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ORIGINAL ARTICLE

Long-Term Morbidity after Endometrial Cancer Surgery: a Comparison of Open vs. Robotic Approach

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Abstract

This retrospective study is looking into the long-term morbidity after endometrial cancer staging surgery and compares the long-term morbidity of patients who underwent open staging surgery vs. robotic approach. One hundred twenty-nine patients who underwent staging surgery for endometrial cancer from January 2014 until June 2017 were included in the analysis. Morbidities occurring 1 month after surgery—vault complications, incisional hernias, vault dehiscence, and lymphedema—were looked into. There were no statistically significant differences between the long-term complications in both groups (vault infection 5.1% vs. 1.4%, vaginal cuff dehiscence 1.6% vs. 0%, incisional hernia 6.8% vs. 0%, and lymphedema 11.8% vs. 10% in open vs robotic groups respectively). But as far as clinical significance was concerned, patients who underwent robotic staging surgery had a significant decrease in vaginal cuff complications and incisional hernia. Our study shows that robotic-assisted surgery can reduce even long-term morbidity in patients undergoing surgery for endometrial cancer.

Keywords Endometrial cancer · Staging surgery · Robotic-assisted surgery · Lymphedema

Introduction

Endometrial carcinoma is the fourth most common cancer in women worldwide, and the most common gynecological malignancy in the West [1]. In India, the incidence rates are as low as 4.3 per 100,000 [2], with cervical cancer being the leading gynecological malignancy. That being said, the incidence of endometrial carcinoma is on the rise [3], due to a change in lifestyle factors contributing to obesity. Most of the cancers present themselves early and thus are associated with a good prognosis. The first step in the management of these clinically early-stage endometrial cancers is surgical staging.

Minimally invasive surgeries have gained popularity over traditional laparotomy for endometrial cancer staging because of their advantages such as shorter hospitalization, fewer complications, and faster recovery with similar disease free and overall survival [4, 5]. Robotic-assisted surgery is associated with less morbidity in the short term and is also associated with a shorter learning curve which enables more surgeons to do minimally invasive surgery for endometrial cancer [6, 7]. Sentinel node mapping is another technique which is gaining popularity in endometrial cancer [8]. Following sentinel node mapping algorithm allows a greater rate of node detection at the same time decreases the morbidity of lymphadenectomy [9, 10]. But there is scarce data about whether the benefits of minimally invasive surgery extend beyond the first postoperative month [11]. In this study, we are looking into whether minimally invasive surgery is benefitting patients in the long run by reducing the long-term surgical morbidity.

Materials and Methods

This is a retrospective study carried out at a single institution in India. All consecutive patients who underwent staging surgery for endometrial cancer from 1 January 2014 until 30 June 2017 were included. This included patients with proven endometrial cancer and also patients with endometrial

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intraepithelial neoplasia as a preoperative diagnosis. Patients with endometrial intraepithelial neoplasia as a preoperative diagnosis were included because more than 30% of patients with such a diagnosis had an endometrial carcinoma detected in the postoperative specimen. Patients with uterine sarcomas and also patients who did not have a minimum of 1-year follow-up were also excluded. Robotic-assisted surgery for gynecologic cancer was introduced in our institute on February 2015; all surgically fit patients undergoing staging surgery for clinically early-stage endometrial cancer were given the option of robotic-assisted staging, and the decision to perform open or robotic-assisted surgery was based on the patient's choice.

All information was collected from the hospital electronic medical records. Patients who had not followed up in the hospital for the last 6 months were contacted telephonically. Demographic and clinicopathologic characteristics (age, BMI, histological type, grade, and FIGO stage) were collected.

In this study, long-term morbidity is defined as any surgery-related complication requiring re-admission and/or treatment that occurred 30 days after the primary surgery. Long-term complications were assessed until 1 year after the primary surgery. Long-term complications that were expected included recurrent vault infection, incisional hernia, lymphedema, and vault dehiscence.

Statistical Analysis

Qualitative variables were expressed as percentages, and quantitative variables were expressed as mean with standard deviation. A chi-square test was applied to obtain the association between the qualitative variables being studied and the two groups of surgery. Quantitative variables were compared using an independent t test. Statistical significance was defined as a p value of < 0.05. All analysis was performed in IBM SPSS for Windows, version 20.

Results

A total of 129 patients (open $n = 59$, robotic $n = 70$) underwent staging surgery for endometrial carcinoma during the study period. Demographic and clinicopathologic data for each surgical group are listed in Table 1. The average age of the patients in the open arm was 61.2 years with a standard deviation of 9.52, and the average age of robotic arm was 57.1 years with a standard deviation of 12.14. The BMI in the two arms had a similar range of 27.2 ± 3.86 in the open arm and 28 ± 5 in the robotic arm. From this data, we can see that the age of the patients has a greater variation in the robotic arm with both younger as well as older patients as well as comparatively higher BMI values.

The most common histopathological type of carcinoma seen was endometrioid accounting for 78.3% of patients in our study. The most common grade was grade 1, accounting for 54.3% of patients, and stage 1A, comprising 44.2% of all patients. With regard to the stage, among FIGO stage 3C patients ($n = 11$), seven underwent robotic-assisted surgery while three underwent open laparotomy. Most FIGO stage 4 patients underwent open surgery ($n = 5$) compared with robotic-assisted ($n = 1$).

Long-term complications are given in Table 2. Among the complications, vault infection occurred in three patients (5.1%) in the open while the occurrence in the robotic arm was in a single patient (1.4%). Incisional hernia occurred in four patients of the open group (6.8%) in almost a year and in two of the cases 2 years post-surgery. There were no cases of hernia in the robotic group. Even though the results are clinically significant, the values could not attain statistical significance probably due to a low number of patients in the study.

Discussion

This study compared the long-term morbidity between the open and robotic-assisted surgeries, when there was a change in the management of endometrial cancer patients from open laparotomy to robotic-assisted surgery. There are many studies which compare the perioperative complications of robotic-assisted surgery for endometrial cancer, but there is scant data regarding the long-term morbidity [6, 12].

In relation to the clinicopathologic characteristics, as seen from previous studies, the most common histopathological type was endometrioid and the most common FIGO stage and grade were 1A and 1 respectively 11. Age was more varied in the robotic arm compared with the open arm, with a wide range of age. The patients were younger in the robotic arm than in the open arm, with as many as six patients below the age of 40 years. An independent t test to compare the ages in the open and robotic patients was done ($p = 0.036$). This is statistically significant and shows that younger ages of patients are seen in the robotic arm. BMI was also compared in the two groups ($p = 0.474$), which did not show statistical significance.

The most common long-term complication was found to be lymphedema (7%). This is consistent with many studies; however, the frequency of complications reported is different for our study. In the study conducted by Hopp et al. [13], the reported rate of lymphedema was as high as 12.8%, and they also concluded that there was no significant relation with the type of surgical approach and the development of lymphedema ($p = 0.64$). In the study conducted by Kuoppala et al. [14], lymphedema and lymphocysts were found to be the most common late postoperative complications; however, they noticed greater number of cases in the laparoscopic group ($n = 5$)

Table 1 Demographic and clinicopathologic data

	Open surgery ($n = 59$)	Robotic ($n = 70$)	p value
Age in years (mean ± SD)	61.2 ± 9.52	57.1 ± 12.14	0.036
BMI (mean ± SD)	27.2 ± 3.86	28 ± 5	0.474
Histopathology			
EIN	3 (5.1%)	8 (11.4%)	
Endometrioid	47 (79.6%)	54 (77.2%)	0.62
Serous	4 (6.8%)	3 (4.3%)	
Clear cell	4 (6.8%)	1(1.4%)	
Carcinosarcoma	1 (1.7%)	4 (5.7%)	
Stage			
I A	25 (42.4%)	32 (45.7%)	0.45
I B	12 (20.3%)	15 (21.4%)	
II	8 (13.6%)	6 (8.6%)	
III A	2 (3.4%)	1 (1.4%)	
III B	1 (1.7%)	0	
III C	3 (5.1%)	7 (10%)	
IV	5 (8.5%)	1 (1.4%)	
Adjuvant treatment			0.34
Radiation	27 (45.7%)	26 (37.1%)	
Chemotherapy	15 (25.4%)	9 (12.8%)	

compared with the traditional open laparotomy group ($n = 3$) which does not correspond to our study where the cases were more in the open group ($n = 7$) than the robotic group ($n = 2$). Despite the disparity in the frequency, our study also did not show a statistical significance for lymphedema ($p = 0.098$) between the groups.

Incisional hernia occurred in 6.8% of patients in the open group, while none of the patients in the robotic group had an incisional or port-site hernia. The study performed by Persson et al. [11] reported that port-site hernia in robotic cases were as much as 4% of patients 1 year post-surgery.

According to the study by Fuchs Weizman et al. [15], there was an increased risk of cuff dehiscence in robotic and laparoscopic approaches compared with alternate procedures such as an open laparotomy. They reported an incidence of 3.2% of vault dehiscence among the robotic hysterectomies, which does not correspond to our study where the incidence is nil. Overall, our study is in concordance with the review of Bush and Apte [16], who report that there is a decreased risk of complications with robotic-assisted surgery compared to laparotomy.

Limitations

The current study is limited by the fact that it is a retrospective study involving a small number of patients at a single institution, and all patients undergoing robotic-assisted surgery were operated by a single surgeon.

Conclusion

In conclusion, it is seen from our study that open surgery is associated with more long-term morbidity complications than robotic-assisted surgery. Lymphedema is the most common complication among both the study groups with no significant difference between the two groups. Vault dehiscence and incisional hernia were other complications which were noted, found exclusively in open surgery patients in our study. Since this study is being limited as being a single-center study involving only a small number of patients with all robotic-assisted surgeries being done by the same surgeon, a

Table 2 Long-term complications

	Open surgery ($n = 59$)	Robotic ($n = 70$)	p value
Vault infection after 1 month	3 (5.1%)	1 (1.4%)	0.4
Vaginal cuff dehiscence	1 (1.6%)	0	0.9
Incisional hernia	4 (6.8%)	0	0.08
Lymphedema	7 (11.8%)	7 (10%)	0.09

multicenter trial with a bigger sample size will be able to give statistically significant results.

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