OUTSTANDING CONTRIBUTION

Reversal of tubal sterilization using laparoscopically placed titanium staples: preliminary experience

Laurel Stadtmauer and Mark V. Sauer

Department of Obstetrics and Gynecology, Division of Reproductive Endocrinology, Columbia-Presbyterian Medical Center, Columbia University College of Physicians and Surgeons, 622 West 168th Street, New York, NY 10032, USA

To whom correspondence should be addressed

We tested the feasibility of performing outpatient laparoscopic surgery to reverse tubal sterilization using titanium staples to reapproximate the oviducts. A total of 14 women underwent the procedure which involved excision of the tubal eschar, stenting of the severed remnants, and circumferential stapling of the muscularis and serosa. Reapproximation was possible in all cases, with a measured tubal length post-anastomosis of 4.5 ± 0.5 cm (range 3.0–7.0 cm). The length of operating time was 2.8 ± 0.2 h (range 2.2–3.8 h), and all patients were discharged the same day. There were no operative complications, and no readmissions were necessary. Within 6 months of surgery there were six pregnancies including one spontaneous abortion and five ongoing pregnancies. Of those not conceiving within 8 months, seven (100%) demonstrated tubal patency on a follow-up hysterosalpingogram. We conclude the laparoscopic approach to tubal sterilization reversal is a viable alternative to open abdominal microsurgical approaches. Although preliminary, laparoscopic surgery promises to be cost effective, as it can be performed on an outpatient basis, may reduce operative time and minimizes the recuperative period of patients.

Key words: laparoscopy/sterilization reversal/tubal sterilization

Introduction

There is increasing demand for tubal sterilization reversals. This is largely due to the large number of tubal ligations performed on women of young age, who often divorce and remarry, and later wish for a second family with their new partner. Traditionally, sterilization reversal was performed through an open abdominal incision. Best results were obtained using an operating microscope to reapproximate the tubal remnants. Using such techniques a successful pregnancy should occur in the majority of patients within a year of surgery (Sauer et al., 1987).

In the United States the ability to provide surgical services for sterilization reversal has mainly been dictated by financial remuneration. In the private sector, occasional coverage is available through insurance reimbursement. However, this is not often a covered benefit, and patients must pay $5000–$15 000 per procedure to cover the costs of hospitalization and surgical fees. In the public sector, cutbacks in governmental expenditures have recently precluded this service. Unfortunately, women in the poorer segments of the population are the most likely to request this procedure, since many undergo tubal sterilization at a very young age.

Appreciative of the necessity to limit hospital spending and provide surgical services on an outpatient basis, we began to offer laparoscopic reconstructive surgery to allow patients in the indigent population the opportunity to reverse their previous tubal sterilizations. We believe this method offers an alternative to conventional surgery, yet greatly reduces the need for hospitalization and dramatically cuts the cost of the procedure.

Materials and methods

From May 1995 laparoscopically performed reversal of sterilization was offered to patients of the Harlem Hospital Reproductive Endocrinology and Infertility Clinic. Patients who attend this clinic are largely indigent and on public aid. They have no means of obtaining private insurance coverage, and are restricted in their ability to pay for expensive medical services. Outpatient surgery was billed through the hospital at a cost of $1000–$2000, or collected through Medicaid reimbursement. A preoperative evaluation of couples included documentation of ovulation, semen analyses, hysterosalpingography, and infectious disease status [serum human immunodeficiency virus (HIV), venereal disease reference laboratory (VDRL), hepatitis screen].

The patients (n = 14) were <45 years of age (mean 34.0 ± 1.1 years; range 27–44). All were parous (mean 3.3 ± 0.5; 1–7 children). The mean time since their sterilization was 5.9 ± 0.5 years (range 1–9 years). Previous surgery included a modified Pomeroy (n = 11) or laparoscopic tubal cautery (n = 3). In all cases the reason for requesting a reversal of sterilization related to a new partner and a desire to have a second family with the new spouse.

Inclusion criteria were liberally applied, and surgery was performed on patients with a visibly intact fimbriated end of normal appearance and at least 1 cm of patent tubal segment on both the proximal and distal side of the anastomosis. Anastomosis was possible in all women but not all Fallopian tubes, with 19 tubes reapproximated in an isthmic-ampullary manner and six as ampullary-ampullary anastomosis. In three instances no attempt at anastomosis was made due to extensive tubal damage.

At the time of informed consent, all individuals were counselled with respect to results for this procedure using conventional surgery and outcomes following assisted reproduction through in-vitro fertilization. However, in all cases the financial burden posed by these approaches precluded them from consideration.
patients. Of these pregnancies, five are ongoing and one patient successfully reconstructed rat uterine horns (Zhu et al., 1994).

Lower pelvis was lavaged with lactated Ringer’s solution containing 50% glucose and blood, methods known to increase patency. Patients were seen 2 weeks postoperatively and again (Rock et al., 1993). In addition, none of our patients had previous sterilization until completion of the trial. However, the patient did not become pregnant. Other reports which combined glueing and suturing techniques or one-stitch suture techniques have demonstrated patency, however, at rates much lower than reported using conventional surgical methods (Rucker et al., 1988; Dubuisson and Swolin, 1995b).

Reports of anastomosis of tubes reapproximated by endoscopic suturing have also shown reduced pregnancy rates (Reich et al., 1993; Tsin and Mahmood, 1993; Istre et al., 1993; Katz and Donesky, 1994). However, recently a report demonstrating pregnancy rates between 70–80% has renewed interest in this approach (Koh, unpublished data).

Our pregnancy rates are lower than conventional surgical approaches, but are preliminary in nature. A longer follow up interval is necessary to evaluate fully the clinical efficacy of this trial. However, long-term surveillance in an indigent population such as Harlem, New York, is nearly impossible. We are pleased with the rate demonstrated to date given the low risk of complications and ease of the procedure. The limitations of this technique are largely related to the operator’s skill and experience. The results are preliminary and may be optimal, none of our patients can afford this type of care. Although a non-surgical approach using assisted reproduction may be optimal, none of our patients can afford this type of care.

Perhaps with longer follow up and more surgical experience, success rates using this approach will approximate rates seen following conventional therapy. However, with these preliminary findings we believe titanium stapling devices offer a viable option to relatively easy laparoscopic surgery and allow sterilization reversals to be performed on an outpatient basis. The limitations of this technique are largely related to cases where segments are far apart and lumen discrepancies are significant. In patients with short isthmic segments, hysteroscopic cannulation is very beneficial. Titanium clips have been shown successfully to reconstruct rat uterine horns (Zhu et al., 1994) and are less inflammatory than sutures (Weis-Fogh et al., 1993). They certainly are easier to place than 7–0 or 8–0 sutures when operating endoscopically.

We conclude that a laparoscopic approach to reversing tubal sterilization is possible and may be simplified using titanium staples.

### Results

Table I outlines the outcomes following the operative procedures. Surgery was successful in re-establishing patency of at least one tube in all patients. The average length of surgery was 2.8 ± 0.2 h (range 2.2–3.8 h) with a postoperative recovery time of 5.0 ± 0.5 h (range 3.0–6.0 h). All patients went home on oral analgesics within 6 h of surgery, and none required readmission or additional pain control measures. There were no operative complications.

Within 6 months, six pregnancies occurred in 5/14 (36%) patients. Of these pregnancies, five are ongoing and one patient who spontaneously aborted went on to have a subsequent pregnancy. There have been no ectopic pregnancies. The oldest pregnant patient is 36 years old (range 27–36). In the nine non-pregnant patients, seven have undergone hysterosalpingogram, with patency of at least one tube noted in all seven women. With respect to the surgical anastomosis of these women, 11/14 (71%) tubes studied demonstrated patency at 6 months.

### Discussion

There are reports of outpatient approaches to tubal reconstruction combining laparoscopy and minilaparotomy (Silva et al., 1991; Daniell and McTavish, 1995). The intrauterine pregnancy rates in these studies were between 40% and 60%, a figure slightly lower than those traditionally published by authors experienced with open abdominal microsurgical techniques (Gomel, 1978; Rock et al., 1987; Dubuisson et al., 1995a; Seiler, 1983). The first reported case of a tubal sterilization reversal performed entirely laparoscopically occurred in 1989 at which time a single tube was reapproximated using an intraluminal guidewire and biological glue (Sebon et al., 1989).

HSG = hysterosalpingogram.

### Operative procedure

Patients were given general anaesthesia and placed in the Trendelenburg position. A 10 mm laparoscope was used and initial inspection of the pelvis required complete visualization of the tubal length. Accessory ports were placed in each of the two lower abdominal quadrants, one 10 mm, the other 5 mm. An intrauterine cannula was inserted and methylene blue dye injected to delineate tubal patency. When encountered, pelvic adhesions were lysed, and then the tubal eschar was excised using laparoscopic scissors. Monopolar cautery using a microwave tip bovie controlled bleeding points. The distal tube was cannulated using a 3-Fr ureteral catheter introduced through the fimbriated end and gently threaded to the point of obstruction. Here scissors were used to open both occluded ends and allow passage of the catheter into the proximal portion. The mesosalpinx was then reapproximated using endosutures (2–0), or titanium staples followed by the anastomosis of the tubes by EAS titanium staples (Ethicon Endosurgical, Cincinnati, OH, USA). A circumferential line of staples (3–4) was placed to align the seromuscular layer of the proximal and distal segments, over the top of the previously placed stent. The stent was extremely valuable for lining up the lumens. In cases in which the isthmic lumen was too small to navigate, the stent was placed hysteroscopically. Following anastomosis, the pelvic adhesions. In addition, none of our patients had previous sterilization until completion of the trial. However, the patient did not become pregnant. Other reports which combined glueing and suturing techniques or one-stitch suture techniques have demonstrated patency, however, at rates much lower than reported using conventional surgical methods (Rucker et al., 1988; Dubuisson and Swolin, 1995b). Reports of anastomosis of tubes reapproximated by endoscopic suturing have also shown reduced pregnancy rates (Reich et al., 1993; Tsin and Mahmood, 1993; Istre et al., 1993; Katz and Donesky, 1994). However, recently a report demonstrating pregnancy rates between 70–80% has renewed interest in this approach (Koh, unpublished data).

Our pregnancy rates are lower than conventional surgical approaches, but are preliminary in nature. A longer follow up interval is necessary to evaluate fully the clinical efficacy of this trial. However, long-term surveillance in an indigent population such as Harlem, New York, is nearly impossible. We are pleased with the rate demonstrated to date given the low risk of complications and ease of the procedure. The limitations of this technique are largely related to the operator’s skill and experience. The results are preliminary and may be optimal, none of our patients can afford this type of care. Although a non-surgical approach using assisted reproduction may be optimal, none of our patients can afford this type of care.

Perhaps with longer follow up and more surgical experience, success rates using this approach will approximate rates seen following conventional therapy. However, with these preliminary findings we believe titanium stapling devices offer a viable option to relatively easy laparoscopic surgery and allow sterilization reversals to be performed on an outpatient basis. The limitations of this technique are largely related to cases where segments are far apart and lumen discrepancies are significant. In patients with short isthmic segments, hysteroscopic cannulation is very beneficial. Titanium clips have been shown successfully to reconstruct rat uterine horns (Zhu et al., 1994) and are less inflammatory than sutures (Weis-Fogh et al., 1993). They certainly are easier to place than 7–0 or 8–0 sutures when operating endoscopically.

We conclude that a laparoscopic approach to reversing tubal sterilization is possible and may be simplified using titanium staples.
staples to reapproximate tubal segments. This technique simplifies the operation and allows it to be reasonably performed by most physicians familiar with basic skills in endoscopic surgery. Converting to an outpatient operation should allow more women access to care, and dramatically reduce cost. Even preliminary rates of success appear to be reasonably comparable to rates from limited numbers of attempts at in-vitro fertilization, a procedure few in indigent areas can afford.

References


Received on August 9, 1996; accepted on January 29, 1997