

Laparoscopic Tubal Anastomosis. An Assessment of the “One-Stitch Technique”

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Abstract

The aim of the present study was to evaluate fertility outcome after laparoscopic microsurgical tubal anastomosis (one-stitch technique).

We carried out a retrospective study of 51 patients seeking reversal of previous tubal sterilization.

The mean age of the patients was 33.2 years (range: 30-44.5 years). Surgery lasted 122 minutes on average, (60-204 minutes). Mean time to pregnancy was 8.2 months (4-32 months) and the rate of pregnancy obtained was 56.2%. Twenty seven patients became pregnant and 12 had ectopic pregnancies; of the 15 intrauterine pregnancies, 3 miscarried spontaneously before 9 weeks.

Our study observed valuable qualities of feasibility, simplicity and rapidity of the “one-stitch technique” in laparoscopic tubal anastomosis surgery, with related good rates of intrauterine pregnancy. The rate of pregnancy obtained is fairly similar to the rates reported in the literature with the same technique. However, the high proportion of ectopic pregnancies makes us believing that laparoscopic procedures using more than one single stitch should be preferred.

Keywords: Laparoscopy; Tubal anastomosis; Sterilization

Introduction

Tubal sterilization is currently the commonest method of birth control (500,000 per year in the USA) [1]. A wide variety of reasons make 3 to 5% of women who had previously undergone tubal sterilization requesting subsequent reversal of the procedure to restore their fertility [2].

Microsurgical reversal of tubal sterilization is reliable and we already obtained encouraging results [3]. Laparotomy is the most frequently used microsurgical technique for this reversal, with results showing intrauterine pregnancies ranging from 50 to 80% and a rate of ectopic pregnancy less than 5% in these series [4,5].

Significant progress in laparoscopic surgery has made it possible today to reverse tubal sterilization by laparoscopy. Since the first reversal performed using biological glue [6], several laparoscopic techniques have been developed and result in satisfactory outcome [7-9].

In our department we have adopted the “one-stitch technique” of Swolin and Dubuisson [7]. Since 1996, this technique has been used in 51 patients. The aim of the present retrospective study is to evaluate the results of these women as compared with those reported in the literature.

Methods

Between January 1996 and October 2009, 51 patients underwent laparoscopic reversal of their tubal sterilization, performed by the same surgeon. Sterilizations had been carried out by different methods, either mechanical (Yoon's Fallope-ring or Hulka's clip) or surgical with resection and destruction of a variable portion of the tube (Pommeroy's technique or electrocoagulation of a segment of the tube).

All our patients clearly preferred reversal of their sterilization by microsurgery and were not interested at that time in any other assisted reproduction technique. The only technical decision we had to make was determining whether this procedure should be performed by laparotomy or laparoscopy; we chose the latter.

The procedure required initial determination by the surgeon that the woman was likely to regain her initial fertility and that her partner, especially in case of a new spouse, was also normally fertile. Such evaluation of the couple included:

- complete history with, whenever possible, a surgical report
- clinical examination
- examination of the temperature curves when questioning suggests the possibility of ovulation dysfunction
- favorable postcoital Hühner test
- semen analysis (except in case of a very favorable Hühner test)
- hysteroGRAPHY performed in all cases to assess the condition of the uterine cavity and the proximal tubal lumen (inaccessible by laparoscopy).

In patients with no surgical report available, surgery began with a complete pelvic exploration revealing the type of sterilization. When this investigation showed extensive endometriosis, poor quality distal portions of the tube, or pelvic adhesions that could not be separated, we did not proceed with the anastomosis. In fact, we reversed sterilization only when everything else was normal.

Surgical procedure

Laparoscopic tubal anastomosis was performed under general

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anesthesia, using the following equipment: a 10-mm laparoscope with its trocar (Storz France Paris, France), three 3-mm operating trocars, 3-mm atraumatic forceps, 3-mm curved scissors, a 3-mm needle holder and a pair of fine bipolar forceps (Storz-France Paris, France). The patient was placed in the Trendelenburg position with her left arm along her side. An intrauterine cannula was inserted to permit manipulation of the uterus and adnexa and the injection of methylene blue. After achieving adequate pneumoperitoneum with CO₂ gas, a 10-mm trocar was introduced in the subumbilical area. A 0° laparoscope was inserted and the pelvic cavity inspected. We used a three-chip high-resolution CCD camera. We placed one 3-mm trocar at the suprapubic area, and position two laterally, avoiding bilateral deep epigastric veins. The uterus was mobilized to inspect the pelvis and examine proximal and distal tube length and the fimbria condition. Any peritubal or periovarian adhesions were treated.

The intervention was mainly based on the laparoscopic microsurgical tubal anastomosis technique reported by Swolin and Dubuisson (the "one-stitch" technique) [7,10]. Fine atraumatic forceps and bipolar cautery enabled us to comply with the basic principles of microsurgery (minimal trauma and careful hemostasis). Methylene blue, introduced by a catheter through the fimbria, distends the distal portion of the tube. The clip or ligated area was grasped with the forcep jaws and resected with laparoscopic scissors. Incision perpendicular to the tube was performed with particular caution to prevent the underlying vessels. Methylene blue was flushed through the intrauterine cannula to distend the proximal portion of the tube. Incision was stopped at the edge of the mesosalpinx to prevent tubal vessels.

The first step of the anastomosis was a single-stitch suture in the mesosalpinx with a 5/0 vicryl filament (Polyglactine 910 curved needle; Ethicon-France, Issy Les Moulineaux, France). The mesosalpingeal suture is crucial in aligning the two segments of the tube. The "one-stitch" technique was used then for the anastomosis; it consists of a single suture placed at the "12 o'clock" site of the antimesenteric borders to approximate the tubal segments. Stitches in the extramuscular serosa, however, were performed with 7/0 vicryl (Ethicon-France, Issy Les Moulineaux, France) using a curved needle. Careful pelvic lavage was carried out to remove blood clots and fibrin degradation products.

Results

All 51 patients were available to follow up. The inclusion date was considered to be that of the surgery, and the outcome date that of the last menstrual period in patients who became pregnant and that of the last contact for the others.

All patients underwent hysterosalpingography 3 to 4 months after the surgery. Bilateral tubal permeability was observed in 45 patients; three patients had one impermeable tube, and three others had both tubes still blocked.

The mean age of our patients was 33.2 years, ranging 30-44.5 years. The surgery lasted on average 122 minutes (60-204 minutes). The mean time to pregnancy was 10.2 months (4-34 months). Twenty-seven patients became pregnant, 12 had ectopic pregnancies; of the 15 intrauterine pregnancies, 3 miscarried spontaneously before 9 weeks, and 12 were delivered between 35 to 40 week gestation. All 12 ectopic pregnancies were treated by laparoscopy: all were located at the anastomosis site.

Discussion

Regardless of the technique used, the results of reverse tubal sterilization by microsurgery are fairly good.

Until 1989, laparotomy provided the only surgical route for reversing tubal sterilization, but the development of laparoscopic surgery made several surgeons considering laparoscopic techniques for reversing tubal sterilization. Sedbon et al. [6] reported the first pregnancy after laparoscopic reversal; they used a catheter and biological glue, with no sutures. This technique was not assessed subsequently in large series. Sometimes later Gauwerky [11] reported a technique combining the use of biological glue and laparoscopic suture, but once again no subsequent larger use of this technique is reported. The use of glue was later abandoned, replaced by simple sutures, with one [7] (at 12 o'clock), two [12] (at 6 and 12 o'clock), three [13] or several points [14,15] (then exactly like a laparotomy). Feasibility of such technique is now clearly established. More than 300 pregnancies obtained by this technique have been reported already worldwide. The rate of intrauterine and ectopic pregnancies varies from one series to another and from one technique to another.

The first results found that pregnancy rates after laparoscopic anastomosis were not as good as those obtained by simple laparotomy: 36% for the former and 51% for the latter [7,12]. The most recent series include more cases and report higher pregnancy rates: 71% for Koh and Janik [9] and 82.8% for Yoon et al. [15]. These results are similar to those for reversal of tubal sterilisation by laparotomy [7,16]. The improvement of the results between the first series and more recent ones is certainly due to increased experience by the surgical teams but may also be related to the technique used. The pregnancy rate is 51% after one stitch [7], 36% after two [12,17,18] and 31% after three [13,19], while higher pregnancy rates have been reported for microsurgical reversal with laparoscopy, otherwise identical to laparotomic techniques: 71% for Koh [14] and 82.4% for Yoon et al. [8].

With a 56.2% pregnancy rate, albeit among a relatively "ideal" population, our results are fairly similar to those reported in the literature for the same technique. We were surprised and disappointed, however, by the high rate of ectopic pregnancy, especially because tubal disease was not visible during the diagnostic investigation and good permeability was observed during hysteroscopy. This ectopic pregnancy rate was very low after the standard microsurgical technique, 3.2% for Yoon et al. [8] and 7.4% for Koh and Janik [9], while it was 16.7% for Reich et al. [12] and 20% for Barjot et al. [13].

We did not seek to compare our results with those obtained after *in vitro* fertilization, and we did not compare the costs of these two methods, because they vary widely from one centre to another and from one country to another. We performed this surgery only in those patients who expressed their will to reverse their tubal sterilization, and we chose the technique of Swolin and Dubuisson [7]; we were surprised by the high rate of extrauterine pregnancies. Our choice for the "one-stitch technique" was motivated by its simplicity, rapidity and the reported good rates of intrauterine pregnancy. Dubuisson and Swolin suggested the ability of this technique to allow spontaneous tubal healing without need for other stitches [7]. Tulandi and Guralnick [20] showed its capacity for spontaneous healing; they described intrauterine pregnancy rates after salpingotomy for ectopic pregnancies equivalent with or without tubal sutures, demonstrating that tubal healing occurs spontaneously.

The question raised by our results, however, is whether post-reversal tubal healing occurs in the same way. There may be a problem of fit between the tubal parts to be sutured. The time required for surgery does become shorter as the surgeon's experience increases. Yoon et al. and Koh and Janik also pointed out this development: although the first reversals lasted more than three hours, the most recent ones

have lasted only one hour [8,9]. Accordingly, given that if a surgeon can make one stitch laparoscopically, he or she can make several, the standard technique of laparotomic microsurgery should be chosen over the "single-stitch" since it appears to yield the best outcome.

The publication of the first laparoscopic reversal of tubal sterilization performed with a robot [21,22] and the confirmation by other teams and larger series [23,24] of the feasibility of tubal reanastomosis by robot-assisted laparoscopy with satisfactory birth rates suggests that such technique is highly valuable, especially as it is reproducible and provides easier visualization. The "one-stitch technique" opened a way to more standard microsurgical techniques and it may be considered that Dubuisson and Swolin helped promoting the laparoscopic reversal of tubal sterilizations [7].

Conclusion

This study demonstrates the feasibility, simplicity and rapidity of the "one-stitch technique" in laparoscopic tubal anastomosis surgery, with related good rates of intrauterine pregnancy. The rate of pregnancy obtained in our study (56.2%) is fairly similar to the rates reported in the literature with the same technique. However, the high proportion of ectopic pregnancies makes us believing that laparoscopic procedures using more than one single-stitch should be preferred.

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