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Comparison of robotic-assisted vs conventional laparoscopy for extraperitoneal paraaortic lymphadenectomy

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ABSTRACT

Objective. To evaluate the perioperative outcomes of robotic-assisted extraperitoneal paraaortic lymphadenectomy for locally advanced cervical cancer and to compare to a previous series of patients from our institution undergoing the same procedure by conventional laparoscopy.

Methods. 17 patients with locally advanced cervical cancer (FIGO stages IB2, IIA2 and IIB–IVA) underwent pretherapeutic extraperitoneal paraaortic lymphadenectomy by robotic-assisted laparoscopy. Perioperative outcomes including age, BMI, FIGO stage, operating time, blood loss, complications and length of hospital stay were compared to a series of 83 patients from our institution undergoing the same procedure by conventional laparoscopy.

Results. The median values for operating time and hospital days for the robotic-assisted and conventional laparoscopy groups were 150 vs. 150 min and 2 vs 2 days, respectively. In the robotic group, blood loss was lower (90 vs 20 ml, $p < 0.05$) and more aortic nodes were removed (14 vs 17 nodes, $p < 0.05$). Docking time was 7 min (range 3–15). There were no intraoperative complications. There were no differences for postoperative complications (17.6% vs 8.4%).

Conclusion. Robotic-assisted and conventional laparoscopy provide similar perioperative outcomes other than lower blood loss and higher number of aortic nodes removed (both without clinical impact) in robotic patients for the performance of extraperitoneal paraaortic lymphadenectomy in patients with locally advanced cervical cancer. We believe that robotic surgery is an additional tool to perform the same surgical procedure.

Highlights. Robotic-assisted and conventional laparoscopic extraperitoneal paraaortic lymphadenectomy provide similar perioperative outcomes.

Introduction

The value of pretherapeutic extraperitoneal laparoscopic aortic lymphadenectomy in patients with locally advanced cervical cancer has recently become a possible option in the care of these patients [1]. Lymph node metastasis, particularly in the paraaortic area, and local tumor extent, are the most important prognostic factors in cervical cancer [1–3].

Although Positron Emission Tomography (PET-scan) has shown improved detection of aortic nodal metastases as compared to computed tomography (CT) and magnetic resonance imaging (MRI) [4–6], 18–32% of patients classified as aortic node-negative by PET-scan have aortic nodal metastases at lymphadenectomy [7]. A prospective randomized trial evaluating the impact of surgical staging on disease-free interval and overall survival is currently being developed (www.clinicaltrials.gov, NCT01365156).

The implementation of appropriate treatment following identification and removal of histologically positive aortic nodes results in a respectable 5-year survival of 50%, as compared to a dismal or no survival if undetected and untreated [8, 9]. Resection of micrometastases (<5 mm) and enlarged positive nodes has also been shown to provide a therapeutic benefit [1, 10–12]. The laparoscopic approach has replaced laparotomy for the evaluation of aortic nodal metastases in locally advanced cervical cancer patients due to improved perioperative outcomes [13] and decreased intestinal complications from irradiation. The extraperitoneal laparoscopic approach, while providing a similar number of aortic nodes, has been shown to have some advantages over the transperitoneal route due to decreased risk of bowel injury, avoidance of pre-existing abdominal adhesions, and reduced adhesion formation [14].

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Robotic technology has advantages over conventional laparoscopic instrumentation [15], and specially for limited surgical fields such as the extraperitoneal approach to aortic nodes. Robotic-assisted laparoscopic extraperitoneal paraaortic node dissection has been shown to be safe and feasible for patients with locally advanced cervical cancer [16–18]. The purpose of this study was to provide a comparison of the robotic assisted vs conventional laparoscopic approaches for extraperitoneal paraaortic lymphadenectomy in patients with locally advanced cervical cancer.

Patients and methods

Between July 2009 and January 2013, 17 non-consecutive patients with locally advanced cervical cancer (FIGO stages IB2, IIA2 and IIB–IVA) {Figo 2009 [19]} were diagnosed and treated at the Unit of Gynecologic Oncology of Hospital Vall d'Hebron in Barcelona, Spain. All patients underwent robotic-assisted laparoscopic extraperitoneal paraaortic and common iliac lymphadenectomy with the da Vinci S surgical system (Intuitive Inc., Sunnyvale, CA®) and constitute our robotic learning curve for this technique. There were no specific selection criteria to perform the lymphadenectomy with robotic technique besides da Vinci robot availability. Exclusion criteria were as follows: severe cardiorespiratory disease, age 80 years old or older, prior radiotherapy or retroperitoneal surgery and evidence of metastatic disease outside of the pelvis in preoperative imaging study. Patients with metastatic paraaortic lymph nodes received extended field radiation therapy concurrent with chemotherapy. Pretherapeutic MRI/PET scan studies were performed in all patients. Lymph nodes were interpreted as suspected following the European Association of Nuclear Medicine (EANM) procedure guidelines for tumor PET imaging, version 1.0.[20]. The study was approved by the ethics committee and the institutional review board.

The operating time was measured from skin incision to completion of skin closure. Early postoperative complications include any adverse event in the first 42 postoperative days. Any subsequent adverse event was considered a late postoperative complication.

These 17 patients were compared to a series of 83 patients from our institution undergoing the same procedure by conventional laparoscopy. The technique and results have been previously published [21].

Robotic surgical technique

The robotic surgical technique is similar to that previously reported for laparoscopy [22] which was modified from Querleu et al. [23]. A left approach is chosen because the majority of lymph nodes are on the left paraaortic region [24] and the right aortic nodes can also be removed [21, 25]. The patient is in a supine position on the left side of the operating table with the surgeon and the assistant to the patient's left side. The patient's right arm is tucked to her side and the left arm is extended at 90°. A diagnostic transperitoneal laparoscopy by means of a transumbilical 12-mm trocar is performed to rule out peritoneal disease. In the absence of peritoneal metastases a 2 cm incision is made above and medial to the left iliac spine with direct laparoscopic intra-abdominal visualization and a 12-mm trocar is inserted under direct laparoscopic visualization. Finger dissection as described in the original technique is no longer used since the space is developed when the extraperitoneal CO_2 insufflation reaches a maximal pressure of 12 mm Hg. A 30° laparoscope is introduced through the extraperitoneal 12-mm trocar and the following trocars are introduced under direct visualization: an 8-mm robotic trocar behind the 11th rib, a 12-mm optical robotic trocar equidistant between the 11th rib and the iliac spine, and a one 5-mm assistant trocar in the midaxillary line for ventral peritoneal retraction, suction and irrigation (Fig. 1). The robotic column is positioned at the level of the patient's right shoulder. The left robotic arm is docked to an 8-mm robotic trocar introduced though the 12-mm trocar near the left iliac spine (telescoping). The 30° da Vinci laparoscope is introduced though the middle 12-mm trocar and the right robotic arm is docked to the 8-mm robotic trocar behind de 11th rib (Fig. 2).

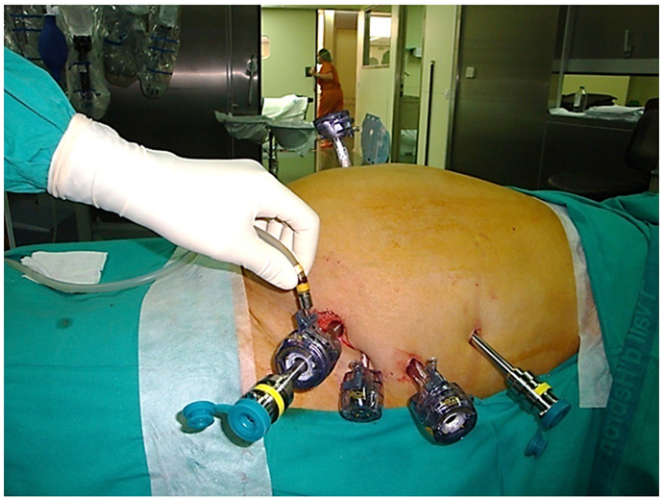

Fig. 1. Port placement for robotic-assisted laparoscopic extraperitoneal paraaortic lymphadenectomy.

Care is taken to maintain a 7–8 cm distance between the ports to avoid arm collision. A bipolar grasper (fenestrated bipolar forceps endowrist instrument, Intuitive Surgical, Sunnyvale, CA®) and a monopolar curved scissors (endowrist instrument, Intuitive Surgical, Sunnyvale, CA®) are used through the left and right robotic trocars, respectively. One monitor and the tower containing the electrosurgical generators are positioned at the end of the operating table.

Fig. 2. Position of robotic column and the patient in robotic-assisted laparoscopic extraperitoneal para-aortic lymphadenectomy.