Robotic Tubo-Ovarian Surgery

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Introduction

Robotic-assisted gynecologic surgery has been implemented in all fields of gynecology, including reproductive endocrinology and infertility, urogynecology, and gynecologic oncology. The most common procedures performed are hysterectomy, myomectomy, sacrocolpopexy, and excision of endometriosis. According to the American College of Obstetrics and Gynecology Committee Opinion, robot-assisted cases should be appropriately selected based on the available data and expert opinion [1]. American Association of Gynecologic Laparoscopists states in their Position Statement that robotic-assisted and conventional laparoscopic techniques for benign gynecologic surgery are comparable regarding perioperative outcomes, intraoperative complications, length of hospital stay, and rate of conversion to open surgery. However, published reports demonstrate that robotic-assisted laparoscopic surgery has similar or longer operating times and higher associated costs [2]. The use of the robot does not add much benefit over conventional laparoscopic surgery for most straightforward benign gynecologic cases, but does provide benefit in complex cases. Endowristed movement of robotic instruments allows for better and more precise suturing compared to conventional laparoscopy. The robotic platform also offers superior visualization and allows the surgeon to rely less on a bedside assistant.

Indications for use of the robotic platform in adnexal surgery include endometriosis, moderate-to-severe adhesive disease, malignancy, and tubal reanastomosis. It does not provide a cost benefit to utilize the robot for straightforward bilateral salpingectomies, salpingo-oophorectomies, or ovarian cystectomies, unless an adequate surgical assist is not available.

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Preprocedural Details

Patient positioning, trocar placement, and robotic docking follow the same guidelines as stated in the robotic-assisted hysterectomy chapter. Please reference this chapter for further details. Regarding instrumentation, we recommend use of a bipolar and a monopolar instrument, such as a fenestrated bipolar grasper or a PK dissector in arm 2 and a monopolar scissors in arm 1. We also recommend routine use of a uterine manipulator.

Endometriosis and Adhesive Disease

Endometriosis is a chronic and progressive gynecologic disorder that affects women of reproductive age. Chronic pain and infertility are the most debilitating problems associated with endometriosis. When medical therapies fail, patients may benefit from surgical treatment. The robot offers distinct advantages over conventional laparoscopy for use in the approach of endometriosis and moderate-to-severe adhesive disease (Figs. 27.1, 27.2, 27.3, and 27.4). Enhanced three-dimensional visualization, 10× magnification, and EndoWrist instruments with seven degrees of freedom facilitate precise and careful dissection. In addition, Firefly Technology using indocyanine (ICG) green dye has been shown to improve detection of lesions that are difficult to visualize with the naked eye [3]. ICG turns endometriotic implants, associated with increased neovascularization, dark green and aids in complete resection of the targeted tissue [4]. The goal of surgical treatment of endometriosis is to take down adhesions, release tethered tissues, remove endometriomas, and, when possible, completely resect any endometriotic nodules. Often, retroperitoneal dissection is necessary to remove deeply infiltrating endometriotic nodules. When full resection is not possible, such as in the case of numerous scattered implants studding peritoneal surfaces, endometriotic implants should be fulgurated. For this, we evoke the use of the argon beam coagulator.

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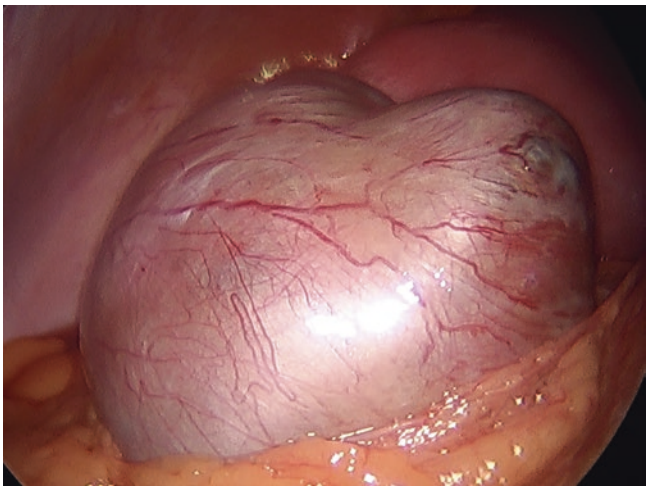

Fig. 27.1 Endometrioma

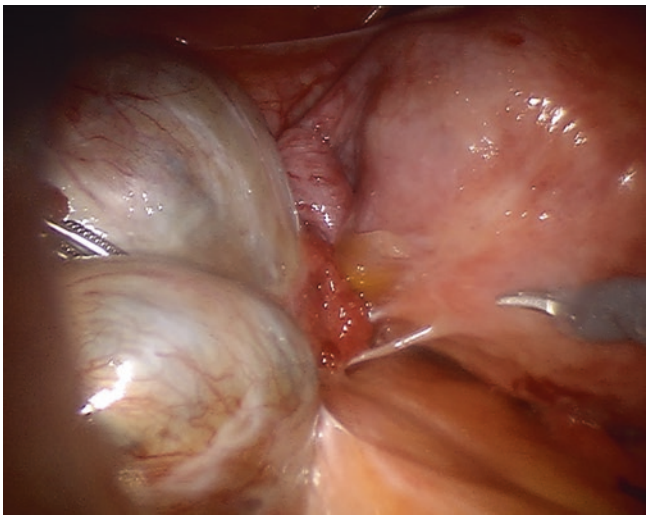

Fig. 27.2 Severe adhesions involving endometrioma, uterus, fallopian tube, and bowel

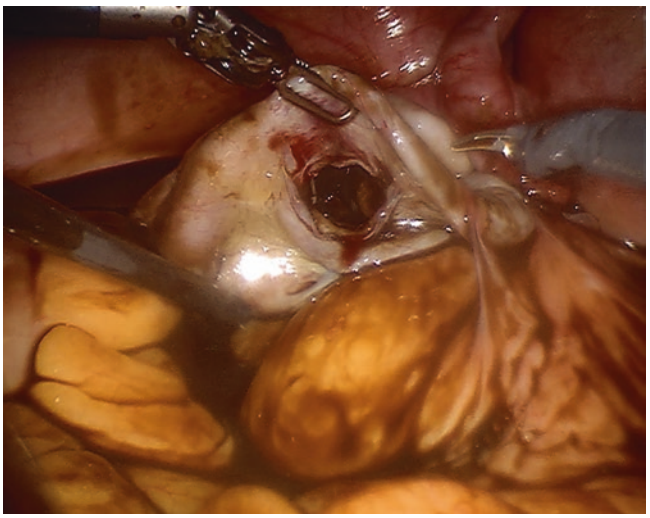

Fig. 27.3 Ruptured endometrioma and "chocolate" cystic fluid

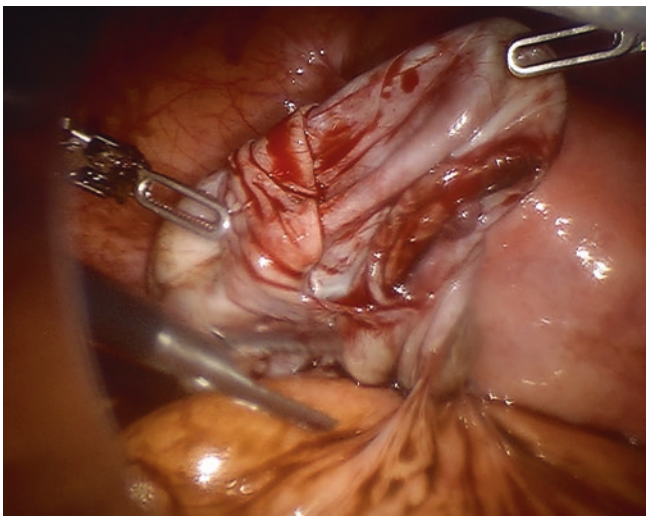

Fig. 27.4 Removing endometrioma cyst wall (right instrument) from ovarian stroma (left instrument)

Tubal Reanastomosis

Tubal ligation is a medical procedure that closes or cuts the fallopian tubes, blocking the female egg from reaching the uterus and consequently preventing pregnancy. Between 1% and 26% of women who undergo tubal ligation later experience regret [5]. Young women are much more likely to feel regret than older women. Although tubal sterilization procedures are considered to be permanent, requests for reversal of the procedure are common. Most tubal ligation procedures can be reversed. If the fallopian tube is fulgurated extensively, missing the fimbriated portion, or completely removed, tubal reanastomosis may not be possible, and the patient may be better served through in vitro fertilization. However, if the method of tubal ligation used previously followed tubal ligation and resection, or utilized a ring or clip, tubal reanastomosis may be attempted and often performed successfully (Fig. 27.5).

Sterilization reversal is the most successful surgical reconstructive procedure for improving fertility. Often, the cost of a tubal reanastomosis surgery is similar to cost of in vitro fertilization, and patients must be counseled thoroughly regarding chances of success when deciding between performing one or another. Factors that influence the success rate of tubal reanastomosis include age of the patient, time from sterilization, sterilization technique, and remaining tubal length. Ideally, resulting tubal length should be 4 cm or more with less success demonstrated in those with shorter tubes [6].

The purpose of tubal reanastomosis is to reconnect the proximal cornual tubal segment to the distal fimbriated tubal segment. First, the blocked ends of each tubal segment are incised, exposing patent tubal lumen (Figs. 27.6 and 27.7). The newly opened tubal ends are drawn to each other by placing

Fig. 27.5 Portion of fallopian tube removed from prior tubal ligation (between the two stars)

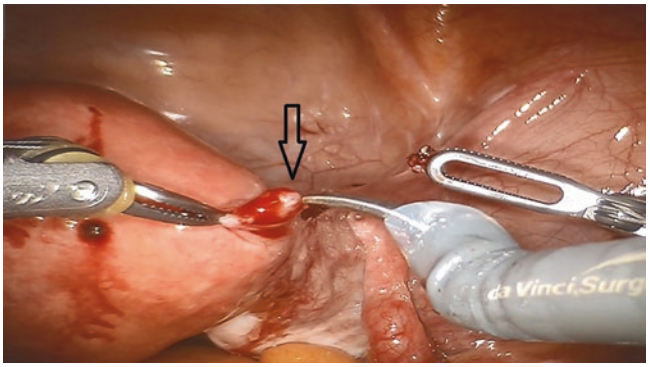

Fig. 27.6 Scar excised, exposing proximal tubal lumen (arrow)

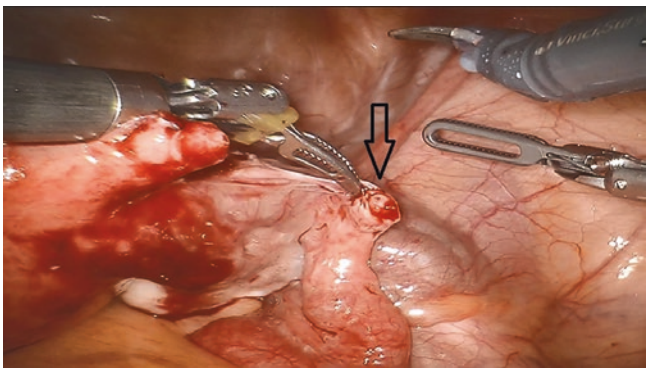

Fig. 27.7 Scar excised, exposing distal tubal lumen (arrow)

sutures in the connective tissue of the mesosalpinx. This retention suture prevents the tubal segments from pulling apart while the tube heals. Microsurgical 6-0 sutures are used to precisely align the tubal lumens, the muscularis externa, and the serosa layer of the tube. This is done in a circumferential fashion in 4-5 sutures. A narrow flexible stent may be used to gently thread through the tubal segments and into the uterine cavity to line the tubes up for reconnection (Fig. 27.8), but care must be taken to not damage the delicate cilia that line the tube. At the conclusion of the procedure, chromopertubation should be performed to ensure patency of each tube (Fig. 27.9).

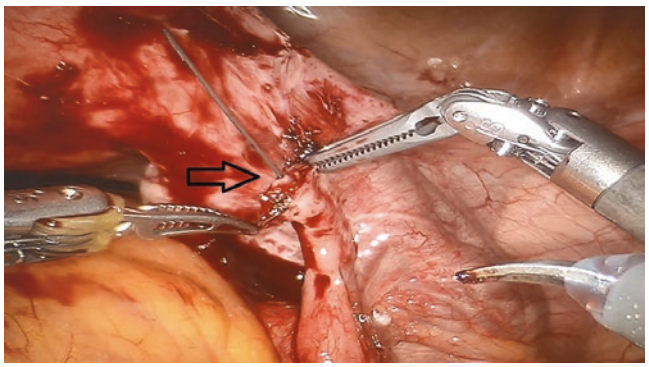

Fig. 27.8 Urologic wire (arrow) is used to gently thread through the tubal segments and into the uterine cavity to line the tubes up for reconnection

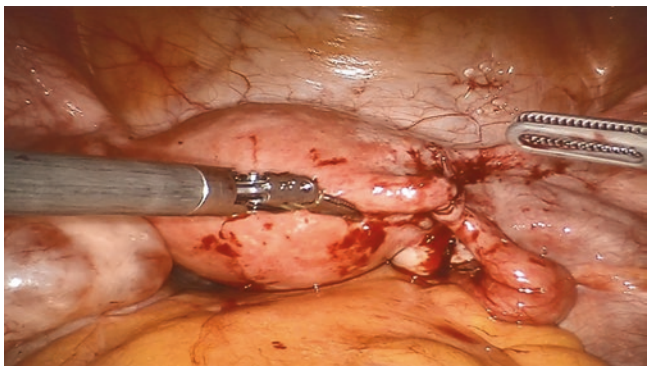

Fig. 27.9 Completed tubal reanastomosis of right fallopian tube with patency demonstrated via chromopertubation

Summary

In summary, though robotic-assisted surgery has been shown to be beneficial in complex cases, such as with endometriosis, scar tissue, malignancy, or microsurgery, the additional operating costs do not lend to utilization for most laparoscopic benign adnexal surgery. This chapter discusses two cases in which utilization of the robotic platform may be beneficial. In excision of endometriosis, the fine dissection, magnified three-dimensional view, and utilization of Firefly Technology aid in procedural success. In tubal reanastomosis, the delicate movements and magnified three-dimensional view enable microsurgery success.

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