ACTA INFORM MED. 2013 Jun; 21(2): 135-137

doi: 10.5455/aim.2013.21.135-137
Received: 15 February 2013 • Accepted: 02 April 2013
CONFLICT OF INTEREST: NONE DECLARED

The Role of Robotics in Ovarian Transposition

Christos Iavazzo,[1] Filippos M. Darlas, [1] Ioannis D. Gkegkes,[2]
IASO Maternity Hospital, Athens, Greece1
Department of Thoracic Surgery, "KAT" General Hospital, Athens, Greece2

Corresponding author: Christos Iavazzo, MD, MSc, PhD. Address: 38, Seizani Str., Nea Ionia, Athens, Greece, 14231. Tel: 00306948054119. E-mail: christosiavazzo@hotmail.com

Professional paper

ABSTRACT

The preservation of ovarian function in young patients after radical hysterectomy has an important role at the post-oncologic management and preserves life quality. Ovarian transposition is a technique in order to avoid irreversible damage to the ovaries caused by irradiation. The principal surgical ways in the transposition of the ovaries is both through laparotomy and laparoscopy. Recently, the application of the robotic technology on this method seems to be promising. We performed a literature search with terms related to robotic surgery and ovarian transposition in Pubmed and Scopus. Two articles were identified dealing with this technique. Robotic assisted ovarian transposition is presented and the possible advantages and disadvantages of such a technique are discussed.

Key words: Ovarian transposition, neoplasms, ovarian function, preservation, laparoscopy, robotics, cervical cancer

1. INTRODUCTION

Cervical cancer frequently involves young women who are at the peak of their reproductive capacity. The surgical treatment of such a malignancy usually consists of radical hysterectomy followed by radiotherapy (1). So, the risk of damage to the ovaries caused by radiotherapy is raised. For this reason, ovarian transposition is suggested by main gynecological centers to preserve ovarian function either for fertility sparing reasons or to avoid early menopause. The most important advantage of this surgical treatment is the fact that such radiosensitive organs such as the ovaries can be transposed out of the radiation field (2).

Ovarian transposition (oophoropexy or ovarian suspension) is the collocation of the ovaries outside of pelvis for protection from pelvic radiation. The most frequent locations for ovarian transposition are out of the pelvis to the paracolic gutters bilaterally, normally at least 3 cm above the upper border of the radiation field or laterally within the pelvis, in the lower paracolic gutters, anterior to the psoas muscles (3). It was described for first time in the late fifties (4). This procedure is performed at patients with diagnosed malignancies most commonly cervical cancer who necessitate pelvic radiation but not oophorectomy. Other indications of ovarian transposition are pelvic sarcomas, Hodgkin's lymphomas, and vaginal cancer. Traditionally, ovarian transposition is performed either with laparotomy or laparoscopy, while recently has also been performed robotically (5, 6).

The aim of this review is to present the role of robotic surgery in the ovarian transposition technique by presenting the main advantages and the possible disadvantages.

2. METHODS

We searched the literature using the terms "robot" or "robotic" or "telesurgery" in combination with the terms "ovarian transposition". Any study reporting data on the robotic assisted ovarian transposition was included in this review. Abstracts in scientific conferences as well as studies published in languages other than English, German, French, Italian and Spanish were excluded from this review. We identified two articles dealing with robotic ovarian transposition.

3. RESULTS

The searches performed in PubMed and Scopus generated a total of 2 which both were identified as eligible for inclusion in this review (5, 6). No additional studies were identified as eligible for inclusion in this review through hand-searching bibliographies of relevant articles.

Technique – Surgical steps

Patient is positioned in a Tredelenburg position. The surgical cart is positioned between the patient's legs. Foley catheter is placed in the bladder and uterine manipulator could be used. A 10 mm trocar is inserted in the midline 4 cm above the umbilicus under direct visualization. The abdomen is fully insufflated for insertion of additional trocars. The trocars are placed about 22 cm from the pubic rami in order to be easier to use the robotic instruments. An accessory trocar is placed at the Palmer's point in order to be used as a port for the fixation device and the suction. A Foley catheter was inserted into the urinary bladder for continuous drainage during the entire procedure. Then the robot is docked. Use of EndoWrist Maryland® bipolar grasper and EndoWrist Cadiere® forceps are suggested. After exploration of the abdominal cavity, lateral peritoneal is opened along ovarian vessels. After opening lateral aspect, tubes and ovarian ligaments are cut.

Peritoneum between ovarian vessels and ureters is cut. Peritoneum lateral is cut while release of caecum is performed maintaining the angle of ovarian vessels. In every dissection, ureters are clearly identified. The ovary is sutured into the paracolic gutter and peritoneum of subhepatic area. Clips are attached at the lower limit of the ovaries in order to recognize and maintain ovaries outside the radiation field, postoperatively.

4. DISCUSSION

It is known that the incidence of ovarian metastasis in cases with cervical cancer is rather rare (0.5% in squamous cancer and 1.3% in adenocarcinomas) (7, 8). For this reason, ovarian transposition could be a safe option in the management of young women with cervical cancer. Ovarian transposition represent an efficient procedure for preserving ovarian function in patients treated by a combination of surgical and radiation therapy. Patients <40 years of age with a small invasive cervical carcinoma (<3 cm), who are treated by initial surgery, are candidates for this procedure (9). In these selected patients, the risk of ovarian metastasis is considered low.[9] The technique used for ovarian transposition was first described by Husseinzadeh et al (10).

In the literature, there have been described various methods of ovarian transposition which are characterized of advantages and disadvantages (Table). The practice of lateral ovarian transposition seems to be more effective than the collocation of the ovaries behind uterus and protecting them with a lead block (11). Another option could be the exteriorization of the ovaries under the skin through an opening in the flank , but it is not generally used and has been related with the formation of ovarian cysts (12). Heterotopic ovarian transplantation is a more complicate procedure, where vascular anastomosis is performed and the ovary is implanted on the inner surface of the arm (13). Furthermore, in the late nineties, in a patient with rectal carcinoma, without dissection of the caecum, the ovarian ligament was transected and the ovaries were transposed without cutting the fallopian tubes (14). The new location of the ovaries was laterally and anteriorly to the level of the anterosuperior iliac spines. Although the patient had received a large dose of pelvic irradiation in combination with intrathecal brachytherapy, the menstrual cycles of the patient were never interrupted (14).

The transposed ovaries could be allocated to a variety of anatomic sites, from the base of round ligament to the low pole of kidneys (15). The pelvic brim is the lowest limit where the ovaries should be transposed. In order to avoid the return of the ovaries into the pelvic cavity, the transposed ovaries should be sutured firmly to the peritoneum. In addition, the transposition above this level could be achieved without any difficulty, being careful not to separate the fallopian tubes from its uterine origin (15). Preserving the integrity of the fallopian tubes permit the possibility of spontaneous conception. In contrary to fallopian tube, the ovarian ligament is not stretchable. To facilitate mobilization of the ovaries, the ovarian ligament should be divided (16).

During the procedure, the ovaries are mobilized and along with their vascular supply, are brought out of the pelvis to the paracolic gutters, ideally at least 3 cm from the upper border of the radiation field. The published success rates present great variation (16 to 90%) (17). Various factors, such as the vascular compromise of the ovaries, the age of the patient, the radiation dose delivered and whether ovaries are shielded during the procedure, can influence the success of the procedure. Furthermore, chronic ovarian pain, infarction of the fallopian tubes, and formation of ovarian cysts are some of the reported complications following this procedure (18). Radiation therapy should take place before ovarian transposition performed in order to prevent return of ovaries to former position (9). As spontaneous pregnancy may be more difficult, the patient may possibly necessitate in vitro fertilization otherwise repositioning as the transposed ovaries can migrate back to their original position, with the purpose of conceive (19).

In the published literature, there are only two case reports regarding the use of robotic technology on ovarian transposition. The first case refers on a woman, in her early thirties, who had undergone a radical hysterectomy and bilateral pelvic lymphadenectomy for a Stage I-B1 cervical squamous cell carcinoma.[6] The transposition of the ovaries was performed in second time after the radical hysterectomy. The histopathologic analysis of the enlarged lymph nodes presented no evidence of metastatic disease. The second case was presented by Al-Badawi study, the robotic-assisted ovarian transposition was performed in a 39-year-old woman with stage II-B cervical cancer and without the presence of extra-uterine disease (5). The operating time ranged from 50-170 minutes, however it should be noticed that in the case of 170 minutes, 108 minutes were necessary for adhesiolysis. So it should be assumed that the operating time is around an hour with the time to be decreasing when the learning curve will increase. In both studies, the blood loss was minimum and the patients were hospitalized for a night while neither immediate nor late complications are described. Furthermore, in both studies, the transposed ovaries presented with good blood supply and with confirmed preservation of ovarian function by measuring post-irradiation LH and FSH levels.

The DaVinci® robot offers the opportunity of a key hole operation which results to significantly less pain, less blood loss, better aesthetic result, as well as shorter hospital stay and shorter recovery time. More specifically, robotically assisted technology presents various advantages. The articulated instruments of the robot permit an extensive range of motion and decreases unintentional hand tremor (20). The 3-dimention visibility of the abdominal cavity facilitates the complex surgical manipulations which can be potentially performed with greater efficiency. In addition, the surgeon has the possibility to sit comfortably on the console and visualizes the various anatomic cavities with a great variety of magnification. Moreover, in the laparoscopy-assisted robotic surgery is important the proper position of the surgical cart in order to provide the appropriate instrument alignment, avoiding interference with the anesthesiologic stuff. The bulky equipment used and increased costs of the current technology are the main disadvantages of the robotic surgery (21), while the efficacy and operation's time are going to be improved as the experience is growing.

Our study has some limitations. Someone could argue that there might be more studies in which an ovarian transposition is performed in the counter of case series presenting robotic radical hysterectomy results. We included only a small number of cases while the fact that the robotic assisted ovarian transposition is an on going technique makes our conclusions premature. However, our review depicts that the procedure can technically be performed with the use of DaVinci Robot. Moreover, it should be mentioned that our literature search while extensive did not cover conference publications. However, the existing learning curve of this novel procedure is more difficult from laparotomy but easier to laparoscopy and for this reason the authors believe that more cases with robotic ovarian transposition are going to be added in the literature in the near future.

5. CONCLUSION

Robotic assisted ovarian transposition seems to be a simple and efficient surgical method. It is beneficial not only to prevent premature menopause but also for preservation of fertility. The application of the robotic technology in ovarian transposition represents an innovation that both the clinical utility and the cost effectiveness of the method are yet to be clarified through larger studies. Further investigation is needed to be done both on the learning curve of the technique and on patients' satisfaction as well.

REFERENCES

1. Rasool N, Rose PG. Fertility-preserving surgical procedures for patients with gynecologic malignancies. Clin Obstet Gynecol. 2010; 53: 804-814.
2. Salakos N, Bakalianou K, Iavazzo C. et al. The role of ovarian transposition in patients with early stage cervical cancer - two case reports. Eur J Gynaecol Oncol. 2008; 29: 280-281.
3. Sella T, Mironov S, Hricak H. Imaging of transposed ovaries in patients with cervical carcinoma. AJR Am J Roentgenol. 2005; 184: 1602-1610.
4. McCall ML, Keaty EC, Thompson JD. Conservation of ovarian tissue in the treatment of carcinoma of the cervix with radical surgery. Am J Obstet Gynecol. 1958; 75: 590-600.
5. Al-Badawi I, Al-Aker M, Tulandi T. Robotic-assisted ovarian transposition before radiation. Surg Technol Int. 2010; 19: 141-143.
6. Molpus KL, Wedergren JS, Carlson MA. Robotically assisted endoscopic ovarian transposition. JSLS. 2003; 7: 59-62.
7. Aida H, Kodama S, Aoki Y. et al. The study of ovarian metastasis in uterine cancer. Nihon Sanka Fujinka Gakkai Zasshi. 1992; 44: 315-322.
8. Nakanishi T, Wakai K, Ishikawa H, et al. A comparison of ovarian metastasis between squamous cell carcinoma and adenocarcinoma of the uterine cervix. Gynecol Oncol. 2001; 82: 504-509.
9. Morice P, Juncker L, Rey A, El-Hassan J, Haie-Meder C, Castaigne D. Ovarian transposition for patients with cervical carcinoma treated by radiosurgical combination. Fertil Steril. 2000; 74: 743-748.
10. Husseinzadeh N, van Aken ML, Aron B. Ovarian transposition in young patients with invasive cervical cancer receiving radiation therapy. Int J Gynecol Cancer. 1994; 4: 61-65.
11. Gabriel DA, Bernard SA, Lambert J, Croom RD, 3rd. Oophoropexy and the management of Hodgkin's disease. A reevaluation of the risks and benefits. Arch Surg. 1986; 121: 1083-1085.
12. Kovacev M. Exteriorization of ovaries under the skin of young women operated upon for cancer of the cervix. Am J Obstet Gynecol. 1968; 101: 756-769.
13. Leporrier M, von Theobald P, Roffe JL, Muller G. A new technique to protect ovarian function before pelvic irradiation. Heterotopic ovarian autotransplantation. Cancer. 1987; 60: 2201-2204.
14. Tulandi T, Al-Took S. Laparoscopic ovarian suspension before irradiation. Fertil Steril. 1998; 70: 381-383.
15. Bisharah M, Tulandi T. Laparoscopic preservation of ovarian function: an underused procedure. Am J Obstet Gynecol. 2003; 188: 367-370.
16. Covens AL, van der Putten HW, Fyles AW, et al. Laparoscopic ovarian transposition. Eur J Gynaecol Oncol. 1996; 17: 177-182.
17. Bromer JG, Patrizio P. Preservation and postponement of female fertility. Placenta. 2008; 29 Suppl B: 200-205.
18. Dursun P, Ayhan A, Yanik FB, Kuscu E. Ovarian transposition for the preservation of ovarian function in young patients with cervical carcinoma. Eur J Gynaecol Oncol. 2009; 30: 13-15.
19. Falcone T, Bedaiwy MA. Fertility preservation and pregnancy outcome after malignancy. Curr Opin Obstet Gynecol. 2005; 17: 21-26.
20. Advincula AP, Falcone T. Laparoscopic robotic gynecologic surgery. Obstet Gynecol Clin North Am. 2004; 31: 599-609, ix-x.
21. Lowery WJ, Leath CA, 3rd, Robinson RD. Robotic surgery applications in the management of gynecologic malignancies. J Surg Oncol. 2012; 105: 481-487.