Gynecology and Minimally Invasive Therapy 5 (2016) 25–29

Contents lists available at ScienceDirect

Gynecology and Minimally Invasive Therapy

journal homepage: www.e-gmit.com

Original article

A comparison of outcomes following robotic-assisted staging and laparotomy in patients with early stage endometrioid adenocarcinoma of the uterus with uterine weight under 480 g

Michael A. Ulm [a, *], Daniel N. Ginn [b], Adam C. ElNaggar [c], Todd D. Tillmanns [a], Kevin M. Reed [d], Jim Y. Wan [e], Catherine H. Watson [f], Sheetal J. Dedania [f], Mark E. Reed [a]

[a] Division of Gynecologic Oncology, The West Clinic, Memphis, TN, USA
[b] Division of Minimally Invasive Gynecologic Surgery, Department of Obstetrics and Gynecology, University of Louisville College of Medicine, Louisville, KY, USA
[c] Division of Gynecologic Oncology, The Ohio State University Wexner Medical Center, Columbus, OH, USA
[d] University of Tennessee Health Science Center College of Medicine, Memphis, TN, USA
[e] Department of Preventative Medicine, University of Tennessee Health Science Center, Memphis, TN, USA
[f] Department of Obstetrics and Gynecology, University of Tennessee Health Science Center, Memphis, TN, USA

ARTICLE INFO

Article history:
Received 31 July 2015
Received in revised form
31 August 2015
Accepted 7 September 2015
Available online 25 September 2015

Keywords:
endometrial cancer
laparotomy
robotic surgical procedures

ABSTRACT

Study Objective: To directly compare perioperative morbidity and hospital stay after robotic-assisted staging and laparotomy in patients with early stage endometrial endometrioid adenocarcinoma and uterine weight under 480 g.
Design: Retrospective cohort study.
Setting: The West Clinic in Memphis, TN, USA.
Patients: Patients with Stage IA and Stage IB endometrial endometrioid adenocarcinoma and uterine weight less than 480 g from June 2007 to January 2011.
Interventions: Patients underwent hysterectomy, bilateral salpingo-oophorectomy, and pelvic lymph node dissection with or without para-aortic lymph node dissection using robotic-assisted surgery or open laparotomy.
Measurements: Perioperative complications and morbidity, length of hospital stay, progression-free survival, overall survival, time to recurrence, and time do death from disease.
Main Results: A total of 160 patients who underwent laparotomy and 165 patients who received robotic-assisted staging were identified. Compared with robotic-assisted staging, laparotomy was associated with increased hospital stay (3 days vs. 1.4 days, $p < 0.001$), greater estimated blood loss (237 cm^3 vs. 102 cm^3, $p < 0.001$), larger uterine weight (136 g vs. 116 g, $p < 0.001$), as well as higher incidence of postoperative complications [29.3% vs. 6.7%, odds ratio (OR) 5.82, 95% confidence interval (CI) 2.1–11.7] including postoperative ileus (9.0% vs. 1.0%, OR 7.82, 95% CI 1.7–35.0), wound infection (6.0% vs. 1.0%, OR 5.43, 95% CI 1.2–25.2), and postoperative atelectasis (4.0% vs. 0%, $p < 0.01$). There were no differences in projected 5-year progression-free and overall survival rates.
Conclusion: Use of the daVinci robotic system was associated with less intraoperative blood loss, fewer postoperative complications, and shorter hospital stay compared with laparotomy for patients with uterine weight less than 480 g.

Introduction

The daVinci robotic surgical system (Intuitive Surgical, Sunnyvale, CA, USA) has had a significant impact on minimally invasive surgical staging for patients with gynecologic malignancies in the

Conflicts of interest: The authors have no conflicts of interest relevant to this article.

* Corresponding author. The West Clinic, Division of Gynecologic Oncology, 100 North Humphreys Boulevard, Memphis, TN 38120, USA.
E-mail address: michaelulm81@gmail.com (M.A. Ulm).

http://dx.doi.org/10.1016/j.gmit.2015.09.002

United States.[1] Retrospective analyses of robotic-assisted staging of endometrial endometrioid adenocarcinoma have demonstrated perioperative and survival outcomes comparable with previously published data for laparoscopic-assisted and open surgical staging.[2–4] Robotic-assisted surgical staging has been adopted by an increasing number of providers as the standard approach for early stage endometrial endometrioid adenocarcinoma.[5] Robotic-assisted staging is now widely used in private gynecologic oncology practices,[6] yet little data about outcomes in private centers exist.

Prior studies comparing laparotomy with minimally invasive surgical techniques have included uterine weights > 500 g,[7] which is associated with an increase in perioperative complications.[8] It has been demonstrated that removing uteri < 480 g vaginally following robotic-assisted hysterectomy with or without vaginal morcellation is both feasible and safe.[9] Given this, we aim to directly compare perioperative outcomes following robotic-assisted staging and laparotomy in patients with early stage endometrial cancer and uterine weight < 480 g.

Materials and Methods

A retrospective chart review was performed for patients who underwent surgical staging for Stage I endometrioid adenocarcinoma of the uterus with postoperative uterine weight < 480 g at the West Clinic from June 2007 to January 2011. The University of Tennessee Health Science Center Institutional Review Board approved this study. Chart review identified 326 patients for analysis. Of these, 166 patients underwent robotic surgical staging and 160 patients received staging by laparotomy. All staging was revised to the International Federation of Gynecology and Obstetrics 2009 classification. Bilateral pelvic lymph node dissection was routinely performed following hysterectomy on all patients. All patients were initially meant to undergo para-aortic lymph node dissection. Obesity during robotic surgery limited para-aortic lymph node dissection in some patients and was omitted. After robotic-assisted or abdominal hysterectomy and bilateral salpingo-oophorectomy were performed, pelvic and para-aortic lymphadenectomy was performed in accordance with the Gynecologic Oncology Group Surgical Procedures Manual. Both the “S” and “Si” models of the daVinci surgical system were used for robotic staging. Lymph nodes were removed through the vagina using a stone grasper. Uteri too large to be removed vaginally were transected using curved Mayo scissors inside an Endo Catch bag (Covidien, Mansfield, MA, USA). Robotic vaginal cuff closure was performed using 2-0 V-Loc (Covidien) in a running fashion. Vaginal cuff closure during open laparotomy was performed using 2.0 VICRYL suture (Ethicon, Cincinnati, OH, USA). Hospital and office charts were retrospectively reviewed for age, body mass index (BMI), estimated blood loss (EBL), depth of myometrial invasion, lymphovascular space invasion, stage, tumor grade, tumor size, uterine weight, adjuvant therapy received, time to disease recurrence, recurrence location, and postoperative complications. Postoperative complications were defined as deep vein thrombosis, pulmonary embolism, pneumonia, ileus, blood transfusion, wound infection, wound evisceration, acute renal injury, atelectasis, and fever requiring readmission within 30 days of surgery. Ileus was defined as nausea and/or emesis requiring nothing by mouth or nasogastric tube placement beyond postoperative Day 2. Hemorrhage was defined as EBL > 500 cm^3 or intraoperative or postoperative blood transfusion within the first 24 hours following surgery. Acute renal injury was defined as an increase in creatinine level by more than two times the preoperative baseline. Statistical analysis using SAS software (SAS Institute Inc., Cary, NC, USA) was performed using Chi-square for discrete variables, *t* test for continuous variables, and Kaplan–Meier curves for disease-free survival. All *t* tests were two sided, and $p < 0.05$ was considered statistically significant.

Results

Table 1 summarizes all patient demographic, surgical, and tumor characteristics. A total 160 patients who underwent laparotomy and 166 patients who underwent robot-assisted staging for both Stage IA and Stage IB endometrioid adenocarcinoma were identified for analysis. There were no significant differences in age ($p = 0.686$), BMI ($p = 0.165$), or tumor size ($p = 0.427$) between the two cohorts. Significantly more pelvic (mean 8.7 ± 7.4 vs. 6.4 ± 4.2, $p = 0.001$) and para-aortic lymph nodes (mean 1.6 ± 2.3 vs. 0.95 ± 1.8, $p = 0.006$) were sampled using laparotomy. Uterine weight was larger for the laparotomy cohort (mean 136 ± 72 g vs. 116 ± 61 g, $p = 0.001$). EBL was higher in patients who underwent laparotomy (mean 237 ± 221 mL vs. 102 ± 103 mL, $p < 0.001$). Patients stayed longer in the hospital following laparotomy than after robotic-assisted staging (3 ± 1.8 days vs. 1.4 ± 1.2 days, $p < 0.0001$). Our conversion rate from robotic-assisted staging to laparotomy was 3.6% (3 for large uterine size, 1 for obesity, 1 for poor pulmonary function in the Trendelenburg position, and 1 for adhesive disease). There were no differences in stage ($p = 0.723$), tumor grade ($p = 0.98$), or presence of lymphatic/vascular space invasion ($p = 0.207$). When comparing those with intermediate risk factors (i.e., Grade 2/3, advanced age, outer third myometrial invasion, or lymphovascular space involvement) there was no difference between the cohorts ($p = 0.966$). One patient who underwent laparotomy and two patients who underwent robotic-assisted staging received adjuvant carboplatin and taxol with concurrent brachytherapy ($p = 0.56$). There were significantly more complications following laparotomy [29.3% vs. 6.7%, odds ratio (OR) 5.82; 95% confidence interval (CI) 2.9–11.7]. Wound infections occurred more frequently after laparotomy (6.0% vs. 1.0%, OR 5.43; 95% CI 1.2–25.2). There was one return to the operating room for abdominal evisceration in the laparotomy cohort. No vaginal eviscerations occurred in either cohort. Postoperative ileus was more common following laparotomy (1.0% vs. 9.0%, OR 7.82; 95% CI 1.7–35.0). Hemorrhage was more likely during laparotomy (4.0% vs. 1.0%, OR 3.73; 95% CI 0.8–18.2). There was no difference in venous thromboembolism rates between the two cohorts ($p = 0.242$; Table 2). Recurrence rates were similar between laparotomy and robotic-assisted staging (10 patients vs. 11 patients, $p = 0.879$, 95% CI −6.0–5.0). The average time to cancer recurrence was similar following robotic-assisted staging and laparotomy (19.4 months and 18.5 months, respectively; $p = 0.865$, 95% CI 9.8–11.5) as was average time to death from endometrial cancer (23.9 months and 22.1 months, respectively; $p = 0.704$, 95% CI −8.9–12.5). There was no difference in disease-related deaths between the two cohorts (4 after laparotomy and 3 following robotic-assisted staging, $p = 0.75$; 95% CI −5.0–3.0; Table 3). There was no difference in projected 5-year progression-free survival following surgical staging between the two cohorts ($p = 0.811$; Figure 1) or projected 5-year overall survival ($p = 0.509$; Figure 2). Sites of recurrence are shown in Table 3. No port-site metastases were noted.

Discussion

Our goal was to directly compare perioperative outcomes for early stage endometrioid adenocarcinoma following robotic-assisted staging and laparotomy in our practice since implementing the daVinci robotic surgical system. We desired to compare outcomes in patients who could have been staged using either surgical modality. Prior studies comparing outcomes following hysterectomy and staging for endometrial cancer have included