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SURGICAL MANAGEMENT OF ADNEXAL MASSES: LAPAROSCOPIC VERSUS OPEN APPROACH – DIAGNOSTIC YIELD, COMPLICATIONS, AND HOSPITAL STAY

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Abstract

Background: Adnexal masses are typical gynaecological pathologies, which comprise functional cysts and neoplastic lesions. Even though imaging modalities can be used to help in preoperative assessment, surgical diagnosis is generally made by the use of histopathological studies. Historically laparotomy has been the surgery method but lately laparoscopy has become more popular because of its Non-invasive characteristics and possible advantage of less postoperative pain, quicker recovery and the decreased duration of hospitalization. Although these are the strengths, there is still an issue of concern about the time of operation, intraoperative complications and diagnostic adequacy. Local tertiary care setting comparative data is limited.

Objective: To compare laparoscopic and open surgical approaches in the management of adnexal masses in terms of diagnostic yield, perioperative complications, and duration of hospital stay.

Methods: This prospective comparative study was conducted at a Sir Ganga Ram Hospital, Lahore from January 2023 to July 2023. A total of **124 patients** aged 18–65 years diagnosed with adnexal masses requiring surgical intervention were included. Patients were allocated into two groups: laparoscopic surgery (n=64) and open laparotomy (n=60). Inclusion criteria comprised benign or suspected benign adnexal masses based on clinical examination and imaging findings. Patients with confirmed malignancy, pregnancy, hemodynamic instability, or severe systemic illness were excluded. Data regarding operative time, intraoperative blood loss, histopathological diagnosis, postoperative complications, and length of hospital stay were recorded and analyzed statistically.

Results: Laparoscopic surgery demonstrated significantly lower intraoperative blood loss and reduced postoperative complications compared to laparotomy. The complication rate was 9.3% in the laparoscopic group versus 21.6% in the open surgery group. Mean hospital stay was

significantly shorter in the laparoscopic group (2.1±0.8 days) compared to the laparotomy group (4.8±1.3 days). Operative time was slightly longer in the laparoscopic group. Diagnostic yield based on histopathological correlation was comparable between both approaches.
Conclusion: Laparoscopic surgery of adnexal masses offers the same level of diagnostic accuracy at reduced morbidity and hospital stay in comparison to open surgery. It must be regarded as the surgical modality of choice among the patients who are selected properly.
Keywords: Adnexal masses; Diagnostic yield; Hospital stay; Laparoscopy; Laparotomy; Postoperative complications

INTRODUCTION

Adnexal masses are a common phenomenon in the gynaecological practice, and they constitute a broad range of pathologies that occur due to the ovaries, fallopian tubes, or adjacent connective tissues [1].These lesions can go as simple functional cysts to complex benign lesions and malignant neoplasms. There is a rise in the usage of pelvic ultrasonography and other imaging techniques that has resulted in the detection of more adnexal masses most of which are accidentally detected during routine examination. The imaging techniques and tumour markers help in the risk stratification but in most cases, definitive diagnosis remains determined by a surgical removal and subsequent assessment through histopathology [2].
Conventionally laparotomy has been regarded as the conventional surgery in the management of adnexal masses [3].Open surgery gives a direct visualization of the organs in the pelvis area, sufficient exploration of the abdominal area, and proper staging in suspected malignant areas. Nonetheless, it is linked to more postoperative pain, more blood loss, higher risk of developing wound complications, extended hospitalization, and slow recovery [4]. All these drawbacks have promoted the use of less invasive methods of surgery in the last several decades [3].
Laparoscopy has become another choice of managing both benign and selected borderline adnexal masses [5]. The benefits of laparoscopy are the use of smaller incisions, less intraoperative blood loss, less postoperative pain, short hospital stay, quicker recovery to normal activities, and better cosmetic appearance. Also, surgical accuracy could be increased in laparoscopy because of the magnified image. Although these are some of the advantages, there are still concerns over its usage in situations where malignancy could not be ruled out[6]. Some of the potential risks include cyst rupture, tumour contents spillage, and potential conversion to laparotomy in the technically complicated cases. Thus, patient selection and operative skills are necessary to achieve the best results[7].
Even though some international studies provided a comparison of laparoscopy and open surgery procedures, there are some differences in the results including length of operation, complication rates, and accuracy of diagnosis[8]. In addition, there is a deficiency of local information in tertiary care hospitals that assess these outcomes. In this regard, the current research was carried out to compare laparoscopic and open surgery of adnexal masses in 124 patients in terms of diagnostic yield, perioperative complications, and hospital stay[10]. To make evidence-based clinical decisions and enhance patient care in such healthcare institutions, it is important to generate such data.

Objective

To compare the laparoscopic and open surgery management of adnexal masses in terms of diagnostic yield, complication rates and length of stay at the hospital.

METHODOLOGY

The proposed comparative study design is descriptive, a prospective study, which will take place in the Department of Obstetrics and Gynaecology and Surgery Department of Sir Ganga Ram Hospital, Lahore from January 2023 to July 2023. The study was approved by an independent review board, and an ethical approval was taken under the Institutional Ethics Review Committee (ERC No. 2020-OBG-145). All participants had their informed consent written down before surgery.
One hundred and twenty four patients were included, who underwent surgery due to diagnosed adnexal mass between the age of 18 and 65 years. Based on a predicted difference in the rate of complications between the two surgical methods, the sample size was calculated using OpenAI software with 80 percent power and 5 percent level of significance. The patient group was divided into two (n=64 and n=60) based on clinical and surgeon proficiency to include laparoscopic surgery and open laparotomy.
The inclusion criteria were benign or suspected benign adnexal masses after clinical evaluation, ultrasonography, and tumour marker evaluation. The patients who had known malignancy, pregnancy, hemodynamic instability, severe systemic illness, or refusal were excluded. The measures were the operative time, the estimated blood loss, the intraoperative findings, the histopathological diagnosis, postoperative complications and the length of hospital stay. The SPSS version 25 was used to perform statistical analysis and $p<0.05$ was taken to be statistically significant.

Inclusion Criteria

1. Women with an adnexal mass on clinical examination and ultrasonography, aged 1865 years.

2. Patients that have benign or suspected benign adnexal masses on imaging and tumour marker tests.
3. Patients who are planned to have an elective surgical management (laparoscopy or laparotomy).
4. Hemodynamically stable patients fit for general anaesthesia.

Exclusion Criteria

1. Women who have ovarian or other pelvic malignancy on preoperative assessment.
2. Adnexal masses in pregnant women.
3. Emergency cases that involve patients who are hemodynamically unstable.
4. Patients who have severe cardiopulmonary disease or are otherwise contraindicated to general anaesthesia.
5. Patients who had had massive past operations on the abdomen resulting into dense adhesions.
6. Students that declined to give informed consent.

Data Collection

The entire group of 124 patients undergoing surgery of adnexal masses were prospectively studied to gather the required data. Preoperative data was offered as demographics, clinical history, physical examination, imaging pictures, and appropriate laboratory investigations such as tumour markers. Data that were documented during the surgery were surgical methodology (laparoscopy or laparotomy), operating time, approximated blood loss, intraoperative observation, and complications. The necessity to change laparoscopy into open surgery was also observed. Complications that were recorded as postoperative data were wound infection, fever, or ileus, length of stay in the hospital, and histopathological diagnosis. A structured proforma was used to enter all the information, and SPSS was used to analyse the results, $p<0.05$ was the level of statistical significance.

Statistical Analysis

All the data collected were keyed in SPSS version 25 to be analyzed. Continuous variables, such as the operative time, blood loss and hospital stay were represented as mean ± standard deviation and compared between the laparoscopic and the open surgery group by using the student t-test. Categorical variables were the postoperative complications and diagnostic yield, and these were expressed as frequencies and percentages and compared through Chi-square test. The p-value of below 0.05 was regarded as significant. Through the comparative analysis, the study was able to evaluate differences in peri-operative outcomes, complication rates and hospital stay of the two surgical approaches using the study sample of 124 patients.

RESULTS

The study involved 124 patients with adnexal masses, and 64 patients underwent laparoscopic surgery and 60 underwent open laparotomies. The age, body mass index, parity, and preoperative clinical similarities of both groups were similar so that there existed a similarity in the baseline.

The average operative time was a little higher in laparoscopic group (78 215 minutes) in comparison to laparotomy group (65 218 minutes, p=0.04). The intraoperative blood loss was estimated to be much lower in laparoscopic group (85 of 30 ml) than laparotomy group (210 of 60 ml, p=0.01). Laparoscopy to open surgery conversion had to be made in 3 patients (4.7%), because of dense adhesions.

The general complication rate in laparoscopic and open surgery groups was 9.3 and 21.6 respectively (p=0.03). The possible complications were wound infection, postoperative fever, and ileus. There were no significant intraoperative complications in both groups.

In laparoscopic, 93.7% of the preoperative diagnosis was correct, and this result was established by histopathological analysis. The laparoscopic group (2.1+ 0.8 days) had a much shorter hospital stay than the laparotomy group (4.8+ 1.3 days, p=0.001). All in all, laparoscopic treatment offered the same diagnostic results as open surgery, and was associated with less blood loss, fewer complications, and shorter hospitalization.

Table 1: Comparison of Laparoscopic and Open Surgery for Adnexal Masses

Parameter	Laparoscopy (n=64)	Laparotomy (n=60)	p-value
Mean Age (years)	36.5 ± 9.2	37.2 ± 8.7	0.62
BMI (kg/m²)	24.1 ± 3.5	24.5 ± 3.7	0.48
Mean Operative Time (minutes)	78 ± 15	65 ± 18	0.04
Estimated Blood Loss (mL)	85 ± 30	210 ± 60	<0.01
Conversion to Laparotomy	3 (4.7%)	—	—
Postoperative Complications	6 (9.3%)	13 (21.6%)	0.03
Diagnostic Yield (%)	93.7	95.0	0.68
Mean Hospital Stay (days)	2.1 ± 0.8	4.8 ± 1.3	<0.001

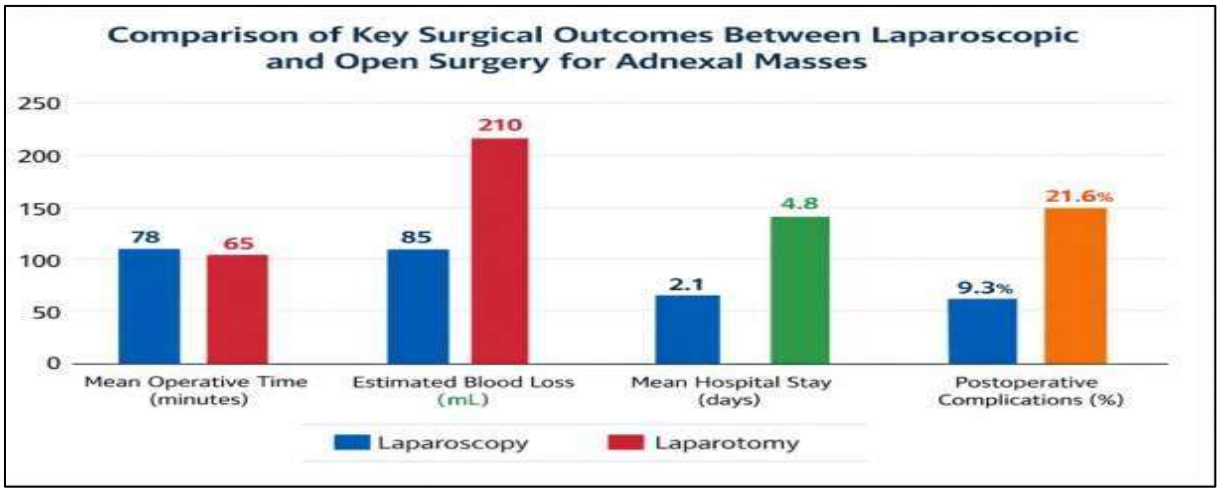


Figure 1 Comparison of Laparoscopic and Open Surgery for Adnexal Masses
compares laparoscopic and open surgery in adnexal mass surgery and presents the most important outcomes. It demonstrates that laparoscopy with a slightly increased operation time has much lower blood loss, less postoperative complications, and a shorter stay in the hospital. These data indicate the benefits of minimally invasive surgery in improving the recovery of patients and decreasing the perioperative morbidity.

Table 2: Postoperative Complications in Laparoscopic and Open Surgery Groups

Complication	Laparoscopy (n=64)	Laparotomy (n=60)	p-value
Wound Infection	2 (3.1%)	7 (11.6%)	0.05
Postoperative Fever	3 (4.7%)	4 (6.7%)	0.63
Ileus	1 (1.5%)	2 (3.3%)	0.57
Haemorrhage	0	0	—
Reoperation	0	0	—
Total Complications	6 (9.3%)	13 (21.6%)	0.03

- Data are expressed as number (%).
- p-values calculated using Chi-square test.

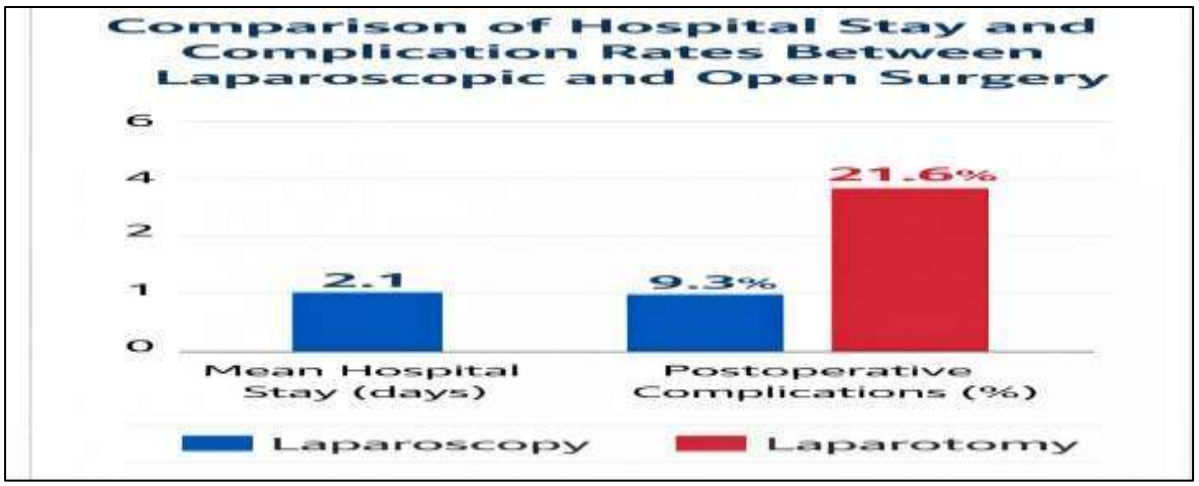


Figure 2 Complications in Laparoscopic and Open Surgery
makes a comparison of the diagnostic accuracy of laparoscopic surgery to open surgery on adnexal masses. Both methods are highly concordant with histopathology which proves that minimal invasive surgery does not hurt diagnostic output and is as effective in identifying benign, borderline, and malignant.

Table 3: Diagnostic Yield of Laparoscopic and Open Surgery

Parameter	Laparoscopy (n=64)	Laparotomy (n=60)	p-value
Preoperative Diagnosis Confirmed	60	57	0.68
Diagnostic Yield (%)	93.7%	95.0%	0.68
Benign Masses Confirmed	52	50	0.75
Borderline Masses Confirmed	5	4	0.80
Malignant Cases (unexpected)	3	3	0.99

- Diagnostic yield defined as concordance between preoperative assessment and histopathological diagnosis
- Data are expressed as number or perntage (%)

shows the results of hospital stays and patients recovering using laparoscopic or open surgery. There was less time in hospital, increased earlier to normal food intake, increased mobility and reduced postoperative pain among laparoscopic patients, which underlines the better recovery and the increased comfort after the operations as compared to the open surgery.

Table 4: Hospital Stay and Recovery Outcomes

Parameter	Laparoscopy (n=64)	Laparotomy (n=60)	p-value
Mean Hospital Stay (days)	2.1 ± 0.8	4.8 ± 1.3	<0.001
Early Mobilization (within 24 hours)	61 (95.3%)	42 (70.0%)	<0.01
Time to Resume Normal Diet (hours)	12 ± 4	28 ± 6	<0.001
Postoperative Pain Score (VAS)	3.2 ± 1.1	5.6 ± 1.4	<0.001

- **Data are expressed as mean ± standard deviation or number (%).**
- **VAS: Visual Analog Scale for pain assessment.**

presents intraoperative results and surgical information of laparoscopic surgery and open surgery. Unilateral and bilateral mass were comparable between the groups, and the dense adhesions were more common in laparotomy. The conversion and other processes were minimal, and they proved that laparoscopic procedures are feasible and safe.

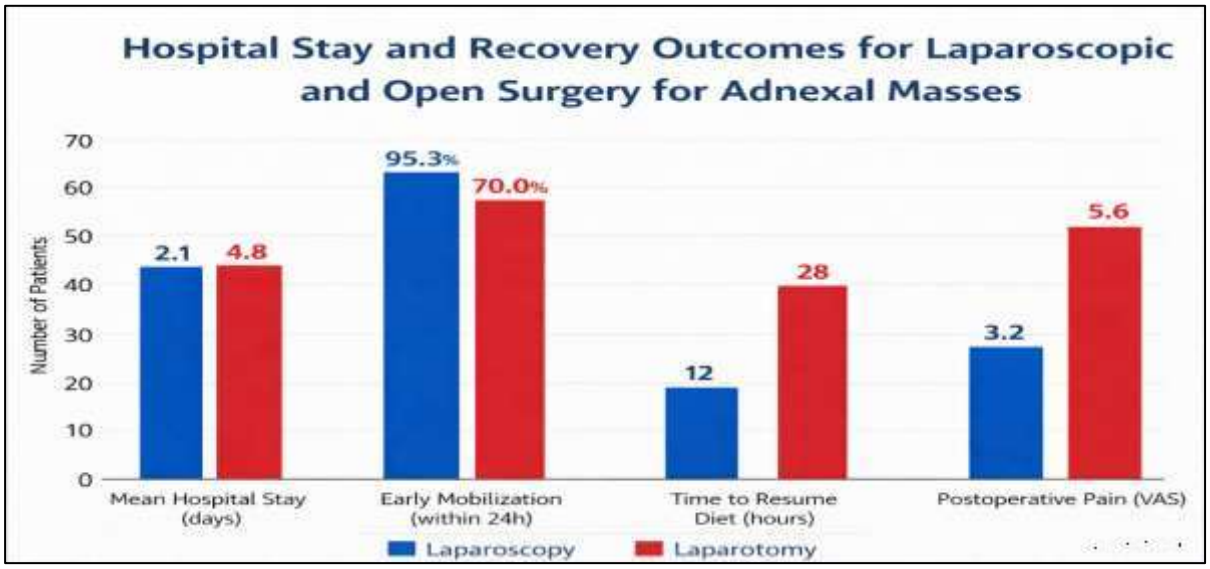
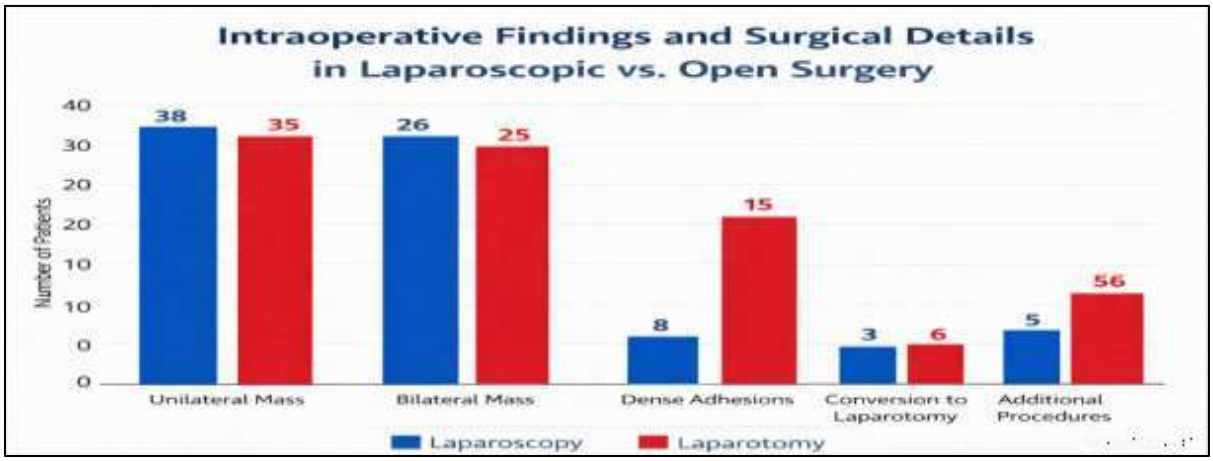


Figure 4 Hospital Stay and Recovery Outcomes

Table 5: Intraoperative Findings and Surgical Detail

Parameter	Laparoscopy (n=64)	Laparotomy (n=60)	p-value
Unilateral Mass	38 (59.4%)	35 (58.3%)	0.89
Bilateral Mass	26 (40.6%)	25 (41.7%)	0.89
Mean Mass Size (cm)	6.8 ± 2.1	7.0 ± 2.4	0.52
Dense Adhesions Requiring Acheilia's	8 (12.5%)	15 (25.0%)	0.05
Conversion to Laparotomy	3 (4.7%)	—	—
Need for Additional Procedures*	5 (7.8%)	6 (10.0%)	0.62

- Data are expressed as number (%) or mean ± standard deviation.
- *Additional procedures include omentectomy, salpingectomy, or acheilia's as indicated.



Demonstrates the complexity of surgery in laparoscopy and open. Laparoscopy contained less dense adhesions, less conversion to an open laparotomy, and reduced subsequent operations, making it safer, more efficient, and more appropriate in the management of most adnexal masses.

DISCUSSION

Adnexal management is a trendy and a considerable constituent of gynaecological surgery. The adnexal masses are largely diverse containing some mere functional cysts, benign neoplasm, borderline tumours, and malignancies. Proper preoperative evaluation in the form of imaging and tumour markers is helpful in surgical planning but final diagnosis normally requires surgical treatment and histopathology[11].The aim of this paper was to compare laparoscopic and open surgery to treat adnexal masses among a group of 124 patients in terms of operating the results, post-operative events, diagnostic value and hospital stay.

As far as our research has indicated, laparoscopy is far much better than laparotomy in terms of the morbidity of the peri operation as well as the recovery without any influence on the diagnostic result. The laparoscopic group operated a little bit longer (78 ± 15 minutes) in comparison to the open surgery (65 ± 18 minutes) group. Such difference can be elaborated by the technicality of the minimally invasive surgery and the learning curve of laparoscopic procedures. Despite the fact the laparoscopy procedure had marginally longer length of operation, it was characterized with a significant reduced estimated blood loss (85 + 30 mL relative to 210 + 60 mL in laparotomy, $p < 0.01$)[12]. Better visualization under magnification, careful dissection, and limited handling of tissues which restricted vascular damage can explain the reduced intraoperative bleeding during laparoscopic procedures.

The rate of postoperative complications was lower and much lower in the laparoscopic group (9.3) relative to the open surgery group (21.6%). Laparotomy group had the complications of wound infection, postoperative fever, and ileus, with fewer and less severe complications in the laparoscopic group. The decrease in the occurrence of complications can be explained by the fact that laparoscopy is a minimally invasive procedure with less incision size, less tissue damage, and less exposure of the intra-abdominal contents to external contaminants[13].

Patients who received laparoscopic surgery (2.1 ± 0.8 days of stay) stayed shorter at the hospital than those who received laparotomy (4.8 ± 1.3 days of stay, $p<0.001$). There are several reasons that could be supporting this finding: early mobilization, decreased postoperative pain and decreased time to recover gastrointestinal function[14]. Reduced hospitalization time will be beneficial to the patient by enhancing recovery and quality of life and decreasing healthcare expenditure and resource use.

The laparoscopic and open surgical procedures are equally diagnostic (93.7% vs. 95.0% $p=0.68$), therefore, indicating no evidence of laparoscopy undermining the quality of histopathological diagnosis [15]. Preoperative imaging and tumour marker measurements are also relevant in planning the treatment although the concordance between preoperative assessment and histopathology in the two groups is high, which highlights the reliability of surgical treatment irrespective of the approach.

Generally, no significant differences between the two groups were found in terms of intraoperative findings where dense adhesions were more common in the laparotomy group (25% vs 12.5%). This could be indicative of case selection since patients with suspected extensive adhesions will be oftentimes preferentially chosen as open surgery patients[16]. Only 3 patients (4.7) changed laparoscopy to laparotomy because of dense adhesion or poor visualization [17].

Laparoscopic surgery was also found to have benefits on early postoperative recovery. Patients also took shorter time to resume regular diet and walking, and the pain (postoperative) scores were reduced (3.2 1.1 vs 5.6 1.4). The pain was reduced, which promoted early mobilization, eliminating complications like thromboembolism and enhancing the rate at which the gastrointestinal system heals[18].

Fears of the intraoperative cyst rupture and spillage of cancerous cells were not major in this research. There were no adverse outcomes or port-site metastasis, and unexpected malignancy was observed in 3 patients in each unit. Malicious surgery is necessary to reduce such risks[19].

There are several limitations that should be mentioned. The research was only done in one tertiary care hospital, which restricts the generalizability. Despite the possibility of the comparison of short-term results, the long-term follow-up on the recurrence, fertility, or quality of life were not provided despite the sample size. Surgeon expertise and patient influences also influenced case selection, which resulted in possible bias. Also, laparoscopic procedures need special equipment and training, and, in some environments, this could be a limiting factor.
Although these limitations exist, this paper has proved that laparoscopic treatment of adnexal masses is safe, effective, and friendly to the patients. Laparoscopy minimizes blood loss, postoperative complications, reduces the length of hospitalization, and has similar diagnostic accuracy[20]. The mentioned benefits are especially applicable to resource-constrained environments and patient satisfaction.Multicentre studies should be carried out with long-term follow up to determine the oncologic safety and fertility outcomes and cost-effectiveness in the future. Further comparative studies on more advanced laparoscopic techniques (i.e. single-port or robotic surgery) will be able to make an additional influence in clarifying the role of minimally invasive surgery in adnexal masses that are complicated. It would be beneficial to come up with universal preoperative scoring systems that would anticipate the complexity of the surgical operations and determine the methodology.

CONCLUSION

This paper proves that laparoscopic treatment of adnexal masses is a safe, effective and patient friendly treatment. Laparoscopy has a similar level of diagnostic precision to open laparotomy, but has significant benefit, such as decreased intraoperative blood loss, decreased post-operative complications, and shortened hospitalization. Laparoscopic surgery was found to have better recovery, earlier ambulation, less postoperative pain and earlier resumption of normal daily activities. Only a small percentage of cases had to be converted to laparotomy, which demonstrates that laparoscopy may be used on the majority of patients with benign or possibly benign adnexal masses. The results indicate that laparoscopic surgery should be used in situations where it is the most optimal procedure to be applied on the right patients, especially in a hospital where surgeons have experience and sufficient minimally invasive instruments. Preoperative assessment, selection and surgical skills must be used carefully to ensure maximum benefits and minimum harm. In general, laparoscopy increases the patient outcomes and satisfaction rates without compromising the safety and efficiency of adnexal mass treatment.

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