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Original Research Article

Laparoscopic Tubal Sterilization Reversal and Fertility Outcomes

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Abstract

Background: Although there are many different contraceptive methods available, tubal ligation is now the most common one. It plays a significant role in India's National Family Planning Programme.

Tubal sterilization techniques range from laparoscopic sterilisation to traditional Pomeroy's fimbriectomy depending on the level of expertise available. 1% to 3% of these women later ask to have their sterilisation reversed, even though it is done as a permanent technique of sterilisation. Many western centres have showed success using improved laparoscopic methods, and this is now commonly considered as a substitute method for carrying out microsurgical reversal of a ligated tube.

Purpose: The study had two objectives. First, it was determined whether the tubal recanalization was appropriate and what circumstances would lead to a successful laparoscopic recanalization. The second goal was to examine how laparoscopic tubal recanalization affected reproductive results and pregnancy rates.

Methods: 43 women who were prospectively monitored and sought tubal sterilisation reversal at a tertiary care facility between May 2015 and February 2020 were included in a retrospective chart assessment.

Results: Only 14 unilateral tubes were suitable and in 2 women bilateral tubes were suitable. For recanalization, all patients requiring laparoscopic tubal sterilisation were suitable, whereas all cases requiring fimbriectomy were not. Salpingostomy was used as an alternative to tubal reanastomosis in 10 (23.25%) cases. Pregnancy rates were 58.8% overall. 4 out of 12 women who had sterilisation using Pomeroy's procedure became pregnant, compared to 5 out of 8 women who underwent laparoscopic tubal ligation (P=0.24). No patients with a final tubal length of less than 5 cm became pregnant (P=0.042). When comparing the age at recanalization, 82.3% of women less than 30 years old conceived, compared to 45% of women over 30 years old.

Conclusions: Sterilisation method and the length of the tube after recanalization are significant determinants of recanalization success. Gynaecologists must sterilise patients with minimal stress while also minimizing failure rates. They must also work to maintain the length of the tube so that, should the patient's circumstances alter, reversal is more likely to be successful.

Keywords: Fimbriectomy, pregnancy rate, sterilization reversal, tubal recanalization.

Introduction

Although there are many different contraceptive methods available, tubal ligation is now the most common one. It plays a significant role in India's National Family Planning Programme. From primary health centres to tertiary care facilities, as well as private hospitals and nursing homes, tubal sterilisation is performed in the public sector. Female sterilisation made up 37.9% of all family planning methods utilized in the nation, per NFHS 5 (2019-2021).[1] The financial remuneration received has an impact on this, and a survey found that 64% of women said they planned to get tubal ligation in the future.[2] Tubal sterilisation techniques range from laparoscopic sterilisation to traditional Pomeroy's fimbriectomy depending on the level of expertise available.[3] More than 45.5% of sterilisation patients are females between the ages of 20 and 25. 1% to 3% of these women

later ask to have their sterilisation reversed, even though it is done as a permanent technique of sterilisation.[4] No research have been conducted in the nation to examine the success rate of recanalization procedures based on the type of sterilisation used.

Historically, laparoscopic microsurgical tubal recanalization has been the gold standard for recanalization. The magnification reached with minimally invasive laparoscopic microsurgery is comparable to that obtained with an operating microscope, opening up new possibilities for tubal repair. The primary benefit is a brief postoperative stay with little tissue manipulation and fewer postoperative adhesions. Many western centres have showed success using improved laparoscopic methods, and this is now commonly considered as a substitute method for carrying out microsurgical reversal of a ligated tube.[5] There are no research from India examining the success of laparoscopic tubal recanalization on fertility.

Objectives

1. To determine whether reversal is appropriate and to examine the variables that influence successful laparoscopic recanalization.
2. The security of reversing laparoscopic tubal sterilisation.
3. To evaluate the success of the laparoscopic sterilisation reversal operation on fertility.
4. To examine the variables influencing the rate of pregnancy following a successful recanalization.

Materials and Methods

Study setting and design

Hitech Medical College and Hospital, Bhubaneswar served as the site of this study. Patients came to this facility from the neighborhood and neighboring states. Retrospective chart reviews of patients who had been planned for follow-up were conducted using the institute's database. Between May 2015 and February 2020, all of the patients who were evaluated for tubal sterilisation reversal were included.

The patients were thoroughly questioned, examined, and scrutinised prior to the procedure. The method of recanalization was thoroughly explained to the husband and wife, who were also informed that the procedure would only be carried out if the tubes were suitable for reanastomosis and if the available tubal length was sufficient. Additionally, they received advice on the success rate, the drawbacks of recanalization, and the in vitro fertilisation alternative. Along with regular examinations for major surgery, a baseline assessment was carried out to rule out other potential causes of infertility, such as husband's semen analysis. All patients provided their free, prior informed consent.

Tubal Recanalization Procedure

Under general anaesthesia, laparoscopic techniques were used to reverse tubal sterilisation. First, the tubes' condition was assessed, and KJK concluded whether they were suitable for recanalization. The laparoscopic tubal reanastomosis was carried unilaterally, bilaterally, or not at all, depending on the tubes' suitability for recanalization. Two-layer closure with no 7-0 prolene was used to perform end-to-end tubal anastomosis. The muscularis layer's first four sutures were placed at 6, 3, 9, and 12 o'clock, followed by the serosal stitches. By carefully electrocoagulating with a bipolar cautery and injecting diluted vasopressin into the mesosalpinx, hemostasis was established. Methylene blue was injected intraoperatively to guarantee the patency. On the second day following operation, the patients received their discharge.

Post Procedure Follow-up

After two weeks, they were requested to personally follow up, and then every three months or sooner if necessary. When the patients didn't show up for a review, they were called in for an interview. After recanalization, all patients were monitored for a total of three years.

The patients were recommended to try for conception from the following cycle after a successful recanalization. The options of in-vitro fertilization (IVF) and adoption were discussed with patients in whom recanalization procedures were not conducted due to unsuitable tubes. Following recanalization, all patients were advised to try for pregnancy naturally; however, if this proved unsuccessful after a year, intrauterine insemination was offered.

Outcome Measures

The appropriateness of the tubes for the recanalization treatment was examined for the prior sterilisation technique used, and the time between the sterilisation and reversal procedures was the outcome measure. The method of initial sterilisation was examined through the analysis of the reanastomosis operation and the anatomical site of anastomosis. Additionally, the pregnancy outcome was examined in relation to the original sterilisation method used, the location of the anastomosis, the length of the patient's tubal, and their age.

Statistical Analysis

SPSS for Windows version 17.0 (SPSS Inc., Chicago, IL, USA) was used for all statistical analysis. Data were presented as means, medians,

standard deviations, and percentages. We compared group means using the Student's t test, and proportions using the Fisher Exact test. P values below 0.05 were regarded as significant.

Results

A total of 43 women, seeking tubal sterilization reversal during the study period were included in the analysis. The mean and standard deviation of age group (29.33 ± 4.47), with a range of 21-40.

Out of 43 study sample, 32(74.4%) women had vaginal deliveries, 8(18.6%) women had cesarean deliveries, and 3 (7%) women had both vaginal and caesarean deliveries. The timing of sterilization was postpartum is 21(48.8%), interval sterilization in 12 (27.9%), In 6 (16.3%) women sterilization was performed along with LSCS, and in 3 (7%) sterilization was done along with medical termination of pregnancy.

The most common procedure of sterilization was Pomeroy's sterilization is 29 (67.4%) women, while laparoscopic tubal sterilization was performed in only 8 (18.6%) women. Remaining 6 (14%) women had fimbriectomy as the method of sterilization performed.

Tubal Recanalization

The mean interval between sterilization and recanalization was 6.10 years and standard deviation is (5.81 ± 2.87), with a range of 1-16. The main reason for seeking sterilization reversal was death 33 (76.7%) or disability 2 (4.7%) children. In the remaining 8 (18.6%), second marriage was the reason for sterilization reversal.

Table 1: The suitability for reversal according to the technique of sterilization

	Unilateral (%)	Bilateral (%)	Unsuitable (%)
Overall suitable	20(46.5%)	5(11.6%)	18(41.9%)
Fimbriectomy	-	-	43(100%)
Laparoscopic	-	31(72.1%)	12(27.9%)
Pomeroy	27(62.8%)	2(4.7%)	14(32.6%)

From the Tab 1that gives the Assessments for suitability showed that in majority of women is, 20 (46.5%) unilateral tubes were suitable and in 5(11.6%) women bilateral tubes were suitable. All other cases 18 (41.9%) with laparoscopic tubal sterilization had one or both tubes suitable for recanalization. In contrast, all cases with fimbriectomy as method of sterilization were unsuitable for recanalization. In 10 (23.25%) cases salphingostomy was performed as an alternative procedure to tubal reanastomosis. These were 6(13.95%) cases with fimbriectomy performed as sterilization procedure and 2(4.65%) case with Pomeroy's sterilization.

The status of tubes in all the unsuitable cases. Thus, an effective procedure of tubal reanastomosis was performed in only 10(55.56%) cases.

The mean and standard deviation length achieved after recanalization in cases with Pomeroy's sterilization was 5.65 ± 1.24, whereas that for cases with laparoscopic tubal ligation was 7.2 ± 0.88.

Table 2: The type of anastomosis subclassifed across the technique of sterilization

	Isthumo Isthumic	Isthumo Ampullary	Cornuo-Isthumal	Ampullo-Ampullary
Overall suitable	11(25.6%)	25(58.1%)	4(9.3%)	3(7.3%)
Laparoscopic	28(65.10%)	5(11.6%)	10(23.3%)	-
Pomeroy	-	37(86%)	-	6(14%)

From the above table 2gives the type of overall anastomosis performed was isthumo-ampullary in 25(58.1%) cases, isthumo-isthumic in 11(25.6%), cornuo-isthumal in 4(9.3%) cases and ampullo-ampullary in a 3(7.3%) case. In cases of Laproscopic isthumo-ampullary in 5(11.6%) cases, isthumo-isthumic in 28(65.10%) and cornuo-isthumal in 10(23.3%) cases with Pomeroy's sterilization, isthumo-ampullary 37(86%) and ampullo-ampullary in a 6(14%) case. The type of anastomosis as sub classified according to the type of sterilization.

None of these patients had any intraoperative, anesthesia-related or postoperative complications. All the patients were discharged average on the Three day of surgery.

Post Procedure Fertility Outcome

At median follow-up of 27 months and the mean interval between sterilization and recanalization was 6.8 years and standard deviation is (5.81 ± 2.87). Of these 8 had undergone isthumo-isthumic anastomosis and 10 had isthumo-ampullary anastomosis. Out of these 4 had ectopic pregnancies, 4 are on-going intrauterine pregnancy and other delivered at term. In cases with sterilization by Pomeroy's method 4 out of 12 (33.33%) conceived, whereas for laparoscopic tubal ligation cases 5 out of 8 (62.5%) conceived with a p value 0.24. In cases where recanalization was done bilaterally, 2 conceived, whereas for unilateral recanalization 14 conceived. None of the patients with final tubal length <5cm conceived p value 0.042.

Comparing the age at recanalization, in women ≤ 30 years, 82.3 % conceived, as compared with 45% when age of women was ≥ 30 years. None of the patients undergoing neosalpingostomy conceived. 4 of the 18 patients, who were unsuitable for recanalization, opted for in vitro fertilization. Two patients conceived after IVF and had twin pregnancy and delivered at term.

Discussion

In India tubal sterilization is done in private nursing homes as well as government hospitals, from remotest public health centre to the tertiary care center using different techniques.

Tubal sterilization is done as a permanent contraception method, few unfortunate women may seek reversal later. In this research, the most common reason for seeking reversal was death of child 76.7% followed by the second marriage 18.6% and disability 4.7% children. In a study, the most common reason for seeking reversal was death or disability of child and this is similar to our studies from India.[6,7] In recent years there is a trend for using more of ART techniques and laparoscopic techniques while training in microsurgery has taken a backseat. With booming ART technology many are opting for this option but cost, ability to achieve more than one pregnancy are some of advantages of tubal recanalization surgery [8,9]

In this study, trying to compare the suitability of reversal across different procedures. In the current study, significant proportion, that is, 41.9% patients were unsuitable for reversal, in a study from Belgium, where only 18% of the cases were unsuitable for surgical reversal. [8] In the current study, three-fourth patients had Pomeroy's sterilization/ fimbriectomy as the technique of sterilization.

In India tubal ligations are performed as part of the national family planning program. In this study we have laparoscopic bilateral 72.1%, but in the another study there are medicolegal and social issues related to the failure of the procedure hence in most centers across the country, gynaecologists perform fimbriectomy, or remove long segments of the tubes during Pomeroy's sterilization making them unsuitable for recanalization in future. Although laparoscopic sterilization is more conservative and an equally effective technique, most of the centers do not have the instruments and expertise to perform the above. Reversal of fimbriectomy by neosalpingostomy has been reported [10] to result in pregnancies, but in our 6 patients in whom, salphingostomy was performed, none of the patients conceived. The overall suitability for reversal and final mean length achieved was better for sterilization performed by laparoscopic fallope ring application (100%) as compared with Pomeroy's method (62.8%). In this study confirmed the importance of tubal length in terms of live birth rates. None conceived when the length was < 5 cm.

In a study The results are concordant with the current literature, The literature also supports the same, and a previous study reported 100% pregnancy rate with >4 cm and 0% with <3cm of the tubal length after tubal reversal by microsurgical technique [6,11,12]

The pregnancy rate was better for laparoscopic sterilization by Falope ring (62.5%), as compared with those with Pomeroy's procedure 33.33%. The Pomeroy's method of combined ligation and excision usually removes 3–4 cm of the isthmic or ampullary portion of the tube and can be even more at times.[12] Such a drastic decrease in post-reversal tube length is bound to manifest as poor pregnancy rate. In studies from other countries, the sterilization is routinely performed by application of rings or clips and it is accepted that mechanical occlusion.

Several studies on microsurgical reversal reported delivery rates ranging from 50% to 87%. A recent study reported 40% and 53% cumulative pregnancy rates at 6 and 12 months, respectively, for open microsurgery and 55% and 71% for laparoscopic microsurgery results compare quite favourably with a pregnancy rate of 53% at a median follow-up of 28 months. The fertility outcomes after laparoscopic recanalization are comparable to other studies from our country in which reversal is done by microsurgical methods. The laparoscopic approach potentially involves less manipulation of intraperitoneal organs and causes less bleeding. [13,14]

In this study we comparing the age at recanalization, in women ≤ 30 years, 82.3 % conceived, as compared with 45% when age of women was ≥ 30 years. None of the patients undergoing neosalpingostomy conceived. 4 of the 18 patients, who were unsuitable for recanalization, opted for in vitro fertilization. Two patient conceived after IVF and had twin pregnancy and delivered at term.

Conclusion

Laparoscopic tubal reversal should be considered as a first-line treatment option for young women without other infertility factors. The gynecologist must use an effective technique of sterilization to minimise the failure rates, which causes minimal trauma, and aim at preserving the length of the tube. When performing tubal sterilisation interval laparoscopic sterilization is better than open Pomeroys method for tubectomy as less length of tube is damaged and reversal is easy.

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