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Robot-assisted tubo-tubal reanastomosis after sterilization in 10 steps

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A B S T R A C T

Five to 20% of women regret having a tubal ligation. These women are generally otherwise fertile and have a better chance of pregnancy than other patients experiencing infertility, whether by in vitro fertilization or after tubal surgery. Historically, tubal anastomosis surgery has long been performed by microsurgery through laparotomy, which provided very high precision but was associated with some degree of morbidity. The parallel development of in vitro fertilization and laparoscopy have contributed to reducing the indications for tubal surgery. The laparoscopic approach is challenging because of the number and precision of the sutures needed. The robot-assisted laparoscopic approach may reduce the surgical difficulty and improve the accessibility of this technique. We have described the technique of tubo-tubal reanastomosis after sterilization with robot-assisted laparoscopy in 10 steps. Robot-assisted laparoscopy provides favourable conditions for performing tubo-tubal reanastomosis after sterilization due to the camera stability, precision of movement, and amplitude of articulations.

Keywords:

Robot-assisted laparoscopy
Tubo-tubal reanastomosis
Sterilization

Introduction

Five to 20% of women regret having a tubal ligation, of which 1–2% request a reversal of sterilization. [1]. These women are generally otherwise fertile and have a better chance of pregnancy than other patients experiencing infertility, whether by in vitro fertilization (IVF) or after tubal surgery [2,3]. The choice between the two techniques must take into account the patient's age, the date of the last pregnancy, the ovarian reserve and the partner's semen quality [4]. Historically, tubal anastomosis surgery has long been performed by microsurgery through laparotomy, which provided very high precision but was associated with some degree of morbidity [5]. The parallel development of in vitro fertilization and laparoscopy have contributed to reducing the indications for tubal surgery. The laparoscopic approach is challenging because of the number and precision of the sutures needed [6]. The robot-assisted laparoscopic approach may reduce the surgical difficulty and improve the accessibility of this technique [7].

The objective of the present work was to describe the technique of robot-assisted laparoscopic tubo-tubal reanastomosis after sterilization in 10 steps and assess its value.

Case presentation

We present the case of a 36-year-old woman, gravida 3 para 3 (3 cesarean sections), with a history of tubal ligation during her last cesarean section three years before who presented for pregnancy intention. After receiving comprehensive information, the patient opted for tubo-tubal reanastomosis as a first-line procedure rather than in vitro fertilization.

Operative settings

Step 1: Robot installation: The procedure is performed using robot-assisted laparoscopy with the Da Vinci Xi four-arm surgical system (Intuitive Surgical, Sunnyvale, California, USA). The patient is positioned in low dorsal lithotomy position with her arms alongside the body. The robot is installed to the right of the patient at an angle of approximately 45°. Four 8 mm robotic ports and one 5 mm assistant port are inserted on a horizontal line at the umbilical level.

Step 2: Assessment of feasibility: The feasibility of the procedure is verified. A sufficient length of healthy tube is required on at least one side. If the tube is too damaged, it may be better to forego the operation in favor of in vitro fertilization.

Step 3: Initial dye test: This step dilates the proximal portion of the tube, which improves the differentiation of the mucosa and thus facilitates the suture.

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Step 4: cutting the tube: The tube is cut on both sides of the ligature without the use of energy to preserve the vascularization and improve the anastomosis.

Step 5: Opening of the mesosalpinx: The ligated portion of the tube is excised by coagulating the adjacent mesosalpinx with monopolar energy. After this step, the proximal and distal portions of the anastomosis can be placed face to face to identify the mucosal and serosal planes on both sides.

Step 6: Suture of the mucosa: Four mucosal interrupted sutures are performed with a 6–0 absorbable monofilament. It is important to start with the deepest point towards the mesosalpinx as it will soon become inaccessible. For this step, it is necessary to take care to position the knot outside the tube lumen by making the first entry from the outside to the inside and the second entry from the inside to the outside. Also, as far as possible, the tube should not be grasped from inside the lumen or crushed. Either the serosa or the mesosalpinx can be gently grasped.

Step 7: Suture of the serosa: Four serosal interrupted sutures are performed with a 6–0 absorbable monofilament. This step seals the anastomosis to prevent leakage and can resolve bleeding. No energy should be used for coagulation. It is important to selectively grasp the serosa to completely cover the anastomosis. The suture should be handled very gently without applying excessive tension so that it does not break. The knots should be tightened gradually.

Step 8: Suture of the mesosalpinx: The mesosalpinx adjacent to the anastomosis is closed with two interrupted sutures performed with a 2–0 absorbable polyfilament. This step indirectly solidifies the anastomosis by avoiding tensions and prevents incarceration of a bowel loop.

Step 9: Final dye test: A final dye test is performed to assess the patency of the tube and confirm the absence of leakage around the anastomosis.

Step 10: anti-adherent agent: anti-adherent agent is applied near the anastomosis to prevent the formation of adhesions.

Discussion

This video article shows the feasibility of tubal anastomosis in robot-assisted laparoscopy and provides a standardized 10-step technique.

A systematic review of the literature on tubal anastomosis surgery was conducted by Van Seeters et al. in 2017 [1]. Although the comparative studies were mostly retrospective and limited in size, the pregnancy rates after surgery seemed to be similar between the different techniques: 68% (95% CI: 58–71%) for laparotomic microsurgery, 65% (95% CI: 61–74%) for laparoscopy and 65% (95% CI: 59–72%) for robot-assisted laparoscopy. Likewise, the rates of ectopic pregnancies appeared to be similar for the different techniques (between 5.6% and 15%). Only 4 studies specifically focused on the robotic approach [5,8–10]. Two studies compared the robotic approach with open surgery and have shown similar results in terms of viable intrauterine pregnancies [5,8]. The robot-assisted approach was associated with a shorter recovery time but longer operative time and higher costs. One study of 25 patients compared conventional laparoscopy and robot-assisted laparoscopy and found no difference in pregnancy rates but showed a significant increase in operative time for robot-assisted laparoscopy [10]. No study compared the robotic approach with IVF. A study of 84 patients comparing the laparotomic microsurgical approach and IVF found no significant difference in pregnancy rates and suggested a lower cost for the surgical approach [11]. Overall, these data are insufficient to conclude that one technique is superior to another in cases of regret following tubal ligation. The surgical approach nevertheless seems to

be a reasonable alternative to IVF [6]. In particular, the robotic approach combines the advantages of minimally invasive surgery while avoiding the difficulties inherent in laparoscopic suturing and could therefore improve the accessibility of this surgery for patients. There are no studies that formally identify the criteria for selecting patients who would have a better chance of pregnancy after surgery rather than IVF (apart from obvious additional infertility factors, particularly in relation to semen analysis) [1]. In case of failure to achieve pregnancy after tubal anastomosis surgery, IVF can be offered to patients. A 2016 study by Berger et al. reported pregnancy rates of 41% (95% CI: 40–42%) 6 months after laparotomy surgery and 58% [95% CI: 57–59%] after one year [2]. This suggests that a delay of at least one year may be allowed before considering IVF.

Conclusion

We have described the technique of tubo-tubal reanastomosis after sterilization with robot-assisted laparoscopy in 10 steps and discussed its value.

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Declaration of Competing Interest

The authors declare no conflict of interest.

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