Distinguished Expert Series

Robotic-assisted laparoscopic anterior pelvic exenteration in patients with advanced ovarian cancer: Farghaly's technique

S.A. Farghaly

The Medical College of Cornell University, New York, NY (USA)

Summary

The safety and efficacy of the robotic-assisted laparoscopic approach to anterior pelvic exenteration is evaluated in patients with advanced ovarian cancer undergoing anterior pelvic exenteration for involvement of the urinary bladder during primary cytoreduction surgery. All patients undergo preoperative lab work, imaging studies and bowel preparation prior to surgery. The Davinci surgical system is used to perform urinary cystectomy, total hysterectomy, bilateral salpingo-oophorectomy, bilateral pelvic adenectomy (including obturator, hypogastic, external iliac, and common iliac lymph nodes). In addition, debulking to less than 1 cm is performed. The anterior pelvic exenteration procedure involves wide perivesical dissection. Then the robot is locked, and ileal conduit is performed via a 6 cm lower midline incision. Operative time can be maintained in 4.6 hours with a mean blood loss of 215 ml and hospital stay of five days. Farghaly's technique of robotic-assisted laparoscopic anterior pelvic exenteration in patients with advanced ovarian cancer is safe, feasible, and cost-effective with acceptable operative, pathological and short- and long-term clinical outcomes. It retains the advantage of minimally invasive surgery.

Introduction

Patients and surgical characteristics

Patients with advanced ovarian cancer undergo preoperative lab work, imaging studies (e.g., chest X-ray and abdominal and pelvic cross-sectional and positron emission tomography (PET) imaging. PET scan is valuable in primary staging of ovarian cancer, and diagnosis of advanced ovarian cancer. Patients with advanced ovarian cancer involving the wall of the urinary bladder are selected for this surgical technique.

Instruments

The SILS (TM) electrosurgical instrument is utilized (Covidien, Mansfield, MA). This is a multi-instrument access port that allows up to three laparoscopic instruments (three 5-mm cannulas or two 5-mm, and one 12-mm cannula) to be used simultaneously through separate flexible channels. The cannula positions are adjustable within the flexible port, and separate channel allows for CO_2 gas insufflation. After the insertion of the port and insufflation of the abdomen with CO_2 gas a blunt 5-mm trocar is placed into the most cephalad channel and a round table 30° laparoscope is introduced (Endoeye, Olympus America Inc., Center Valley, PA). A blunt 10-mm trocar is inserted through the most cephalad channel of the robotic scope (Intuitive Surgical, Sunnyvale, CA), and additional 5-mm and 8-mm trocars are inserted caudally and laterally to this for the robotic trocars/instruments. A single-channel Gelport (Applied Medical, Rancho Santa Margarita, CA) is used. The Gelport consists of two parts: the outer rigid Gelcap (10 cm in diameter) visualized, and the Alexis Wound Retractor over which the Gelcap fits. The wound retractor has an inner flexible retraction ring which can be inserted into small incisions and can accommodate a variety of port diameters from 1-10 cm to a rigid extra-peritoneal retraction ring onto which the Gelcap fits to provide a large surface area for trocar placement and superior exposure. The combination of the rigid ring of the Alexis wound retractor with a Gelseal® cap help to maintain the pneumoperitoneum during multiple instrument exchanges. A blunt 5-mm trocar is placed at the most caudal aspect of the Gelport. The abdomen is insufflated with CO_2 gas to 15 mmHg, and a 5-mm 30° Olympus laparoscope is inserted. A 10-mm robotic scope is introduced through a 10-mm blunt trocar and two standard robotic-trocars (5-mm and 8-mm, respectively) are placed through the Gelport in a triangulated distribution. In addition a V-care uterine manipulator is used.

Technique

Once the patient is anesthetized, she is placed in the low lithotomy position in yellowfin stirrups with her arms tucked at her side. After prepping and draping the patient, a standard Vcare Uterine Manipulator (Conmed Endosurgery, Utica, NY) is placed and a foley catheter is inserted into the urinary bladder. A 3-cm incision is made at the umbilicus, a Gelport is inserted into the incision and trocars are introduced through the port with robotic instruments. The patient is then placed in the steep Trendelenburg position and the da Vinci surgical system (Intitutive Surgical, Sunnyvale, CA)

Revised manuscript accepted for publication January 27, 2010

is docked between her legs. A 10-mm robotic 30° scope is used through the 10-mm port and a robotic monopolar hook and bipolar Maryland instruments are used through the triangulated robotic ports to perform the procedure. The assistant intermittently places an endoscopic suction device directly through the port. Ovarian cancer tumors and local metastases are debulked to less than 1 cm in diameter. The round ligaments are ligated bilaterally, and retroperitoneal spaces are developed. The infundibulopelvic ligaments are skeletonized and transected. A bladder flap is developed, and the uterine arteries and their tributaries are skeletonized and ligated. Pelvic and paraaortic lymph nodes are dissected. Anatomical margins for the lymph node dissection include: medially the ureter, laterally the body of the psoas muscle and genitofemoral nerve, posteriorly, the obturator nerve, inferiorly, the deep circumflex iliac vein, and cephalic of the midportion of the common iliac artery. The superior limit of the paraaortic dissection is the inferior mesenteric artery. Farghaly's technique for anterior pelvic exenteration is employed to create free margins as the ovarian cancerous tumor spreads to the bladder wall. The bladder is dissected with its covering. The peritoneum in the cave of Retzius and ureters are clipped and cut. The vagina is cut with harmonic shears and this cut is extended anteriorly into the urethera and the entire specimen is disconnected. The paracolpos is cut with a ligasure till the levator ani muscle with endopelvic fascia is seen. The entire specimen; uterus, ovarian tumor tissues, fallopian tubes and all lymph nodes, are removed through the vagina by placing it in an endocatch bag, and the vagina is packed to prevent carbon dioxide gas leakage. The urinary resevoir is formed by dissecting the terminal ileum about 12 cm from the ileocecal valve and the large colon is dissected 15-20 cm distal to the hepatic flexure. The transection site of the large colon is performed before the middle colonic artery. The distal portion of the ileum is used for the continent mechanism of the resevoir. The isolated bowel tract is washed using normal saline solution, Ringer's lactate and antiseptic proidone-iodine solution. The isolated bowel tract is then filled with 200 ml of normal saline, and six teniamyotomies are performed. The tenia is sectioned across the whole width to the subumblical layer with, 6 cm between each teniamyotomy. The teniamyotomies are left open to increase the resevoir capacity of the pouch. The spatulated urerters are sutured together at the medial side of spatulation to create a trapezoidal plane which is anastomosed to the resevoir as the distal ileum is used as an efferent segment of the pouch. The distal ileum is cannulated with a 14 Fr catheter. The ileocecal valve is reinforced with 2/0 prolene sutures. The tapered ileum is then brought to the anterior abdominal wall.

A pelvic drain is introduced through the 10 mm port and ports were removed under vision. The vagina is closed by intracorporeal suturing with 2-0 vicryl and by taking continuous interlocking sutures. The fascia is closed using 0 vicryl sutures and the skin is closed with a running 4-0 monocryl subcuticular stitch. Estimated operative time is 4.6 hours, and average blood loss is 210 ml. The pelvic drain is kept in place for 24-48 hours depending on the drainage. Hospital stay is about five days.

Discussion

The advantage of using the robotic system is that it enables the surgeon to dissect deeply in the narrow pelvic floor. Also, it offers better visualization with the binocular optics generating 3-D steroscopoic vision. Utilization of a harmonic scalpel allows for control of the pelvic sidewall vessels and transaction of the ligament attachments around the pelvic structures. The articulating wristed robotic instrument allows for fine sewing. Robotic surgery for advanced ovarian cancer can be achieved by rotating the operating table and relocking the robot at the patient's head. This position will allow dissection and removal of the paraaortic lymph nodes, resection of the upper abdominal metastases, and debulking of the diaphragm and liver involvement [1]. It has been shown that robotic radical prostatectomy provides a significant advantage in terms of its learning curve, especially for surgeons with little or no advanced laparoscopic experience [2]. It requires only 12 cases to achieve proficiency in performing robotic-assisted radical prostatectomy.

Total cystectomy with urinary diversion remains the treatment of choice for organ-confined muscle invasive cancer of the urinary bladder. Gil *et al*. [3] reported laparoscopic radical cystectomy, bilateral lymphadenectomy, and ileal conduit diversion with the entire procedure carried out by an intracorporeal laparoscopic technique.

There have been few case reports of laparoscopic anterior pelvic exenteration [4, 5]. It has been shown that the procedure is feasible even if combined with intracorporal urinary diversion. Overall morbidity and hospitalization have considerably decreased. It is worth noting that the goal of extensive surgery, anterior pelvic exenteration, should always be resection of the tumor with tumor-free margins. Prototypes of the robotic operative systems that come down from the ceiling and have the ability to rotate 360° have been proposed to allow more flexibility and better visualization of the operating field.

Conclusion

Farghaly's anterior pelvic exenteration technique offers benefits such as improved surgeon dexterity, enhanced ergonomics and 3-D optics. The utilization of an ileal conduit formation for urinary diversion is technically feasible with good results. Moreover, it is safe, cost effective, with acceptable operative, pathological and short- and long-term clinical outcomes. It retains the advantage of minimally invasive surgery. Randomized controlled studies are necessary to define surgical and oncologic outcomes obtained from this surgical technique, and to assess the relative benefits of this technique compared with more conventional minimally invasive approaches.

References

[1] Bandera C.A., Magrina F.: "Robotic surgery in gynecologic oncology". *Obstet. Gynecol.*, 2009, 1, 25.
[2] Ahlering T.E., Skarecky D., Lee D., Llayman R.V.: "Successful transfer of open surgical skills to a laparoscopic environment using a robotic interface: initial experience with laparoscopic radical prostatectomy". *J. Urol.*, 2003, *5,* 1738.
[3] Gill I.S., Fergany A., Klein E., Kaouk J.H., Sung G.T., Merahey A.M. *et al.*: "Laparoscopic radical cystectomy with ileal conduit performed completely intracorporeally; the initial 2 cases". *Urology,* 2000, *56*, 26.
[4] Lin M.Y., Fan E.W., Chiu A.W., Tian Y.F., Wu M.P., Liao A.C.: "Laparoscopy-assisted transvaginal total exenteration for locally advanced cervical cancer with bladder invasion after radiotherapy". *J. Endourol.,* 2004, *9*, 867.
[5] Pomel C., Rouzier M., Pocard A., Thoury A., Sideris L., Morice P. *et al.*: "Laparoscopic total pelvic exenteration for cervical cancer relapse". *Gynecol. Oncol.,* 2003, *3*, 616.

Address reprint requests to:
S.A. FARGHALY, M.D.
P.O. Box 20171
DHPCC
New York, NY (USA)
e-mail: samirfarghaly@yahoo.com