcomes of microsurgical vasectomy reversal in the hands of experienced surgeons are excellent with a patency rate of 80-99%<sup>5-8</sup> and natural pregnancy rate of 40-60%.<sup>5-7</sup> Fertility rates following vasectomy reversal are dependent on factors other than surgery alone. Vasectomy reversal provides superior fertility outcomes when performed for couples with the same female partners.<sup>1-13</sup> Moreover, pregnancy rates correlate highly with the age of the female partner.<sup>14</sup> This may be related to shorter vasectomy-reversal time intervals. Other factors include previously proven fecundity, and emotional dedication.<sup>1-13</sup> This study has demonstrated that the preoperative presence of serum anti-sperm antibodies is another factor that may affect the quality of semen when the reversal procedure is successful in terms of patency.

In our study, the vasectomy-reversal time interval

proved to be a major factor with a significantly lower rate in patients with a larger interval. This may be partially related to the older age group of patients with larger vasectomy-reversal time intervals. Our data were too small to conduct multivariate regression analysis to test this notion. Another finding in this study is the fact that the patency rate was relatively lower than that reported in the literature. The reason for this is probably that 42 patients were lost to follow-up, because they probably fathered children. The results may therefore underestimate the true success rate. Another limitation of our study is that we were unable to determine the pregnancy rate for the same reason. However, even if natural spontaneous conception does not occur, the presence of some live spermatozoa in the ejaculate makes it possible for couples to opt for in-vitro fertilization, and intracytoplasmic sperm injection without the need to undergo epididymal or testicular sperm extraction procedures.

In conclusion, microsurgical vasectomy reversal produces satisfactory patency outcomes, even after 15 years of vasectomy-reversal time interval. Where the semen parameters are sub-optimal, this procedure does bypass the need for sperm extraction surgery prior to the application of assisted reproductive technologies.

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