Robotic radical parametrectomy in patients with undiagnosed invasive cervical cancer: a step by step procedure

Houssein El Hajj[1], Domenico Ferraioli[1], Mathilde Roussel[1], Camille Jauffret[1], Gilles Houvenaeghel[1,2], Eric Lambaudie[1,2]

[1]Department of Surgical Oncology, Institut Paoli Calmettes, 232 Boulevard Sainte Marguerite, 13009 Marseille, France; [2]Aix Marseille Université, CNRS, INSERM, CRCM, Marseille, France

Correspondence to: Eric Lambaudie, MD, PhD. Department of Surgical Oncology, Paoli Calmettes Institute and CRCM, CNRS, INSERM, Aix Marseille Université., 232 Bd de Sainte Marguerite, 13009 Marseille, France. Email: lambaudiee@ipc.unicancer.fr.

Abstract: Occult discovery of invasive cervical cancer discovered after hysterectomy for non-malignant indications is not uncommon. For patients presenting an incidental diagnosis of early stage invasive cervical cancer (FIGO Stages IA1-IB2), two possible strategies can be proposed: Adjuvant radiation Therapy with no tumor target or Radical Parametrectomy (RP) associated with upper vaginectomy and pelvic lymph node dissection. When compared to Radiation therapy RP presents a lower rate of late complications, making it the preferred approach to treat younger patients. Traditionally performed via laparotomy, minimally invasive approach is now proven feasible and effective. This article presents a focused anatomic review and describes the surgical technique of the five-port robotic assisted radical parametrectomy.

Keywords: Robotic surgery; radical parametrectomy; occult invasive cervical cancer; surgical technique

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Introduction

Occult discovery of invasive cervical cancer after hysterectomy performed for non-malignant indications is not uncommon. Representing 3.5% of incidental invasive cervical cancers, early stages consist of stages 1A1 with Lympho-Vascular Space Involvement (LVSI) to 1B2 according to the 2018 FIGO classification (1). This may occur in patients undergoing "simple hysterectomy" without an adequate screening for cervical dysplasia, with a falsely negative Pap Smear or in patients who only had a colposcopy for severe dysplasia (2). Without additional treatment, the 5-year overall survival rate (OS) of these patients is less than 50% (3). The two treatment strategies that can be proposed for patients with occult early stage invasive cervical cancer are: Adjuvant radiation Therapy (RT) without tumor target associated or not to chemotherapy [concurrent chemo-radiation therapy (CCRT)] (4,5), or radical parametrectomy (RP) with upper vaginectomy associated with bilateral pelvic lymphadenectomy (PLND) (6-8). There is a lack of literature regarding the optimal treatment approach. Narducci *et al.* showed that when compared to RT/CCRT, surgery is associated with a better 5-year disease-free survival (DFS) (86% *vs.* 37%) and 5-year OS (100% *vs.* 77%). These findings were also confirmed by a recent review of the literature performed by Ruengkhachorn *et al.* (9). Complications rate after radical parametrectomy varies between 18% and 30% in the literature (1,10-12), but when compared to RT or to CCRT, RP presents a lower rate of late complications such as bladder and rectal complications, sexual dysfunction and ovarian failure (12). This approach is preferred in young women because negative pathology findings indicate no further therapy. Traditionally performed via laparotomy, RP can also be achieved via minimally invasive techniques since its feasibility and safety were proven (11). In 2008, Ramirez *et al.* (13) demonstrated that robotic assisted minimally invasive RP is feasible and is associated with an enhanced visualization, an improved precision and dexterity.

This article describes the surgical technique of the five-port robotic assisted radical parametrectomy.

Operative technique

To decrease operative related morbidity, this procedure should be performed by experienced surgeons with a solid knowledge of pelvic anatomy. Prior to describing the surgical technique, we will present a brief focused anatomic description.

Anatomy

The parametrium is an anatomical structure consisting of connective tissue lying between the parietal pelvic fascia and the visceral pelvic fascia. It contains mainly the lymphovascular and neural structures that drain the pelvic viscera. It is divided into three parts: anterior, lateral and posterior (2,14).

The anterior parametrium also called "the bladder pillar" is identified after dissecting the vesico uterine septum and developing the vesico-cervical and vesico-vaginal spaces anteriorly and developing the medial and lateral paravesical spaces laterally. It is divided by the ureter into a cranial-medial portion consisting of the vesico-uterine ligament and a caudal-lateral portion corresponding to the lateral ligament of the bladder (15).

The posterior parametrium consists of three important anatomical structures: The Uterosacral Ligaments (USL) connecting the cervico-isthmic dorsal portion of the uterus to the ventral sacral bone, The Rectovaginal ligaments connecting the dorsal portion of the vagina to the ventral portion of rectum and the Lateral Rectal Ligaments connecting the lateral portion of the rectum to lateral pelvic wall. The lateral and caudal parts of the USL contain nerves deriving from the superior hypogastric plexus (16).

The lateral parametrium also called "paracervix" is identified after developing the para-vesical spaces and para-rectal spaces. The ureter's path defines two parts: a cranial-medial structure corresponding to the Cardinal ligament and a caudal-lateral structure corresponding to the para-cervix. The cardinal ligament consists of connective tissue surrounding the uterine artery and superficial uterine vein and the related lymphatic tissue. The uterine vein divides the paracervix into a medial part made of connective tissue and a lateral part made of lympho-vascular and nervous structures (17-19).

Surgical technique (Video 1)

To be considered eligible for radical parametrectomy, patients should have a normal pelvic examination with no evidence of vaginal or parametrial macroscopic residual disease. Vaginal cytology and preoperative evaluation with magnetic resonance imaging (MRI) or positron emission tomography–computer tomography (PET-CT) scan should be performed for all patients prior to surgery. This is followed by an anesthesia consultation to rule out major contraindications to surgery. An antibiotic prophylaxis is given within 30 minutes of skin incision.

Proper positioning of the patient is essential and steep Trendelenburg position (30°) is crucial to ease the exposure and keep the bowels out of the operative field. The patient must be positioned in a semi lithotomy position with the arms tucked to the patient's side using appropriate padding and secured properly to prevent upward slippage on the table. A vaginal probe and if needed, a rectal probe could be used to mobilize both the vaginal cuff and the rectum allowing a better dissection of the vesicovaginal and the rectovaginal spaces. The robotic column is placed on the left lateral side of the patient.

After open laparoscopy, a 12-mm bladeless trocar (Ethicon Endosurgery, Cincinnati, OH) or a 12-mm Hassan trocar is introduced in the umbilicus. This trocar is used to house the robotic optical arm. The abdomen is insufflated (pressure =12 mmHg). The patient is then placed in a steep Trendelenburg position (30 degrees). The abdomen is explored for evidence of metastatic disease. If found, carcinomatosis lesions should be excised and sent to frozen section to rule peritoneal metastases. If present, free abdominal fluid is aspirated for cytology. If not, peritoneal washing is performed. The robotic trocars are then placed on a horizontal line at the same level of the umbilicus. The first robotic trocar is placed 7 cm to the left of the umbilical trocar, the second robotic trocar is placed 8 cm to the left of the first robotic trocar, the third robotic trocar is placed 7 cm to the right of the umbilical trocar. The Airseal 12 mm trocar is inserted in the right flank 8 cm lateral to the third robotic trocar. This trocar is used by the patient-side assistant and serves for counter-traction, coagulation, suction & irrigation, needles insertion and extraction as well as placing Hem-O-Lok clips. The robotic instruments used include an EndoWrist (Intuitive Surgical, Sunnyvale, CA) fenestrated bipolar grasper through the first robotic trocar, an EndoWrist Cadiere grasper through the second robotic trocar, and an EndoWrist monopolar scissor through the

third robotic trocar. The DaVinci robotic system (Intuitive Surgical, Sunnyvale, CA) is then docked. Once the robot is docked and the CONMED Airseal system is connected, the intra-abdominal pressure can be lowered to 8 mmHg or less, to limit post-operative pain.

The procedure starts by incising the peritoneum on the lateral pelvic sidewall. The peritoneal dissection is proceeded from the round ligament stump towards the ligated infundibulo-pelvic pedicle stump. This is followed by the development of the retroperitoneal space with the identification of the umbilical artery, the iliac vessels and laterally the psoas muscle with the genito-femoral nerve. The paravesical and pararectal spaces are then developed down to the pelvic floor and the cardinal ligaments, uterine arteries, and ureters are widely exposed. A radical pelvic lymphadenectomy is performed bilaterally from the bifurcation of the common iliac artery cranially to the circumflex iliac vessels and the Cooper ligament caudally. The margins of the lymphadenectomy are the external iliac vessels laterally and the umbilical artery medially. The lymph nodes in the obturator space are also removed. The lymph nodes are extracted separately in two Endo Bags and sent to frozen section examination. Once lymph node involvement is excluded, we proceed to parametrectomy.

Radical parametrectomy is started with the dissection from the posterior leaf of the broad ligament. The anterior division of the internal iliac artery (IIA) is identified and the uterine artery and vein are transected proximally at their origin using a vascular sealing system or Hem-O-Lok clips. The ureters are then mobilized from their attachments and separated from the medial leaf of the peritoneum down to the ureteral tunnel below the uterine artery and to their entrance into the bladder. Aided by the vaginal probe, the bladder peritoneum is incised, and the bladder is dissected and mobilized inferiorly down to the middle third of the vagina. After dissection of the bladder pillar, the vesico-vaginal space is joined to the paravesical space, completely separating the bladder from the anterior vaginal wall. In cases of anatomical distortion or bladder adhesions, instillation of 300 cc of saline solution associated with Methylene blue dye in the bladder might be required to guide the dissection. Posteriorly, the peritoneum is incised at the level of the cul-de-sac of Douglas and the rectovaginal space is developed isolating the uterosacral ligaments. The proximal parametrium and para-vaginal tissues are finally dissected as in a Type B1 Querleu Morrow radical hysterectomy.

The same procedure is performed on both sides. A circular incision is made about 3 cm below the vaginal cuff aided by upward vaginal traction.

The surgical specimen is removed through the vagina, and the vaginal vault is sutured using the EndoWrist Mega Needle Driver and a barbed V-Loc suture. The robot is then de-docked and the trocar sites are closed.

Comments

Simple extra-fascial hysterectomy is not the standard approach for treating patients with early stage (IA1) invasive cervical cancer with LVSI or higher stages. In cases of incidental occult cervical cancer, this treatment approach is associated with a 50% survival rate at 5 years (1). RP or adjuvant RT/CCRT are valid therapeutic options proved to decrease the recurrence rate and to improve the overall survival. When comparing both strategies and after review of literature, it is not possible to define the gold standard approach due to the paucity of literature on the subject (7). Interestingly, RP after a "simple hysterectomy" for occult early stage invasive cervical cancer is associated with similar oncologic outcome when compared to the standard surgical treatment for cervical cancer in case of negative pelvic lymph node staging. If positive nodes are identified on frozen section, RP must be abandoned and para aortic lymph node dissection is performed to tailor the CCRT.

This paper describes our robotic radical parametrectomy technique. Similarly, to Zapardiel *et al.* we perform bilateral pelvic lymph node dissection before proceeding to radical parametrectomy (20).

Literature review during the last decade, shows that we can consider RP as a safe, efficient and reproducible technique that might be an alternative to RT/CCRT in case of occult early stage cervical cancer. Nonetheless, due to its technical complexity the treatment approach must be discussed thoroughly during multidisciplinary tumor boards (10).

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Supplementary

Discussion

(I) Dr. Liliana Mereu: Following new guidelines, could the authors specify in which cases they give indication to perform radical parametrcetomy in patients with undiagnosed invasive cervical cancer?

Radical parametrectomy is a valid option for patients diagnosed with early stage occult cervical cancer (2018 FIGO stages 1A1 with LVSI to IB2) in order to improve local control and avoid radiation related complications.

(II) Dr. Liliana Mereu: Could the authors highlight the advantages of robotic approach?

Radical parametrectomy like radical hysterectomy is a complex pelvic procedure that can benefit from the advantages of robotic assistance to achieve a nerve sparing surgery. These advantages are mainly related to the enhanced 3D visualization, greater precision, tremor control and finer tissue handling.

(III) Dr. Liliana Mereu: In consideration to recent studies published on MIS in cervical cancer, do the authors have any concerns in relation to re-treat by MIS an undiagnosed invasive cervical cancer?

Considering that the tumor was completely resected during the initial surgery and no evidence of residual disease was found on pre-operative clinical examination and imaging; minimally invasive techniques are always suggested to the patients. Patients should be informed of the results of the LAAC trial and patient's preference should be taken into consideration when choosing the surgical approach.