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Review

Survival rate comparisons amongst cervical cancer patients treated with an open, robotic-assisted or laparoscopic radical hysterectomy: A five year experience

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ABSTRACT

Background: The purpose of this retrospective study was to assess the 5-year survival outcomes of cervical cancer patients who underwent an, open radical hysterectomy (ORH), robotic-assisted radical hysterectomy (RRH) or laparoscopic radical hysterectomy (LRH) for the treatment of their disease.
Method: We conducted a review of all cervical cancer patients who were managed with an ORH, RRH or LRH.
Result: Forty-nine patients were treated with LRH, 58 were managed via RRH and 39 patients underwent an ORH. The LRH (1.78 h) patients had a significantly shorter operative duration than the RRH (2.88 h) and ORH (2.39 h) subjects ($p < 0.001$). Blood loss was the highest in the ORH (475 cc) group (RRH = 207 cc and LRH = 312 cc) ($P < 0.001$). Moreover, the ORH (5.04 days) patients had a significantly longer hospital stay than the LRH (2.95 days) and RRH (2.50 day) subjects ($P < 0.001$). Kaplan–Meier survival analysis revealed a progression free survival (PFS) rate of 84.6% for the ORH group, 89.8% for the LRH group and 89.7% for the RRH patients ($P = 0.271$) at 60 months; overall survival was 92.3% for the ORH group, 95.9% for the LRH group and 96.6% for the RRH patients ($P = 0.80$).
Conclusion: The results from this study suggest that, irrespective of operative approach, patients who underwent a radical hysterectomy for early stage cervical cancer attained similar 5-year disease free and overall survival outcomes.

Contents

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1. Introduction

There are an estimated 12,340 cases of cervical cancer diagnosed annually in the United States, 4030 of which will expire from progressive disease [1]. The five-year survival rate for all patients with cervical cancer is approximately 68% although when diagnosed at an early stage, the prognosis approaches 91% [2].

Initially, an abdominal radical hysterectomy was considered the standard of care for the treatment of early stage cervical carcinoma [3]. However, numerous studies have subsequently indicated that a laparoscopic approach confers more auspicious patient outcomes, specifically with regard to attenuated blood loss, decreased postoperative pain and enhanced recovery periods [4–6]. The advent of robotic-assisted hysterectomy (da Vinci, Intuitive Surgical Inc., Sunnyvale, CA) has further augmented conventional laparoscopy by affording the physician 3-D visual access, motion scaling, intuitive movements, visual immersion and tremor filtration [3,7–9].

Clinical investigations have since compared the operative differences between minimally invasive procedures, reporting that robotic and conventional laparoscopic outcomes are essentially similar [10–13]. Nonetheless, data equating the long-term outcomes of cervical cancer patients treated with an open, laparoscopic or robotic-assisted radical hysterectomy are scant [10,14–17]. Accordingly, we sought to retrospectively compare these three surgical approaches within the context of early stage cervical cancer patient 5-year survival rates.

2. Methods

2.1. Patient study inclusionary and exclusionary criteria

We conducted a retrospective analysis involving all cervical cancer patients who were initially managed with a radical hysterectomy by an individual group of gynecologic oncologists (A.A.M., L.N.A, M.A.R., J.V.B., and J.P.M.) from January 2009 until December 2013. From this group, 247 cervical cancer patients underwent a Piver type III or C1 [18] open radical hysterectomy (ORH), robotic-assisted radical laparoscopic hysterectomy (RRH) or radical laparoscopic hysterectomy (LRH); the route of radical hysterectomy was based upon the surgeons' preference, all of whom possessed considerable experience conducting the foregoing procedures. An institutional review board approved this study prior to patient chart data evaluation.

All patients who were diagnosed with FIGO stage IA2-IIB cervical cancer [19–21] and initially underwent a radical hysterectomy via ORH, RRH or LRH were eligible for study participation. Any subject who was diagnosed with a gynecologic condition other than FIGO stage IA2-IIB cervical cancer or was not managed by the aforementioned physicians with a radical hysterectomy was excluded. A radical hysterectomy comprised surgery to extract the uterus, cervix, upper third section the vagina, and a wide area of ligaments and tissue surrounding these organs [18,22]; furthermore, the ovaries, and fallopian tubes were resected.

Additionally, subjects underwent a systematic pelvic lymphadenectomy comprising the resection of the internal iliac nodes, external iliac nodes, medial suprainguinal nodes, lateral suprainguinal nodes, obturator nodes, sacral nodes and common iliac nodes. When applicable, a systematic para-aortic lymphadenectomy incorporated the complete removal of all fat and nodal tissues surrounding the aorta, inferior vena cava and renal vessels from the left renal vein cranially to the midpoint of the common iliac vessels caudally. All staging was performed in accordance with the 2009 FIGO guidelines [23].

2.2. Study characteristics and outcome measures

The following variables were evaluated: patient demographics, Body Mass Index (BMI), surgical history, pathologic characteristics (clinical stage, grade, and histology), surgical approach, operative time, estimated blood loss (EBL), number of pelvic and/or para-aortic lymph nodes removed, intra-operative (e.g., conversion to laparotomy) and post-operative complications (major complications were comprised of any surgical related event that necessitated a return to the operating room), hospital duration, hospital readmissions, adjuvant therapy, time to disease progression, recurrence site and disease status.

Progression free survival was determined by calculating the patients' time from surgery until their initial, documented recurrence. The patients' overall, disease specific survival was measured from the date of surgery until their data (i.e., disease status) were censored at the time of the final, recorded clinical evaluation or date of patient expiration.

2.3. Statistical analyses

All statistical analyses were conducted using MedCalc statistical software for biomedical research (version 9.5.1 for Windows). The initial data analysis was evaluated via a descriptive statistical approach that further incorporated chi-square testing and analysis of variance (ANOVA) with 2-sided p values. In the event of significance, post-hoc tests were conducted to determine differences amongst the various scores. Estimated disease-specific progression-free and overall survival intervals were calculated using the Kaplan–Meier method.

3. Results

From the original group of 247 early stage cervical cancer patients, 101 subjects were immediately excluded because they were not treated via radical hysterectomy, initially managed outside the intended time frame (2009–2013) or the patients' medical and surveillance records were incomplete. The remaining 146 patients comprised the subject matter of the current investigation.

In the open radical hysterectomy group (ORH; n = 39) the patients' mean age was 51.3 years (SD = 12.47); the age for the laparoscopic radical hysterectomy (LRH; n = 49) and robotic radical hysterectomy surgery (RRH; n = 58) patients were 47.8 (SD = 12.02) and 47.3 (SD = 11.24) years, respectively; there were no age differences amongst the various surgery groups (P = 0.301). The mean BMI was 29.2 kg/m^2 (SD = 6.00) for the ORH patients, 27.9 kg/m^2 (SD = 5.71) for the LRH group and 28.1 kg/m^2 (SD = 6.08) for the RRH group (P = 0.585). Please refer to Table 1 for the surgery groups' demographic and pathologic characteristics.

The mean operative time was 1.78 h (SD = 0.48) for the LRH group, 2.88 h (SD = 0.78) for the RRH group and 2.39 h (SD = 0.87) for the ORH group; the surgery time for the LRH patients was significantly shorter (P < 0.001) in duration than the RRH and ORH groups; the ORH group's operative time was significantly less than the RRH group (P < 0.05). Estimated blood loss for the ORH group (475 cc (SD = 429.13)) was significantly higher than the LRH (312 cc (SD = 321.70)) and RRH groups (207 cc (SD = 182.44)) (P < 0.001); there were no EBL differences between the LRH and RRH groups (P > 0.05).

The mean number of pelvic lymph nodes removed was 14.9 (SD = 6.32) for the RRH group, 11.2 (SD = 4.78) in the LRH group, and 12.8 (SD = 5.97) for the ORH group (P = 0.005). The RRH group was associated with a significantly higher number of resected pelvic nodes than the LRH group; the ORH and LRH groups were similar (P > 0.05). Alternatively, surgical approach was not a