Keywords: Maternal; Pediatric; Health; Gestational; Vitamin D

Laparoscopy in Cervical Cancer

Radical Hysterectomy

Laparoscopic surgery has played a role in the treatment of cervical cancer since the late 1980s. Nichols reported on laparoscopic lymphadenectomy for cervical cancer in 1993, over 30 years ago. The laparoscopic radical hysterectomy with pelvic and para aortic lymph node dissection was then first reported by Nezhat a few years later. When compared to the traditional radical hysterectomy performed via laparotomy, the laparoscopic approach allows for less blood loss and a shorter hospital stay at the cost of slightly increased procedure times. A retrospective study from Memorial Sloan Kettering compared 195 laparotomy patients to 17 laparoscopy patients undergoing radical hysterectomy. In this study, there was no significant difference between mean pelvic lymph node count (30.7 versus 25.5), transfusion rate (21 versus 5.3%), or negative surgical margins (5.1 versus 0%). The mean operating room times (296 versus 371 minutes, < 0.01), mean EBL (693 versus 391 mL, < 0.01), and mean length of hospital stay (9.7 versus 4.5 days, < 0.01) were significantly different with a lower EBL and shorter hospital stay in the laparoscopic group, but a longer mean operating time in the laparoscopic group. Another retrospective study, from MD Anderson, compared 54 laparotomy and 35 laparoscopic radical hysterectomies for cervical cancer. There was a significant difference in mean blood loss between the two groups (548 versus 319 mL), but no significant difference in transfusion rates (15 versus 11%). Again, the operative times were significantly longer in the laparoscopic group (344 versus 307 minutes), and the median length of stay was shorter in the laparoscopic group (5 versus 2 days, < 0.001). The incidence of postoperative infectious morbidity including fever, wound cellulitis, urinary tract infection, pneumonia, intra-abdominal abscess, and necrotizing fasciitis was significantly greater in the patients undergoing laparotomy (53 versus 18% < 0.001) [1].

All but one case had resumed menstruation, but there were no reported pregnancies. In 2010, Kim reported on 27 successful cases of laparoscopically assisted vaginal trachelectomy. Seventy-four percent of the tumors had a squamous histology while 22.2% were adenocarcinomas. All patients had negative resection margins, and the mean operating time was 290 min (range of 120-520). The mean estimated blood loss was 332 mL, and 6 patients (22%) did receive a transfusion. There were no intraoperative or postoperative complications and after a median follow-up time of the 31 months (range of 1-58), 1 patient had experienced a recurrence. Regular menstruation did resume in 24 patients; however, 8 patients reported decreased menstrual flow and 3 complained of new severe dysmenorrhea. Among the 6 patients attempting to conceive, 3 succeeded. Martin and Torrent reported on 9 cases, similar to the Kim study, where the vaginal cuff incision and cervical reconstruction were performed vaginally. Six patients had squamous cell carcinoma, and 3 had adenocarcinoma. Two were stage IA1 and 7 were IB1.The mean operative time was 270 minutes, and

Laparoscopy in Endometrial Cancer

Hysterectomy and Staging

Historically, the surgical treatment of endometrial cancer has been performed via laparotomy. Laparoscopic technology has granted surgeons a method of treatment and staging in patients, who are likely to benefit the most given their tendency to have higher body mass indices and other associated comorbidities. The Gynecologic Oncology Group LAP2 Study randomized 2616 patients, in an approximately 2: 1 fashion, to a laparoscopic versus open approach for the treatment and staging of endometrial cancer. The primary endpoint of this study was to compare recurrence free survival rates with secondary endpoints being the comparison of perioperative complications, conversion rates, and length of hospital stay. Twenty-five percent of the laparoscopy group were converted to laparotomy. The most common reason for conversion was poor visualization, but age > 63, increasing BMI, and presence of metastatic disease all increased a patient's risk for conversion. The median operative time for the laparotomy group was 130 minutes versus 204 minutes for the laparoscopy arm (< 0.001). The intraoperative complications (8 versus 10%), readmission rates (7 versus 6%), reoperation rates (2 versus 3%), and 30-day perioperative deaths (8 versus 10) were not significantly different between laparotomy and laparoscopy groups. Postoperative complications, including intestinal ileus, cardiac arrhythmia, antibiotic use, and hospital stay > 2 days were significantly less likely in the patients undergoing a laparoscopic approach, occurring in 21% of the laparotomy group and 14% of the laparoscopy group (< 0.001). With regard to staging, 97% of the laparotomy group had documented para-aortic lymph nodes in the final specimen, which was significantly different from 94% of the laparoscopy group (= 0.002). After a median of 59.3 months of follow up for both groups, there were a total of 309 recurrences (210 laparoscopy, 99 laparotomy) and 350 deaths (229 laparoscopy, 121 laparotomy). The 3-year estimated cumulative incidence of recurrence for laparotomy patients was 10.24%, compared with 11.39% for laparoscopy patients, with a hazard ratio of 1.14 (CI-1.278-3.996). There was no difference in the estimated 5-year overall survival (89.9% in each group), postoperative adjuvant therapy, and site of recurrence. From this important study, we can conclude that a minimally invasive approach to the treatment of endometrial cancer is as good as an open approach with many benefits including fewer postoperative complications, a shorter hospital stay, and less blood loss. The Cochrane Collaboration published a review in 2012 that included 8 studies, of which at least 70% of patients had early stage endometrial cancer; the 2009 Walker study previously cited was included. When comparing laparoscopy to laparotomy, the review concluded that there were no differences in overall survival (HR 1.14, CI 0.62-2.10), recurrence free survival (HR 1.13, CI 0.90-1.42), or perioperative death (HR 0.76, CI 0.3-1.79) between the two groups. The estimated blood loss was lower in the laparoscopy group (mean difference of 106.82 mL, 95% CI: -141.59, -72.06), though the need for blood transfusion was not significantly different (95% CI: 0.21, 1.49). There was also no significant difference of bladder injury (RR = 0.49, 95% CI: 0.13, 1.86), bowel injury (RR = 1.49, 95% CI: 0.39, 5.72) or vascular injury (RR = 0.43, 95% CI: 0.08 to 2.32) between patients undergoing laparoscopy and laparotomy. The risk of severe postoperative complications was significantly lower with laparoscopy with a relative risk of 0.58 (95% CI: 0.37 to 0.91). Given the available data for the use of laparoscopy in endometrial cancer, laparoscopy seems to have significant perioperative and postoperative benefits in these patients without sacrificing the desired oncologic outcomes [3].

Laparoscopy in Ovarian Cancer

Laparoscopy has also been reported on for staging in early ovarian cancer. Chi reported a case-control study of 20 patients undergoing laparoscopy and 30 patients undergoing laparotomy. Baseline characteristics of age, BMI, primary disease site, histology, and tumor grade did not differ between the groups; however, 65% of the patients undergoing laparoscopy had a cancer diagnosis prior to surgery compared to only 23% of the laparotomy patients (0.003). There was no significant difference between laparoscopy and laparotomy in terms of the number of lymph nodes removed, the size of the omental specimen, the site of metastases, or complications. The mean operating times (321 versus 276 minutes, 0.04), mean estimated blood loss (235 versus 367 mL, mean di ere(charact.5(no si(gnosp thaou

had negative parametrial and vaginal margins, but 12% had evidence of positive lymph nodes. There were 2 intraoperative complications (4.8%) that included 1 conversion to laparotomy to repair a cystotomy and 1 ureteral injury. Postoperatively, DVT occurred in 2.4% of the subjects, pyelonephritis in 2.4%, and infection in 4.8%. There were no readmissions or reoperations. Cantrell evaluated 63 robotic cases and compared outcomes to open radical hysterectomies and found some significant differences between the 2 groups perioperatively. When the robotic cases were compared to the laparotomy cases, there was a lower mean estimated blood loss (50 versus 400 mL, < 0.0001), a higher median number of lymph nodes (29 versus 24, 0.04), shortened operative time (213 versus 240 min, 0.0015), and shorter hospital stay in the robotic population (1 versus 4 days,

operative time (189 versus 215 minutes, 0.0004), mean estimated blood loss (50 versus 150 mL, < 0.0001), and mean hospital stay (1.02 versus 1.27 days, 0.01). From this study we can counsel patients about the morbidity rates associated with robotic surgery for endometrial cancer and conclude that the overall intraoperative and postoperative complication rates following robotic surgery are low. Brudie reported on the recurrence-free survival and overall survival of 372 patients who underwent robotic surgery after a median followup of 31 months. Adjuvant therapies were not standardized but directed by physician preference. The risk of recurrence for all patients was 8.3%, with 4.6% of patients dying of their disease. The estimated 3-year recurrence-free survival for the entire group was 89.3% with an estimated 5-year overall survival of 89.1% and 92.5% and 93.4% for the endometrioid subset. These results appear very similar to those of the LAP2 study, reinforcing the idea of that disease outcomes are not altered when robotic assistance is used for endometrial cancer surgery. The use of robotics in the treatment of endometrial cancer seems promising with similar outcomes as laparoscopy and may bridge the gap between those

placed or a single-port which can accommodate multiple ports and instruments. With its newly gained popularity, the descriptions for this surgical approach have varied from OPUS (One Port Umbilical Surgery) to SILS (Single-Incision Laparoscopic Surgery) to SPICES (Single-Port Incisionless Conventional Equipment Utilizing Surgery). In order to clarify surgeon communication and the research language, the Laparo Endoscopic Single-Site Surgery Consortium for Assessment and Research (LESSCAR) published a consensus statement in 2010 establishing the term laparo endoscopic single-site surgery (LESS) as the standard term to describe such surgery [11].

LESS in Gynecologic Oncology

Fader and Escobar first reported on the use of LESS in gynecologic oncology in 2009. This series included 13 patients, of whom 9 were performed on via LESS and 4 were with robotic-assisted LESS. One patient had staging for endometrial cancer, 1 had staging for granulosa cell ovarian cancer, 1 had a retroperitoneal pelvic lymph node dissection and peritoneal biopsies for a suspected right pelvic sidewall recurrence of papillary serous ovarian carcinoma, 2 had a risk reducing extra fascial hysterectomy and bilateral salpingooophorectomy, 5 had a risk-reducing BSO alone, 1 had an ovarian cystectomy for a mature cystic teratoma, and 2 had bilateral salpingo-oophorectomies for complex adnexal masses. There were no conversions to conventional multiport laparoscopy or open surgery, no postoperative complications, and no early port-site hernias noted. The median overall operating time was 65 min (range 35-178), but the median operating time for hysterectomy with or without a lymphadenectomy was significantly longer at 168 min (range 145-178 minutes). The mean hospital stay was 0.7 days. Eighty five percent of patients reported pain scores of 0-1 in the immediate postoperative period and at their follow-up visits, and 62% (including 2 of the 3 patients who underwent hysterectomies) reported not using narcotics at all as an outpatient. Surgeons attributed lack of instrument crowding in their cases to a laparoscope with a flexible tip and articulating instruments. Participating surgeons also determined that the surgical range of motion was increased in robotic cases when the Gelport was used as the access platform.

Acknowledgement

None

Con ict of Interest

None

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