

## PREGNANCY SUCCESS FOLLOWING MACRO-SURGICAL REVERSAL OF FEMALE STERILIZATION

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### SUMMARY

In this study 41 women underwent macrosurgical sterilization reversal, from June 1991 to July 1994. All the procedures were performed personally. Routine post-operative adjuvant therapy was used. Hydrotubation was done on day 4th and 8th of surgery and subsequently post-menstrual in first three cycles. Thirty cases could be followed up for 6 months to 4 years. The incidence of pregnancy observed was 70%, intra-uterine pregnancy 66.6%, ectopic pregnancy 3.3%, term delivery 50%, abortion 3.3% and 4 are ongoing pregnancies. The pregnancy rate was superior in women of less than 30 years of age, when the interval between ligation and reversal was less than two years, in cases of Falope ring and with tubal length of 4 to 5 cms. Maximum conceptions occurred in first 6 months and all conceptions occurred within 18 months of surgery. The aim of this study was to determine the pregnancy success and factors influencing the pregnancy rate following macrosurgical sterilization reversal.

### INTRODUCTION

Tubal ligation is the most common method of permanent female contraception used world over. Since younger females with low parity are accepting tubal ligation, thinking that their family is complete, and due to unforeseen circumstances 1-3% of

these women subsequently demand sterilization reversal (Gruncert et al 1981). The most common reasons for request for sterilization reversal are, death of all children, death of the only male child, divorce and remarriage. In our country, the first two reasons are the most common, where as in western countries, divorce and remarriage are the most common indications (Ganguli et al 1992, & Boeckk et al 1986

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& Hunt et al 1992). It has now been universally accepted, that microsurgical technique offers a pregnancy rate superior to that achieved with traditional macrosurgical technique (Grunert et al 1981, Boeckk et al 1986, Winston RML - 1980, William GFJ-1973, Siegler et al 1980, and Mukherjee et al 1992).

But due to the expense involved and the expertise required to perform microsurgery, it is available only in few centres in India. The number of female sterilization performed has been steadily increasing, especially boosted to the number done as an adjunct to MTP, hence a parallel increase in demand for sterilization reversal. As facilities for microsurgical reversal are available only in few centres, to meet the potential demand, a procedure must be implemented which can be performed by more and more gynaecological surgeons with an optimistic outcome. In India most commonly used methods of tubal ligation are Falope ring placement and Pomeroy technique.

This prospective clinical study presents the pregnancy success and the factors influencing the pregnancy rate following macrosurgical tubal sterilization reversal.

#### **MATERIAL AND METHODS**

In this study, 41 women underwent sterilization reversal performed by macrosurgical technique observing principles of microsurgery, from June 1990 to July 1994. They were admitted through Gynaecological out patient department of Safdarjung Hospital, New Delhi. Before performing surgery, these women were clinically evaluated. Complete medical, obstetric, menstrual and personal history

was obtained and a complete general physical, systemic and pelvic examination was performed. History regarding the timing of tubal ligation, whether done as an interval procedure or in concurrence to M.T.P., L.S.C.S., hysterotomy or laparotomy done for some other gynaecological pathology was elicited. The method of tubal ligation used and post operative complications if any were recorded. Any medical contraindication for major surgery or pregnancy in the female and any absolute cause of infertility other than tubal factor in the couple were excluded. Besides, routine investigations for major surgery, specific tests performed were, assessment of ovulation, semen analysis and PCT. Pre-operative HSG and diagnostic laparoscopy were performed only when a clinical suspicion of adnexal pathology existed. The main indications for reversal operation were no living child (26), for a male child (7), desire for second child irrespective of the sex of the child (4), remarriage (2) and the only living child being mentally handicapped (2). Before performing the procedure the couple was counselled and the procedure, prognosis and possibility of ectopic pregnancy were explained. Written consent for surgery was obtained.

All the procedures were performed in the post-menstrual period personally with the assistance of the junior staff. Reconstruction of the fallopian tubes was performed using conventional macrosurgical approach. On laparotomy, the fallopian tubes were inspected for the site of ligation, length of the proximal and distal tubal segments, and the fimbrial status was noted. Any other associated pelvic pathology, which could have subsequently affected the tubal



function was excluded. During surgery first the falope ring was removed, then the mesosalpinx along the inferior border of the tube was incised and the blood vessels were reflected downwards. Then the ligated portion of both the tubal segments was transected serially till normal tubal mucosa and tubal lumen were visualized. Handling of the tubes was gentle and atraumatic either with Babcock's forceps or with fingers. The uterus was stabilized with uterine holding forceps. The tissues were kept moist during surgery by continuous irrigation with a solution consisting of 1,000 ml Ringer's lactate mixed with dexamethasone 8 mg, Promethazine 50 mg and Heparin 5000 I.U. No sponging was used. Haemostasis was achieved by ligating the bleeding points. Electro-cautery was not used in order to avoid deeper tissue damage. A blunt tipped metal probe was passed through both the tubal segments to ensure the luminal patency. End to end anastomosis was carried out in two layers. The suture material used was 6-0 vicryl (polyglycolic acid) sutures on half circle atraumatic microsurgical needle. When the luminal disparity between the proximal and distal tubal segments was more, the proximal segment was slit longitudinally 2-3mm along its antimesentric border. In the first layer three interrupted sutures were taken through tubal muscularis at 5, 12 and 7 O'Clock position. Care was taken not to take the endosalpinx in the suture and to enter the tubal lumen while placing the sutures. The sutures were tied after all the three sutures had been placed. The ligatures were tied loose, in order to obtain a precise luminal alignment and to prevent overlapping of the proximal and distal tubal

segments. In the second layer, four interrupted sutures were placed circumferentially through tubal serosa at 2, 4, 8 and 10 O'Clock position. The gap in the mesosalpinx was closed with interrupted sutures of 5-0 vicryl placed in anterior and posterior layers separately. After the anastomosis on both sides was completed, fundal chromotubation was done with diluted methylene blue dye with uterine cavity blocked at the level of internal os with a modified Shirodkar clamp. If there was excessive leakage of the dye at the site of anastomosis and no fimbrial spill, the anastomosis was undone and the sutures were reapplied. The length of the reconstructed tubes was assessed and recorded. Uterus was ventrisuspended by performing round ligament plication. Routine post operative antibiotic therapy was given for 7 days, which consisted of ampicillin and Gentamycin. Adjuvant therapy used to prevent post operative adhesions, consisted of injection dexamethasone 4mg, 8 hourly for first 24 hours and injection promethazine 50 mg 8 hourly for 48 hours following surgery. From the third postoperative day, chymotrypsin (chymoral forte) one tablet thrice daily was given for 10 days. Post-operative hydrotubation was done on the 4th and 8th day after surgery and subsequently post-menstrually in the first three cycles. The solution used for hydrotubation consisted of 20ml of normal saline mixed with one ampule of hylase and 50mg promethazine.

Patients were discharged from the hospital on 8th operative day with an advice to observe abstinence for one month. If pelvic examination was normal at first post operative check-up one month after

surgery, patient was advised to try for an early conception. Subsequently the patients were followed up every 3 months. If the patient did not conceive for one year, HSG was performed. The followup in these cases ranged from 6 months to 4 years. Out of 41 cases, only 30 cases could be followed up and other 11 women were lost to followup. Hence the results were analysed in 30 women with complete follow-up. Since a significantly large number of women conceived within 6 months following surgery, this was taken as a criteria for minimum followup period for analysing the results. In this study no pregnancy occurred when the interval following the reversal surgery exceeded 18 months. Hence the procedure was considered a failure if the patient did not conceive for 2 years following surgery. The pregnancy rate was

correlated to the method of previous tubal ligation used, age of the patient at the time of sterilization reversal, parity at the time of tubal ligation, interval between sterilization and reversal operation, length of the reconstructed tubes (length of the longer tube), anatomical site of anastomosis and interval between reversal operation and occurrence of conception.

### RESULTS

Clinical profile of these 30 patients revealed that majority 27 (90%) were less than or equal to 30 years of age. The mean age was 29 years (range 26 years to 38 years). The parity ranged from 1 to 4 with a mean of 2.3 living children. The mean interval between sterilization and sterilization reversal as 4 years and 7 months (range 9 months to 12 years). Tubal ligation

TABLE - I  
Pregnancy outcome following macrosurgical sterilization  
Reversal (N = 30)

	No. of Cases	(%)
<b>Pregnant</b>	21	70
a) Intrauterine pregnancy	20	66.6
* Term viable births	15	50
* Abortion	1	3.3
* On going pregnancy	4	13.3
b) Ectopic pregnancy	1	3.3
<b>Not Pregnant</b>		
* Follow up less than 1 yr.	4	13.3
* Failure	5	16.6
HSG (3)		
B/L patent (2)		
U/L patent (1)		



TABLE - II  
Patients Profile and Pregnancy Rate

Age (Years)	No. of Patients	Pregnant	
		No.	(%)
26 - 30	27	19	(70.4)
31 - 35	2	1	(50.0)
> 35	1	0	(0)
Parity			
1	2	2	(100)
2	19	12	(63.1)
> 3	9	7	(77.7)
Duration of interval Between Stz* & Stz. Rev# (Year)			
< 2	2	2	(100)
2 - 4	12	9	(75)
4 - 8	15	10	(66.6)
> 8	1	0	(0)

\* - Sterilization

# - Sterilization Reversal

had been performed with Pomeroy technique in 8 (26.7%) patients. Interval sterilization had been performed in (16), MTP and sterilization (9), puerperal sterilization (3) and tubal ligation done during second caesarean section (2).

As shown in table - I, 21 (70%) out of 30 patients conceived. Pregnancy was intrauterine in 20 (66.6%) and tubal ectopic in 1 (3.3%). Fifteen cases (50%) had term deliveries, abortion in 1 (3.3%) and 4 are ongoing pregnancies, of 36 weeks, 28 weeks, 26 weeks and 20 weeks each. Hysterosalpingography was done in 3 cases. In two cases the tubes were bilaterally patent

and in the third case, left tube was patent and the right tube showed cornual block. After HSG, one patient with bilateral patent tubes conceived in the 17th month following surgery and it was a tubal ectopic pregnancy. She had undergone the sterilization during second caesarean section and in her, ampullo-ampullary anastomosis had been performed. The tubal length in this patient was more than 5 cms. This patient reported with ruptured ectopic pregnancy following two months amenorrhoea and for her left salpingectomy was performed.

As shown in Table-II, pregnancy rate

TABLE - III  
Pregnancy outcome in relation to the previous method of tubal ligation used

Method of Tubal Ligation	Stz Rev.* No. of pt.	Pregnant No.	Pregnant (%)	Term Pt. No.	Intra Uterine Pregnancy		Ongoing No.	E.P.** No.
					(%)	(%)		
Falope ring	22	16	(72.7)	12	(75)	0	4	0
Pomeroy	8	5	(62.5)	3	(37.5)	0	1	1 (12.5)
<b>Total</b>	<b>30</b>	<b>21</b>	<b>(70)</b>	<b>15</b>	<b>(50)</b>	<b>0</b>	<b>4</b>	<b>(13.3%)1 (3.3)</b>

\* Sterilization Reversal \*\* Ectopic Pregnancy

was higher (70.4%) when the age of the women was 30 years or less and pregnancy rate showed a decline when the age was more than 30 years. The pregnancy rate was not influenced by the previous parity. A superior pregnancy rate of 100% was observed when the interval between the sterilization and sterilization reversal was less than two years. Subsequently pregnancy rate was not influenced when the interval exceeded two years. The pregnancy rate was higher (72.7%) in cases of Falope ring, than a pregnancy rate of 62.5% in case of Pomeroy technique (Table-III). In Falope ring group all pregnancies were intra-uterine and resulted in term deliveries in 12 (75%) with live births and 4 (25%) are ongoing pregnancies. As shown in Table-IV, pregnancy rate was maximum (92.3%) when the tubal length was 4-5 cms and pregnancy rate was substantially reduced to only 14.3% when the tubal length was less than 4 cms. Pregnancy rate was similar at all sites of anastomosis except when ampullo-cornual anastomosis was performed.

As shown in Table-V, maximum (66.6%) conceptions occurred in first six months following surgery. Subsequently the pregnancy rate was reduced markedly and only 9.4% women conceived when the interval exceeded more than 12 months. There was no conception when the interval was more than 18 months. The mean interval for conception to occur following surgery



**TABLE - IV**  
**Correlation of Pregnancy rate to tubal length**  
**and site of anastomosis**

Tubal Length (cm)	No. of Patient	Pregnant	
		No.	(%)
< 4	7	1	(14.3)
4 - 5	13	12	(92.3)
> 5	10	8	(80)
<b>Site of anastomosis</b>			
Cornuo - ampullary	1	0	(0)
Isthmo - Isthmic	8	6	(75)
Isthmo - ampullary	14	11	(78.6)
Ampullo - Ampullary	6	4	(66.6)
Ampullary Salpingostomy	1	0	(0)

**TABLE - V**  
**Correlation of pregnancy rate with interval between**  
**Reversal and occurrence of conception (N = 21)**

Interval (Months)	Pt. Conceived	
	No.	(%)
< 3	9	(42.8)
3 - 6	5	(23.8)
6 - 9	3	(14.3)
9 - 12	2	(9.5)
12 - 15	1	(4.7)
15 - 18	1	(4.7)
> 18	0	(0)
<b>Total</b>	<b>21</b>	<b>(100)</b>

was 5.3 months.

### DISCUSSION

All sterilization reversal procedures were performed by a single surgeon thus limiting the degree of variability of the surgical technique used. Majority (90%) of these women were in age group of 26 to 30 years and 70% of them had only one or two living children at the time of sterilization. In India women marry early and thus complete their families at a younger age. Most common reason for sterilization reversal seen in 80% of these cases in this study and reported in earlier Indian studies, is the death of all children or death of the only male child (Ganguli et al 1992) and Biswas et al 1993). This observation is in contrast to the western series where the most common indication is remarriage or divorce seen in 80% to 90% of the cases (Grunert et al 1981 and Hunt et al 1992). In India childhood mortality due to infection is very high, hence women with inadequate medical services available for their children, should be identified and instead of offering them tubal ligation they should be advised to practice temporary methods of contraception. Besides, their children should be provided with adequate medical services to reduce childhood mortality and thereby reducing the subsequent demand for sterilization reversal.

It is universally noted that pregnancy rate following sterilization reversal performed by microsurgery is superior (55% to 86%) to a pregnancy rate of 30% to 55% achieved with traditional macrosurgical approach. In the present

study a pregnancy rate of 70% is equivalent to the pregnancy rate of 64% to 86% achieved after microsurgical sterilization reversal (Rock et al 1987), Boeckk et al 1986, William 1973, Diamond 1977 and McCormick et al 1976). It may not be the use of microscope that is of value for a successful sterilization reversal, but it is a good surgical technique with delicate tissue handling, avoidance of excessive tissue loss, and accurate placement of sutures to obtain a precise luminal alignment of the proximal and distal tubal segments. The use of intra-operative and post operative adjuvant therapy to prevent post operative adhesions will help in improving the pregnancy rate. Ectopic pregnancy rate of 3.3%, noted in this study is comparable to the incidence of ectopic pregnancy rate of 2.5% to 5% reported after microsurgical technique (Grunert et al 1981 and Boeckk et al 1986).

The pregnancy rate was higher of 70.4% in women less than or equal to 30 years of age. The age has a definite influence on the pregnancy rate (Rock et al 1987 & Hunt et al 1992 & Sieler 1983). A higher conception rate in younger women may be attributed to their greater fertility potential and more sexual activity. Parity has no influence on the conception rate and in this study also no correlation was observed in the pregnancy rate in relation to the previous parity of the patient (Boeckk et al 1986, Sieler 1983). The mean interval between the sterilization and reversal was 55 months which is comparable with the



interval reported in previous series (Biswas et al 1993 and Grunert et al 1981). A higher pregnancy rate has been reported when the interval between sterilization and reversal operation is less than 5 years (Seiler 1983). In this study pregnancy rate was 100% when interval was less than 2 years but no significant correlation was observed when the interval exceeded two years. The method of tubal ligation used is an important determining factor for pregnancy success following sterilization reversal. As has been noted in this study and reported earlier, the pregnancy rate was higher 72.7% when tubal ligation had been performed with Falope ring, than a pregnancy rate of 62.5% in cases of Pomeroy technique (Biswas et al 1993, and McCormick et al 1976). In cases with mechanical occlusion of the uterine tubes with falope ring, less amount of tubal segment is sacrificed, whereas method of tubal ligation requiring surgical excision, a larger tubal segment is excised. Hence tubal ligation with Falope ring is recommended so that if subsequently desired, a more successful sterilization reversal is possible.

The most important factor to enhance the effectiveness of the recanalisation, is the length of the reconstructed tubes (Silber et al 1980). Incidence of pregnancy rate was 92.3% in cases with tubal length of 4-5 cms and this observation confirms the observations made previously, where a pregnancy rate of 75% to 100% has been reported when the tubal length was of more than 4 cms (Rock et al 1987 and Silber et al 1980). From these results, it can be inferred that the optimal tubal length required for conception to occur

is more than 4 cms. Perhaps this amount of tubal length is important to maintain a normal tubo-ovarian relationship, which is an important influencing factor for occurrence of conception. Hence, while performing tubal ligation, care should be taken to sacrifice only a minimal amount of tubal segment.

In previous studies a higher pregnancy rate of 75% to 100% has been reported when isthmoisthmic anastomosis is performed (Boeckk et al 1986, Hunt et al 1992 & Silber et al 1980). In the present study pregnancy rate was same irrespective of the site of anastomosis, except when ampullo-cornual anastomosis was performed. The anatomical site of anastomosis does not have a significant effect on fertility rate provided an optimal tubal length with normal fimbria is available after the reconstruction of the tubes. Incidence of conception was highest in first 6 months following surgery. In this study 66.6% patients conceived within 6 months following surgery and pregnancy rate was reduced significantly only to 9.4% when the interval was more than 12 months and no conception occurred when the interval exceeded 18 months. An inverse relationship of pregnancy rate with the time interval following surgery has been reported in earlier studies (Grunert et al 1981 & Boeckk et al 1986 and Silber et al 1980).

Macrosurgical female sterilization reversal performed with precision, adequate precautions taken during surgery and use of adjuvant therapy in the post operative care, an improved pregnancy rate, almost equivalent to that reported after microsurgery is

possible. Tubal ligation performed with falope ring offers a more successful sterilization reversal.

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