

July 1993

Adhesion Formation After Endoscopic Posterior Colpotomy

Farr Nezhat, M.D.
Andrew I. Brill, M.D.
Ceana H. Nezhat, M.D.
Camran Nezhat, M.D.

Twenty-two women who had undergone laparoscopic posterior colpotomy at initial operative laparoscopy and later underwent a second laparoscopic procedure were evaluated for adhesion formation. Fifteen women (68%) had myomata removed, 3 (14%) had a dermoid cystectomy, 1 (5%) had a serous cystadenoma removed, and 3 (14%) who had large endometriomata and severe adhesions underwent salpingo-oophorectomy. Although filmy adhesions were noted in nine women, no adhesions were noted in the cul-de-sac. Based on our limited results, it does not appear that tissue removal via laparoscopic colpotomy predisposes reproductive-age women to post-operative adnexal adhesion formation.

Introduction

Vaginal colpotomy performed to gain access to pelvic pathology and remove tissue is well established. It was first described by Henchel in 1760 "to tap a cyst per vaginam."¹ Despite the safety, accuracy and relative ease of performing posterior colpotomy,

From the Center for Special Pelvic Surgery, Atlanta, and the Department of Obstetrics and Gynecology, Mercer University School of Medicine, Macon, Georgia; and the Department of Obstetrics and Gynecology, University of Illinois at Chicago, Chicago, Illinois.

Address reprint requests to: Camran Nezhat, M.D., 5555 Peachtree Dunwoody Road, Suite 276, Atlanta, GA 30342.

its use in gynecology remained sporadic until it was popularized as a technique for tubal sterilization.

By 1900 Kelly had successfully performed 10 salpingectomies for tubal pregnancy by posterior colpotomy.² Colpotomy, which minimizes trauma to the pelvic peritoneum, was reported by Babcock in 1929 for draining pelvic abscesses and pelvic hematoma and for performing salpingectomy (for tubal pregnancy), appendectomy and enterostomy.³ In 1949 Boysen and McRae reported their experience with Pomeroy tubal ligation by posterior colpotomy in 89 patients.⁴ In 1955 Doyle described a new technique of paracervical denervation by uterosacral transection using posterior colpotomy.⁵ In 1960 Smith and Morris reported their experience with 95 patients who underwent salpingectomy, ovarian cystectomy and oophorectomy by posterior colpotomy.⁶ Yuzpe et al, in 1972, reported their results of 1,393 tubal sterilizations by posterior colpotomy. They noted excellent results with few complications.⁷

The revolution of operative laparoscopy created the need for new methodologies to assist endoscopic tissue removal. Semm and Nezhat reported drainage and excision of ovarian dermoid cysts and leiomyomata by posterior colpotomy during operative laparoscopy.⁸⁻¹⁰ Martin reported the combined use of vaginal colpotomy and operative laparoscopy to excise deeply infiltrating cul-de-sac endometriosis.¹¹ Davis and Hruby later reported their experience using transabdominal endoscopic laser colpotomy (transabdominal laparoscopic incision of the cul-de-sac) to remove sizable tissue specimens from 25 patients.¹²

Endoscopic colpotomy is indicated in removing excised ovaries, very large hydrosalpinges, ovarian cysts and uterine myomata and during the final stages of laparoscopically assisted hysterectomy.^{13,14} Colpotomy can be difficult in cases of posterior cul-de-sac obliteration by endometriosis and after hysterectomy.

Several investigators have reported a low incidence of *de novo* adhesions and adhesion reformation after laparoscopic surgery.¹⁵⁻¹⁷ Nevertheless, given the anatomic proximity of the fallopian tubes, and in some cases the ovaries, to the pelvic cul-de-sac, it seems logical to presume that endoscopic colpotomy could result in the formation of significant periadnexal adhesive disease.

We conducted a study to review the incidence of periadnexal adhesions at second-look laparoscopy in patients of reproductive age who had previously

undergone primary tissue removal by endoscopic colpotomy.

Materials and Methods

The charts of all women undergoing second-look laparoscopy from January 1982 to June 1992 following operative laparoscopy were reviewed for evidence of prior colpotomy. We identified 22 women who had undergone colpotomy; none suffered any demonstrable complications from colpotomy, including hemorrhage, hematoma or abscess formation. Videolaparoscopy using a CO₂ laser through the operative channel of the laparoscope was performed as previously described.¹⁷ Each patient received 1 g of cefoxitin or 100 mg of doxycycline intravenously, both preoperatively and postoperatively. Any endometriosis was treated by vaporization or excision; in cases of ovarian cysts, cystectomy or oophorectomy was performed.^{18,19} In cases of myomectomy the tissues were stored in the posterior cul-de-sac prior to removal.

Colpotomy was then performed in the following fashion. After Betadine vaginal preparation, a wet sponge and ring forceps were inserted in the vagina to place superior traction on the posterior cul-de-sac at the uterosacral hiatus. The rectovaginal reflection was carefully identified. At times, rectal examination was performed by an assistant for better identification of anatomy. Both ureters were identified laterally.

Laparoscopic colpotomy was performed in a transverse fashion using the CO₂ laser. The resulting smoke was evacuated with a suction irrigator (American Hydro-Surgical Instruments, Delray Beach, FL, or Cabot Medical, Langhorne, PA). On vaginal entry, a double-toothed surgical clamp was placed adjacent to the wet sponge and held upon the cul-de-sac defect. Under endoscopic visualization, the pelvic specimen was grasped and placed in traction inferiorly to accomplish safe and successful vaginal delivery. The cul-de-sac defect was closed by vaginal approach using a delayed, absorbable suture in an interlocking fashion. The pelvis and cul-de-sac were copiously lavaged with warmed lactated Ringer's solution and examined to evaluate hemostasis. Before terminating the procedure, 300–500 mL of lactated Ringer's was placed in the pelvis and left there for flotation of pelvic organs and small clot dispersal.

Results

Twenty-two women underwent second-look laparos-

copy who had previously undergone endoscopic colpotomy for tissue removal. The time between the primary laparoscopic procedure and second-look procedure ranged from 2 to 56 months. The patient's ages ranged from 24 to 42 years. Fifteen women (68%) had myomata removed, 3 (14%) had a dermoid cystectomy, 1 (5%) had a serous cystadenoma removed, and 3 (14%) with large endometriomas and severe adhesions underwent salpingo-oophorectomy. Nine patients (41%) underwent concomitant surgery for stage I or II endometriosis (revised American Fertility Society classification, 1985). None of these nine had significant pelvic adhesions at the initial procedure. The colpotomy incision healed well in all patients. Pelvic adhesions were noted in 11 of the 22 women. However, no adhesions were noted between the fallopian tubes or ovaries and the underlying cul-de-sac. In one patient a filmy adhesion was noted between the cul-de-sac and adjacent uterosacral ligament. In five women who had undergone myomectomy, filmy adhesions were noted between the myomectomy site and several adjacent structures, including the fallopian tubes, omentum, broad ligament and ovaries. In three patients treated for ovarian endometriosis, filmy adhesions were noted between the ovaries and adjacent broad ligaments. All three women who had dermoid cysts removed showed complete healing of the ovaries, with no significant adhesion formation. In the three women who underwent salpingo-oophorectomy, the pelvic sidewall healed well. Two women had no adhesions, and one had avascular omental adhesions in this area.

Discussion

Endoscopic colpotomy offers a safe and reasonable alternative for large tissue removal during the course of advanced operative laparoscopy. While infection and hemorrhage have been reported following vaginal colpotomy,^{8,20,21} we did not encounter either of them in our patients who underwent colpotomy (over 300 women). Laser or electrosurgical incisions help to minimize the occurrence of these problems. The high power density or electron density provides nearly complete and immediate hemostasis while sealing lymphatics and vaporizing bacteria. This results in a surgically dry and sterile incision. Residual microbes from the vagina that contaminate the pelvic floor are diluted by thorough irrigation and destroyed by the peritoneal macrophage system.

Surgical entry into the posterior vagina by colpo-

tomy does enlist the potential for significant complications. Rectal injury may occur when the rectovaginal reflection rests high upon the uterosacral hiatus. Extension of the colpotomy incision beyond the lateral border of the uterosacral ligament invites injury to the adjacent ureter and uterine vessels.

Any endoscopic surgical technique performed on reproductive-age women must be scrutinized for its potential to create pelvic adhesive disease and resulting infertility.

Since many well-documented cardinal risk factors (trauma, ischemia, foreign body reaction, hemorrhage and raw surfaces) for adhesion formation are present following colpotomy, some form of significant adhesion formation between the fallopian tubes and the adjacent anatomic cul-de-sac could be predicted.²² A transmural thermal injury with some lateral spread is created by the laser during colpotomy incision, with greater spread created by electrosurgery. Twisting of and traction on the pelvic specimen, especially during myomata removal, bluntly widens the vaginal aperture by shearing the adjacent peritoneum and vaginal tissues. Finally, the defect is closed with 2-0 Vicryl in a tissue strangulating and interlocking fashion.

It is plausible that rather than being the beneficiary of surgical correctness and proper technique, the cul-de-sac is an anatomic sanctuary, free of the usual development of postoperative adhesions that usually entrap superiorly placed pelvic organs. The constant bathing of this dependent area by accumulated peritoneal fluid may be the biologic key to adhesion prevention in the cul-de-sac. In 1932 Babcock reported no complications secondary to adhesions in over 300 pelvic operations performed to treat carcinoma of the rectosigmoid, in which the vaginal vault had been left open and packed, or in over 30 "pull-through" incisions of the rectum that had been performed without reperitonealization.²³

Eleven of 22 women had significant adhesion formation in other areas, and while laser surgery is not devoid of the risk of adhesion formation, the absence of cul-de-sac adnexal adhesions in this group of patients reinforces the opinion that the cul-de-sac resists adhesion formation. Within the limits of our study, it does not appear that colpotomy for endoscopic tissue removal predisposes reproductive-age women to postoperative adnexal adhesion formation.

References

1. Tovel HM, Dank LD: *Gynecologic Operations*. Hagerstown, MD, Harper & Row, 1978, p 280
2. Kelly H: Treatment of ectopic pregnancy by vaginal puncture. *Johns Hopkins Hosp Bull* 7:209, 1986
3. Babcock W: The vaginal approach for certain intraperitoneal operations. *Am J Obstet Gynecol* 17: 573, 1929
4. Boysen H, McRae LA: Tubal sterilization through the vagina. *Am J Obstet Gynecol* 58:488, 1949
5. Doyle J: Paracervical uterine denervation by transection of the cervical plexus for the relief of dysmenorrhea. *Am J Obstet Gynecol* 70:1, 1955
6. Smith J, Morriss J: Posterior colpotomy: An avenue for definitive pelvic operations. *Am J Obstet Gynecol* 79:52, 1930
7. Yuzpe AA, Allen HH, Collins J: Tubal sterilization, newer concepts, methodology, post-operative management and follow-up of 2934 cases. *Can Med Assoc J* 107:115, 1972
8. Semm K: Postoperative intraabdominal bowel and omentum adhesions: Their endoscopic clearance. Presented at the American Association of Gynecologic Laparoscopists 15th Annual Meeting. Orlando, FL, November 19-23, 1986
9. Nezhat C, Winer W, Nezhat F: Laparoscopic removal of dermoid cysts. *Obstet Gynecol* 73:278, 1989
10. Nezhat C, Nezhat F, Silfen SL, et al: Laparoscopic myomectomy. *Int J Fertil* 36:275, 1991
11. Martin DC: Laparoscopic and vaginal colpotomy for the excision of infiltrating cul-de-sac endometriosis. *J Reprod Med* 33:80, 1988
12. Davis GD, Hruba PH: Transabdominal laser colpotomy. *J Reprod Med* 34:438, 1989
13. Nezhat C, Nezhat F, Gordon S, et al: Laparoscopic versus abdominal hysterectomy. *J Reprod Med* 37:247, 1992
14. Nezhat C, Burrell MO, Nezhat FR: Combined laparoscopic/vaginal radical hysterectomy with paraaortic and pelvic node dissection. *Am J Obstet Gynecol* 166:864, 1992
15. Luciano AA, Maier DB, Koch EL, et al: A comparative study of postoperative adhesions following laser surgery by laparoscopy versus laparotomy in the rabbit model. *Obstet Gynecol* 74:220, 1989
16. Nezhat CR, Nezhat FR, Metzger DA, et al: Adhesion reformation after reproductive surgery by videolaseroscopy. *Fertil Steril* 53:1008, 1990
17. Nezhat C, Nezhat F, Nezhat C: Operative laparoscopy (minimally invasive surgery): State of the art. *J Gynecol Surg* 8:111, 1992
18. Nezhat F, Nezhat C, Silfen SL: Videolaseroscopy for oophorectomy. *Am J Obstet Gynecol* 165:1323, 1991
19. Nezhat C, Nezhat F, Welander CE, et al: Four ovarian cancers diagnosed during laparoscopic management of 1,011 adnexal masses. *Am J Obstet Gynecol* 167:790, 1992
20. Smith RP, Maggi CS, Nolan TE: Morbidity and vaginal tubal cautery: A report and review. *Obstet Gynecol* 78:209, 1991
21. Gupta HB, Singh P, Gupta AN, et al: Morbidity following vaginal tubal ligation. *Ind J Med Res* 69:770, 1979
22. Holz G: Prevention and management of peritoneal adhesions. *Fertil Steril* 41:497, 1984
23. Babcock WW: The operative treatment of carcinoma of the rectosigmoid. *Surg Gynecol Obstet* 55:627, 1932