Microsurgical tubal recanalization: A hope for the hopeless

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ABSTRACT

Objective: To analyse the various factors affecting pregnancy rate after microsurgical tubal recanalisation.

Design: Prospective study, follow-up of 5 years in patients treated with tubal microsurgery.

Setting: Referral Tertiary Care Hospital.

Patients: Fifty women underwent microsurgical tubal recanalisation procedure. Principles of microsurgery were followed throughout the procedure meticulously.

Interventions: Microsurgical tubal recanalisation.

Main outcome measure: Pregnancy rate.

Results: With microsurgery, an overall 60% pregnancy rate was achieved. In these patients, pregnancy outcome was in form of intrauterine pregnancy (96.66%), ectopic pregnancy (3.33%), term viable pregnancy (96.55%) and spontaneous abortion (3.45%).

Conclusions: The important factors for determining the success of operation were age of the patient, time interval between sterilization and reversal, site of ligation, method used for previous ligation & the remaining length of the tube after recanalisation. The microsurgical technique should be available at specialized centres to improve the success of family planning services.

KEY WORDS

Microsurgery, Tubal Recanalisation, Pregnancy Rate.

INTRODUCTION

Female sterilization is an everyday procedure. It is an important constituent of National Family Planning Programme in India. All these sterilizations are nowadays performed in young women of low parity thinking that family is complete. However due to unforeseen circumstances, 1-3% of these women subsequently demand reversal of sterilization.1 With the introduction of microsurgical tubal surgery, there is likelihood of marked improvement in pregnancy rates. Therefore, this study was carried out to find the pregnancy rate after microsurgical tubal recanalisation and also to analyse the various factors which might affect the pregnancy rate in our set-up.

MATERIAL AND METHODS

50 women seeking reversal of tubal recanalization were subjected to the operation with the help of operating microscope (12 x to 20x magnification) at Sir Sunderlal Hospital, Banaras Hindu University, Varanasi during 1992-1997 with 5 years follow up. Before operation, they were thoroughly interrogated, examined and investigated. Besides routine investigations for major surgery, a preoperative diagnostic laparoscopy and hysterosalpingogram (HSG) to assess the site of block, exclude multiple blocks and to rule out tuberculosis were performed. Semen analysis of the husband was also done. Patient was called for surgery to be performed between 7th and 10th day of the menstrual
cycle. The only contraindication to tubal surgery in our study was genital tuberculosis which was ruled out by diagnostic laparoscopy. The informed consent was taken from all patients after a detailed counseling of both husband & wife.

**TUBOPLASTY**

Tubal microsurgery was performed under general or spinal anesthesia. Principles of microsurgery were meticulously followed throughout. The occluded segment of the tube was resected till there was complete excision of pathological tissue. Precise alignment of tissue planes usingatraumatic technique was carried out by prolene (monofilament polypropylene) 8-0, mounted on a spatulate tipped round-bodiedatraumatic needle or a round body micro needle. For end to end tubal anastomosis, four sutures at 12', 6', 3' and 9-O clock were taken in the muscularis layer and serosa. Mucosa was avoided. Sutures were taken in such a way that knots faced the serosa. Final length of the reconstructed oviduct was measured on each side and noted. Heparinized normal saline (5000 u/L) was used for constant irrigation. Haemostasis was achieved by precise electro coagulation by bipolar cautery. Swabbing was avoided as far as possible. No tubal splint was used. The patency was assured intra-operatively by methylene blue injection. Abdomen was closed in layers after a thorough peritoneal lavage.

The technique of ampulla – ampulla anastomosis requires special mention, as it is technically, a difficult procedure due to propensity of ampullary epithelium to prolapse through the lumen. The epithelial folds are replaced back with the tip of micro forceps while placing and tying the suture. Every possible care is taken not to include the epithelial fronds in the suture, knot or in between the two segments of the tube. The number of sutures required for anastomosis in this region is also much more than in other segments.

The discrepancy in luminal diameter is tackled by enlarging the narrower segment by giving a 2-3 mm cut with scissors at its antimesosalpingeal border.

Sexual intercourse was allowed after two months of surgery. Three months post operatively HSG levels was performed to ascertain the status of tubal patency. Subsequently, these patients were followed up three monthly for the evidence of pregnancy up to five years.

Pregnancy rate was correlated with the method used for previous tubal ligation, age of the patient at the time of sterilization reversal, time interval between sterilization and reversal, length of the reconstructed tubes, anatomical site of anastomosis.

**OBSERVATIONS**

Altogether, 50 women undergoing sterilization reversal by microsurgical technique were included in the study. The main reason for sterilization reversal in our study was death of all the children in 70% followed by death of the only male child in 26%. The age of the patients ranged from 20-40 years. The youngest patient was 22 years of age and oldest being 39 years of age. As shown in Table 1, the pregnancy rate was higher (75%) but insignificantly so \((P = 0.2616)\) when the age of the patient seeking reversal was 25 years or less. There was a definite correlation with the duration of sterilization. Maximum chances of conception \((77.27\%, P = .0136)\) were with short sterilization – reversal interval of \(< 2\) years. The Pregnancy rate substantially declined with interval exceeding \(5\) years \((16.66\%, P = .0025)\).

Thirty out of the fifty women \((60%)\) undergoing tubal recanalization by microsurgical method conceived. Intrauterine pregnancy occurred in all except one patient \((96.66\%)\). The only case with extra uterine pregnancy \((3.33\%)\), required emergency salpingectomy for tubal rupture. Unfortunately, spontaneous abortion

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>No. of patients</th>
<th>Pregnant (n=30)</th>
<th>Percentage</th>
<th>Statistical analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. 20-25</td>
<td>4</td>
<td>3</td>
<td>75.00</td>
<td>vs II, III, IV; (P = .2616) (NS)</td>
</tr>
<tr>
<td>II. 26-30</td>
<td>25</td>
<td>17</td>
<td>68.00</td>
<td></td>
</tr>
<tr>
<td>III. 31-35</td>
<td>20</td>
<td>10</td>
<td>50.00</td>
<td></td>
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<tr>
<td>IV. 36-40</td>
<td>1</td>
<td>0</td>
<td>0.00</td>
<td></td>
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<table>
<thead>
<tr>
<th>Interval between sterilization &amp; reversal (years)</th>
<th>No. of patients</th>
<th>Pregnant (n=30)</th>
<th>Percentage</th>
<th>Statistical analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. 0-&lt; 2 yrs</td>
<td>22</td>
<td>17</td>
<td>77.27</td>
<td>vs II (P = .0136)</td>
</tr>
<tr>
<td>II. 2-5 yrs</td>
<td>22</td>
<td>12</td>
<td>54.54</td>
<td></td>
</tr>
<tr>
<td>III. &gt; 5-10 yrs</td>
<td>6</td>
<td>1</td>
<td>16.86</td>
<td>vs III (P = .0025)</td>
</tr>
</tbody>
</table>
occurred in one case (1/29, 3.33%) and the rest (28/29, 96.55%) delivered term viable babies without any complication. Eighty percent of these women (24/30) conceived within one year of reversal and the rest within five years.

Our results were influenced, apart from age, by final length of tube, site of anastomosis and the method of tubal ligation (Table 2). Success rate was high (83.33%) when final post-reversal tubal length was 8-10 cm as compared to <4 cm (9.09%, $P = .00001$) after reversal and type of anastomosis was isthmus-isthmus (83.33%, $P = .0002$). The patients, who underwent sterilization by Falope ring, had higher chances of pregnancy than those with Pomeroy’s technique (68.57% Vs 40.00%, $P = .05$).

**DISCUSSION**

Tubal sterilization is currently the most popular form of birth control in India. However such a woman may seek reversal due to unforeseen events such as death of the only male child or undergoing a second wedlock. Estimating how many of these women would be candidates for reversal, if adequate facilities are available, is difficult. In our study, the women sought reversal for two reasons mainly, the first being death of all children (70%) and the second, death of the only son (26%). Similar figures are also reported by others from our country. On the contrary, the most common reason for regretting sterilization in the developed countries was the desire to have children from a new husband.

Microsurgical technique for reversal of tubal reacanalization minimizes injury to delicate tissue in and around fallopian tubes and helps to ensure clear passage within the tubes for the sperm and the ovum. This improved surgical technique has resulted in live births in 56% of cases in our study (28 out of total 50 sterilization reversal procedure). The overall success in terms of intrauterine pregnancy after reversal of sterilization by microsurgery reported by other authors also varies from 60-80%. Surprisingly, the most serious and persistent risk of ectopic pregnancy after sterilization reversal was only in one (3.33%) out of total 30 pregnancies. This low rate of ectopic pregnancy is due to proper alignment of lumen, gentle handling of tissues and proper excision of all pathological tissue under magnification. In a large series from various hospitals, 0.3 to 3% of all pregnancies were reported to be ectopic. One should not forget the fact that like sterilization reversal, sterilization itself appears to increase the likelihood that a pregnancy, should it occur, will be ectopic. Rates of 7% and 16% ectopic pregnancies after sterilization have been reported in some studies. While these proportions are similar to those seen after sterilization reversals, the overall chance of pregnancy, ectopic or intrauterine is <1% after sterilization.

While tubal surgery might result in increased rate of spontaneous abortion, microsurgical technique lowers this risk to 14% as compared to normal rate of reported spontaneous abortions of 12% of all pregnancies. Fortunately in our study, spontaneous abortion rate was only 3.45% out of total 30 pregnancies that resulted after sterilization reversal. It is possible that all cases of biochemical abortions, early spontaneous abortions and all ectopic pregnancies preceded by a live birth were not included.

The outcome following tubal microsurgery depends upon 3 factors

<table>
<thead>
<tr>
<th>Operative factors</th>
<th>No. of cases (n=50)</th>
<th>Pregnant (n=30)</th>
<th>%</th>
<th>Statistical analysis</th>
</tr>
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<tr>
<td>Tubal length (cms) after recanalisation</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>I. &lt; 4</td>
<td>11</td>
<td>1</td>
<td>9.09</td>
<td>I vs II</td>
</tr>
<tr>
<td>II. 5-7</td>
<td>15</td>
<td>9</td>
<td>60.00</td>
<td></td>
</tr>
<tr>
<td>III. 8-10</td>
<td>24</td>
<td>20</td>
<td>83.33</td>
<td>I vs III</td>
</tr>
<tr>
<td>Site of anastomosis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I. Isthmus-isthmus</td>
<td>30</td>
<td>25</td>
<td>83.33</td>
<td>I vs II</td>
</tr>
<tr>
<td>II. Ampulla-ampulla</td>
<td>7</td>
<td>3</td>
<td>42.85</td>
<td></td>
</tr>
<tr>
<td>III. Isthmus-Ampulla</td>
<td>10</td>
<td>2</td>
<td>20.00</td>
<td>I vs III</td>
</tr>
<tr>
<td>IV. Cornu isthmus</td>
<td>1</td>
<td>0</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Cuff salpingostomy</td>
<td>2</td>
<td>0</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Sterilization technique</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I. Falope ring</td>
<td>35</td>
<td>24</td>
<td>68.57</td>
<td>I vs. II</td>
</tr>
<tr>
<td>II. Pomeroy’s technique</td>
<td>15</td>
<td>6</td>
<td>40.00</td>
<td>I vs IL</td>
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</tbody>
</table>

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1. The women's general and reproductive health
2. The effect of sterilization procedure on the tubes.
3. The technique and surgical skill used to anastomose the tube. Besides these, we have also found that age of the patient, type of anastomosis, length of the remaining tube after sterilization, time interval between sterilization and reversal procedure all played a very important role in success of the operation as far as pregnancy is concerned.

Our study confirmed the importance of tubal length in terms of live birth rates. When length of the tube was >8 cm, the pregnancy rate was 83.33%, which was markedly reduced to 4%, if length of the tube was < 4 cm \( (P = .00001) \). In 1980, Sherman, Sliber & Robert reported 100% pregnancy rate with > 4 cm of the tube and 0% with < 3 cm of the tubal length after tubal reversal by microsurgical technique. Gomel in his study mentioned that length of the tube was not only important for the success of the operation but it also affected the time interval between the procedure and the pregnancy. Those who had < 4 cm length of repaired tube took significantly longer time to conceive – 19.1 months compared to 10.2 months in women with tubal length more than 4 cm.

Some important studies have suggested that isthmus to isthmus anastomosis has the best chance of successful reversal. This is also proved in our study. Our results showed that isthmus-isthmus anastomosis resulted in pregnancies in 83.33%, \( (P = .0002) \) on comparison with other sites) ampulla-ampulla in 42.85% \( (P = .0123) \) and isthmus-ampulla only in 20% \( (P = .0001) \) of the cases. This is because in isthmus-isthmus anastomosis, the tube ends being anastomosed are of similar diameters. With ampulla-ampulla anastomosis, the chances of pregnancies are reduced by almost half due to thin muscularis and the tendency for prolapse or extrusion of the mucosal folds into the tubal lumen which might disrupt the alignment of the two segments of the tube. Thus we should always ligate the tubes as near to the cornu as possible at the time of sterilization.

Another important factor that can influence the outcome after reversal is type of sterilization procedure performed on the tubes. The two most widely used methods frequently performed for tubal sterilization have been Pomeroy's technique and Falope's ring. The methods with least injury to the tube are most successfully reversed. In our study, the patients with Falope ring sterilization showed comparatively better results (68.57% pregnancy rate) than those with Pomeroy's procedure (40%, \( P = .05 \)). The latter method of combined ligation and excision usually removes 3 to 4 cm of the isthmic or ampullary portion of the tube and can be even more at times. Such a drastic decrease in post – reversal tube length is bound to manifest as poor pregnancy rate. We strongly recommend that Falope ring should be used by laparoscopic method, as close to cornu as possible in all the women who opt for sterilization.

The time interval between tubal ligation and its reversal has also influenced the success rate. Our data showed that better pregnancy rates were observed when the time interval between sterilization and reversal of sterilization was up to 5 yrs (65.9%). On the contrary, a pregnancy rate of only 16% was observed if this duration exceeded 5 years perhaps due to increased abnormalities of tubal mucosa.

In short, microsurgical technique for reversal of sterilization can provide better results than conventional surgery. Although microsurgical reversal achieved 100% patency rate in our patients, certain factors, like duration of sterilization, technique of sterilization, and the length of the tube remaining after reversal, played a crucial role in deciding the pregnancy rate. Besides the magnification and atraumatic technique, tubal length > 4 cm and time interval between sterilization and reversal of ≤5 years resulted in better pregnancy rate. Although the microsurgical technique has its own limitations, its proper application has brought a ray of hope to women seeking sterilization reversal.

REFERENCES
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