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Laparoscopic versus robotic radical hysterectomy after neoadjuvant chemotherapy in locally advanced cervical cancer: A case control study

E. Vizza [a], G. Corrado [a,*], E. Mancini [a], P. Vici [b], D. Sergi [b], E. Baiocco [a], L. Patrizi [c], M. Saltari [c], G. Pomati [c], G. Cutillo [a]

[a] *Department of Oncological Surgery, Gynecologic Oncologic Unit, "Regina Elena" National Cancer Institute, Rome, Italy*

[b] *Department of Medical Oncology, Medical Oncology Unit, "Regina Elena" National Cancer Institute, Rome, Italy*

[c] *Academic Department of Biomedicine and Prevention and Clinical Department of Surgery, Division of Gynecology and Obstetrics, Tor Vergata University Hospital School of Medicine, Rome, Italy*

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Abstract

Objective: To compare the surgical outcome of robotic radical hysterectomy (RRH) versus laparoscopic radical hysterectomy (LRH) for the treatment of locally advanced cervical cancer (LACC) after neoadjuvant chemotherapy (NACT).

Materials and methods: From August 1st 2010 to July 1st 2012 a prospective data collection of women undergoing RRH for cervical cancer stage FIGO IB2 to IIB, after neoadjuvant chemotherapy, was conducted at National Cancer Institute "Regina Elena" of Rome. All patients deemed operable underwent class C1 RRH with pelvic lymphadenectomy within 4 weeks from the last chemotherapy cycle.

Results: A total of 25 RRH were analyzed, and compared with 25 historic LRH cases. The groups did not differ significantly in body mass index, stage, histology, number of pelvic lymph nodes removed. The median operative time was the same in the two groups with 190 min respectively. The median estimated blood loss (EBL) was statistically significant in favor of RRH group. Median length of stay was shorter, for the RRH group (4 versus 6 days, $P = 0.28$). There was no significant difference in terms of intraoperative and postoperative complications between groups but in the RRH group we observed a greater number of total complications compared to the control group.

Conclusion: This study shows that RRH is safe and feasible in LACC after NACT compare to LRH. However, a comparison of oncologic outcomes and cost–benefit analysis is still needed and it has to be carefully evaluated in the future.

Keywords: Robotic radical hysterectomy; Minimally invasive surgery; Locally advanced cervical cancer; Neoadjuvant chemotherapy

Introduction

Globally, cervical cancer is the third most common female cancer with over 500,000 new cases diagnosed every year.[1] Patients with locally advanced cervical cancer (LACC), defined as FIGO stage IB2 and usually with tumors greater than 4 cm, IIB, III and IVA, are usually treated with chemo-radiotherapy that, following a National Cancer Institute (NCI) alert in 1999,[2] became standard care for women with locally advanced cervical cancer. Investigations of neoadjuvant chemotherapy (NACT) prior to radical surgery for cervical carcinoma started to appear over 20 years ago. Possible advantages include the potential for reducing tumor volume, increasing resectability,[3] helping to control micrometastatic disease[4] and to provide a viable alternative to chemo-radiotherapy when access to radiotherapy is poor or if there are unavoidable delays in delivering radiotherapeutic treatment.[5] However, despite the enrollment of thousands of women in randomized trials, the value of this therapeutic approach is surrounded with uncertainty and debate.

* Corresponding author. Department of Surgical Oncology, Gynaecologic Oncology Unit, Regina Elena National Cancer Institute, IFO, Via Elio Chianesi 53, 00128 Rome, Italy. Tel.: +39 06 52666974; fax: +39 06 52666907.

E-mail address: giacomo.corrado@alice.it (G. Corrado).

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In the past decade with the marriage of laparoscopy and oncology in daily practice, we witnessed a progressive shift from traditional open surgery towards minimal invasive accesses to treat both the early[6] and locally advanced[7] stages of cervical cancer.

In the present decade robotic technology has been applied to the performance of surgery, by means of the Da Vinci system (Da Vinci Surgical System®, Intuitive Surgical Inc., CA, USA). This technology provides a high definition-3-D vision system and instruments which allow surgeons to increase accuracy by mimicking the complex movement of the human hand, enhance the dexterity with tremor abolition, and faster suturing. The development of robotic technology has facilitated the application of minimally invasive techniques in gynecologic oncology,[8] and recently also the feasibility of this procedure in locally advanced cervical cancer after neoadjuvant chemotherapy, has been investigated.[9]

In this study we present the results of robotic radical hysterectomy (RRH) performed in a single institution compared with historical control cases of laparoscopic radical hysterectomy (LRH) in LACC after NACT.

Material and methods

Study design and data collection

From August 1st 2010 to December 31st 2012, patients with histologically confirmed locally advanced cervical carcinoma (International Federation of Gynecology and Obstetrics (FIGO) stages IB2–IIB)[10] with clinical response after 3 courses of NACT were eligible for the study and underwent RRH using the Da Vinci Si Surgical System®. Neoadjuvant chemotherapy was chosen according to the regimen of the European study SNAP01.[11] Clinical objective tumor responses were evaluated, with magnetic resonance imaging (MRI) and examination under anesthesia, according to the Response Evaluation Criteria in Solid Tumors criteria.[12]

These cases were compared with a historic cohort of women who underwent LRH prior to the implementation of the robotic system. A retrospective chart review of these patients was performed in order to obtain the comparative data. Approval to conduct the study was obtained independently from an internal review board at each participating institution. Informed consent, including to neoadjuvant chemotherapy, clinical evaluation and robotic surgery, was obtained from all patients in accordance with local and international legislation (declaration of Helsinki). Patients that were not considered candidates for the minimally invasive approach underwent abdominal radical hysterectomy (ARH). Previous abdominal surgery was not considered a contraindication for the RRH or LRH. All the patients who underwent RRH or LRH were informed that ARH would be carried out if difficulties were encountered with the robotic approach.

Clinical patient characteristics including age, body mass index (BMI), clinical stage according to the FIGO classification, histopathologic subtype, and tumor grade were recorded. Intraoperative parameters evaluation included complications and blood loss. Blood transfusions were administered if Hb value was $\leq$7 g/dL. Postoperative parameters included short term (within 30 days of the procedure), and long term complications (more than 30 days after the procedure), length of hospitalization (counted from the first postoperative day), time to recovery of normal bladder function. Moreover, status of the surgical margins, status and number of removed pelvic lymph nodes, length of dissected vagina and width of bilateral parametrium were evaluated.

Surgical procedure

The technique used for the Class C1 LRH and RRH with lymphadenectomy, according to Querleu and Morrow classification,[13] during this time period has already been described in previous reports.[7,14] Para-aortic lymphadenectomy is not routinely performed unless pelvic lymph nodes are confirmed to have metastatic disease on frozen section evaluation in order to determine the field of postoperative radiation.

All patients have antibiotic prophylaxis (Amoxicillin 2.2 g intravenously) and perioperative low molecular weight Enoxaparin (40 mg/24 h subcutaneously). The vaginal cavity is cleansed with povidone–iodine solution, and a Foley catheter is placed in the bladder. In addition, intraoperative lower extremity sequential compression devices for venous thrombosis prophylaxis are used. All procedures were performed under general endotracheal anesthesia.

All LRH and RRH, were performed by one senior gynecologic oncologic surgeons (EV), which has an important experience in minimally invasive surgery (MIS) in gynecology oncology, assisted by either another gynecologic oncology surgeon or a fellow.

Operating time was defined from the beginning of skin incision to completion of skin closure. The estimated blood loss (EBL) was calculated by the difference in the total amounts of suctioned and irrigation fluids.

Statistical analysis

Categorical variables were reported as absolute frequencies and percentages and association between variables was measured by a non-parametric test. Continuous variables were reported as median and differences were analyzed by the Student *t*-test. Chi-square and Fisher's exact test were used to analyze proportions, as appropriate. A two-sided P value <0.05 was considered significant. The SPSS statistical program version 16 (SPSS Inc, Chicago, IL) was used for the analysis.