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JMIG The Journal of Minimally Invasive Gynecology

Instruments and Techniques

Improving Double Docking for Robot-assisted Para-aortic Lymphadenectomy in Endometrial Cancer Staging: Technique and Surgical Outcomes

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ABSTRACT Robot-assisted para-aortic lymphadenectomy (PALND) may prove to be a challenging procedure, and the ability to reach the planned anatomic landmarks is critical. In this retrospective study between 2012 and 2015, we present surgical data using a modified technique to perform infrarenal PALND for endometrial cancer using double side docking. All women with high-risk endometrial cancer scheduled for complete robotic staging including infrarenal PALND were included in the analysis. During the study period, a total of 76 women were identified. Three patients had disseminated disease and were treated with palliative hysterectomy only. The remaining 73 women underwent surgery with the intention to perform infrarenal PALND. In 7 cases, PALND was aborted because of technical inability to reach the left renal vein (10%). A median of 36 lymph nodes were harvested (pelvic n = 20, para-aortic n = 16). The median operating time (skin to skin) for patients with completed infrarenal PALND was 228 minutes (range, 181–371 minutes). Among all 76 patients, postoperative complications according to the Clavien-Dindo nomenclature were observed in 27 (36%) patients, with 6 (8%) having grade III complications. No patient died within 30 days from surgery. Our technique of double docking for robot-assisted PALND was associated with a success rate of 90%. The described technique seems to be a useful strategy to maximize the likelihood of completing the planned procedure. Journal of Minimally Invasive Gynecology (2016) 23, 818–824 © 2016 AAGL. All rights reserved.

Keywords: Endometrial cancer; Para-aortic lymphadenectomy; Robotic surgery

Lymphadenectomy, pelvic and para-aortic, is an essential part of surgical staging procedures in gynecologic malignancies. The extent of para-aortic lymphadenectomy (PALND) varies between countries and institutions, and the Society of Gynecological Oncology recommends the inferior mesenteric artery as the cranial border, whereas the European Society of Medical Oncology advocates the left renal vein [1,2]. In addition, no consensus regarding quality indicators such as the number of harvested nodes currently exists. Limited data suggest that lymphadenectomy has therapeutic potential in endometrial cancer although further studies are needed to confirm retrospective analyses [3]. Hence, lymphadenectomy is primarily considered as a diagnostic procedure to better guide the use of adjuvant therapy. In the evolving era of less invasive technologies for the diagnosis of metastatic disease (especially sentinel node), systematic lymphadenectomy may be of limited importance in the near future.

Lymphadenectomy can be performed either as open surgery (laparotomy) or as minimally invasive surgery. The latter includes both traditional laparoscopy and robot-assisted laparoscopy. The first 3 generations of the da Vinci system (Intuitive Surgical Inc., Sunnyvale, CA) were not designed for multiquadrant surgery, and different approaches have been developed to overcome this limitation. Three different techniques have been described to perform robot-assisted PALND: single center docking (between the patient's legs), double docking at the patient's head, and double docking from the patient's left or right side [4–6]. Achieving adequate exposure up to the renal vein may be challenging regardless of the technique, especially in obese women. The ability to actually perform a planned systematic

The authors declare that they have no conflict of interest.

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Submitted March 2, 2016. Accepted for publication March 30, 2016.
Available at www.sciencedirect.com and www.jmig.org

http://dx.doi.org/10.1016/j.jmig.2016.03.023

lymphadenectomy is crucial because patients are put at significant risk for morbidity related to a relatively extensive surgical procedure. In the published studies on robot-assisted PALND, few report on the ability to reach a planned anatomic boundary (i.e., the renal vein or the inframesenteric artery). Theoretically, double docking provides an advantageous approach with a superior exposure of the upper abdomen and the large vessels. In addition, a preliminary study comparing single with double docking for robot-assisted PALND suggested that the number of harvested nodes may be higher using the latter approach [5]. However, a mean operating time (OT) exceeding 5 hours and the use of additional port sites raise concerns regarding the complexity of double docking procedures.

At Karolinska University Hospital, a tertiary referral center for gynecologic malignancies in Stockholm, Sweden, robotic staging for endometrial and ovarian cancer has been performed since 2009. The purpose of this study was to develop a standardized, robust method to perform robot-assisted PALND with a limited number of port sites and a high probability of reaching the infrarenal area. In this article, we report on the potential benefits of a modified double side docking technique for robot-assisted PALND in endometrial cancer staging.

Material and Methods

This study is a retrospective analysis of all patients with high-risk endometrial cancer who underwent robotic surgery with pelvic lymphadenectomy (PLND) and PALND between 2013 and 2015 at Karolinska University Hospital.

According to national and local guidelines, high-risk endometrial cancer is defined as type 2 histology or endometrioid histology grade 3 or preoperative stage IB-II. Lymphadenectomy is not performed in women >75 years of age. The da Vinci SI robotic system (Intuitive Surgical Inc.) was used for all staging procedures. The surgeries were performed by 2 senior surgeons with individual experience of >100 robotic surgeries before the onset of this study. Data were retrieved from patient medical records and hospital databases. During the study period, a total of 654 women with endometrial cancer underwent primary surgery. One hundred fifty-three women (23.4%) were scheduled for full staging including infrarenal PALND, and the remaining 501 were scheduled for hysterectomy and bilateral salpingo-oophorectomy. Of the 153 women scheduled for PALND, 77 were operated on with laparotomy and 76 with robot-assisted laparoscopy. The choice of robot-assisted or open surgery was decided as follows:

1. During the first period of the study (14 months), the surgical route was determined by the access to the robot and patients' preferences (n = 66). There were no differences in age, body mass index (BMI), or history of previous surgery between women undergoing open or robotic surgery (data not shown).
2. During the second period of the study (22 months), women were included in an ongoing trial with randomization 1:1 to either robot-assisted or open surgery (n = 87).

The clinical characteristics of the patients were analyzed regarding age, BMI, and the American Society of Anesthesiologists physical status classification system. Intraoperative data including OT (skin to skin), estimated blood loss (EBL), and the inability to reach the left renal vein (robotic failures) were recorded. From the final pathology reports, data on the number of harvested lymph nodes and rate of lymph node metastases were collected. The 30-day postoperative complications were recorded and graded according to the Clavien-Dindo (CD) classification system [7]. This system defines complications as follows: minor, grades I and II (i.e., urinary tract infection and simple wound infection) and major, grades IIIa (requiring intervention not under general anesthesia), IIIb (requiring intervention under general anesthesia), IV (requiring intensive care), and V (death). Hospital length of stay (LOS), readmissions, adjuvant therapy, and 30-day mortality were recorded.

Data are presented as median and range or percentages where appropriate. All statistical analyses were performed with GraphPad Prism software (GraphPad Software Inc., San Diego, CA). This study was approved by the regional ethics committee at Karolinska Institutet.

Surgical Procedure

To limit the number of port sites, the optimal position for the camera port was assessed using the patients' preoperative abdominal computed tomographic scans in which the distance between the aortic and iliac bifurcation was measured. It appeared that the optimal camera position coincides with the iliac spine. (In thin patients, the promontory can be palpated.)

In the operating room, the patient was placed in the lithotomy position. Open dissection in the midline at the level of the iliac spine (approximately 3 cm caudal to the umbilicus) was used to enter the abdominal cavity. A balloon trocar was placed, and the camera was inserted and CO_2 insufflated. After inspection of the abdominal cavity, 2 robotic trocars were inserted at an 8-cm lateral distance from the camera port on the same level. The third robotic trocar was placed on the right side at the level of the umbilicus. A 12-mm assistant port was placed on the patient's left side between the camera port and the robotic port (Figs. 1 and 2). The 4 robotic ports and the assistant port were used for PALND and pelvic surgery. No additional ports were used in any of the reported surgeries. The patient was then put in the Trendelenburg position (30°), and the robotic column was positioned on the patient's right side with the cart facing downward and docked (Fig. 3). The instruments were introduced with monopolar scissors on the lateral right side, a bipolar grasper on the medial right side, and a Cadier grasper (Intuitive Surgical Inc., Sunnyvale, CA) on the right side. The procedure was commenced with PALND,