

Assessment of Clinical Outcomes and Recovery Following Laparoscopic versus Open Abdominal Hysterectomy for Benign Gynecological Conditions

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Abstract:

Background: Hysterectomy is a commonly performed surgical procedure for benign gynecological conditions. Laparoscopic hysterectomy has increasingly been adopted as a minimally invasive alternative to open abdominal hysterectomy due to its potential advantages in postoperative recovery and reduced morbidity.

Aim: To compare the clinical outcomes and recovery following laparoscopic versus open abdominal hysterectomy for benign gynecological conditions.

Methodology: This prospective comparative study included 125 women undergoing hysterectomy, comprising 62 laparoscopic and 63 open abdominal procedures. Baseline characteristics, intraoperative outcomes, postoperative recovery, complications, and patient satisfaction were assessed and compared.

Results: Baseline demographic and clinical characteristics were comparable between the groups ($p > 0.05$). Although operative time was longer in the laparoscopic group (108.4 ± 22.6 vs 92.5 ± 18.4 minutes; $p < 0.001$), blood loss (148.6 ± 62.8 vs 322.7 ± 104.2 ml; $p < 0.001$) and transfusion requirements (4.8% vs 17.5%; $p = 0.026$) were significantly lower. Laparoscopic hysterectomy resulted in lower pain scores, earlier ambulation, shorter hospital stay, and faster return to daily activities ($p < 0.001$ for all). Overall complications were significantly lower (11.3% vs 38.1%; $p < 0.001$), while excellent recovery (71.0% vs 36.5%) and patient satisfaction scores (8.9 ± 1.1 vs 6.8 ± 1.6) were significantly higher.

Conclusion: Laparoscopic hysterectomy offers superior recovery, fewer complications, and greater patient satisfaction than open abdominal hysterectomy, despite requiring a longer operative time.

Keywords: Laparoscopic Hysterectomy, Abdominal Hysterectomy, Benign Gynecological Conditions, Postoperative Recovery, Clinical Outcomes, Patient Satisfaction.

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Introduction

Hysterectomy is the most common of the major gynecologic operations performed worldwide and remains the definitive treatment for a variety of benign and malignant diseases of the uterus. It involves surgical removal of the uterus, with or without the cervix, fallopian tubes, and ovaries, depending on the pathology and patient characteristics. Over the past century, hysterectomy has been a mainstay in the management of gynecological conditions such as uterine fibroids, abnormal uterine bleeding, adenomyosis, endometriosis, chronic pelvic pain, and pelvic organ prolapse. Despite the availability of conservative medical and minimally invasive treatment options, hysterectomy is still the treatment of choice

for many women who have completed childbearing and have persistent symptoms that negatively impact their quality of life [1].

Each year hysterectomy is one of the most frequently performed gynecologic surgeries in the world. Approximately 600,000 hysterectomies are performed annually in the United States and nearly 40,000 procedures are performed annually in England [2]. It is estimated that nearly 40% of women worldwide will have undergone a hysterectomy by the age of 64 years. Most procedures performed are for symptom relief, improvement of functional status and improvement of overall quality of life. The most frequent reason for hysterectomy is uterine fi-

broids, followed by abnormal uterine bleeding, adenomyosis, endometriosis and chronic pelvic pain syndromes [3]. Despite the availability of other therapeutic options including advances in medical management, endometrial ablation techniques, uterine artery embolization and levonorgestrel-releasing intrauterine systems, hysterectomy is still the most definitive and efficacious treatment for many benign gynecological conditions [4].

Traditionally, abdominal hysterectomy has been the most performed surgical procedure. Open abdominal hysterectomy (AH) offers excellent visualization of the pelvic anatomy and is often the preferred approach when the uterus is large, extensive pelvic adhesions exist, or when concomitant pelvic pathology is present. However, abdominal hysterectomy involves a larger surgical incision and is associated with more postoperative pain, increased blood loss, longer hospital stay, delayed recovery and greater risk of wound-related complications [5]. These limitations have led to the development and acceptance of minimally invasive surgical techniques that seek to reduce surgical morbidity while providing similar clinical results.

Laparoscopic hysterectomy (LH) revolutionized gynecologic surgery by providing a minimally invasive alternative to the traditional open surgery. The first laparoscopic hysterectomy was reported by Harry Reich in 1989 and since then advances in endoscopic technology, surgical instruments and surgeon expertise have greatly expanded its application [6]. Laparoscopic hysterectomy is a surgical procedure performed through small incisions in the abdomen. A camera and special surgical instruments are inserted through the incisions to perform the surgery. Laparoscopic hysterectomy has been associated with decreased intraoperative blood loss, less postoperative pain, decreased infection rates, earlier mobilization, shorter hospital stay, quicker return to normal activities and improved cosmesis [7] compared to open abdominal hysterectomy.

The choice of laparoscopic versus open abdominal hysterectomy is an important clinical dilemma and an area of ongoing research. Studies have shown that laparoscopic surgery is useful for patient satisfaction and recovery after surgery. However, concerns associated with laparoscopic procedures are longer operative duration, higher equipment costs and technical expertise. In addition, certain complications may be linked with laparoscopic hysterectomy, including urinary tract injuries, vascular injuries and conversion to open surgery in selected cases [8]. Therefore, the surgeon's experience and proper patient selection are important factors in determining the success of the procedure.

Several factors are implicated in the clinical outcomes following hysterectomy including patient age, body mass index, indication for surgery, uterine

size, presence of comorbidities and the surgical approach used. The multiple dimensions of recovery after surgery encompass postoperative pain, blood loss, length of stay, time to ambulation, return to routine activities, complication rate, and overall patient satisfaction. Assessment of such outcomes is critical for evaluating effectiveness and safety of various surgical techniques and to inform evidence-based clinical practice [9].

There has been a growing focus on patient-centered outcomes and enhanced recovery protocols in recent years. Today, hysterectomy is expected to successfully solve gynecological symptoms, but also to ensure rapid postoperative recovery, minimal discomfort, shorter hospitalization and improved quality of life. As a result, laparoscopic hysterectomy has gained popularity in many tertiary care centers and is increasingly being regarded as the preferred method in properly selected patients with benign gynecological conditions [10]. However, open abdominal hysterectomy is still a common procedure especially in resource limited countries where laparoscopic facilities, trained personnel and advanced equipment may not be easily available.

Hysterectomy continues to be one of the most common gynecological surgeries done in developing countries like India where benign gynecological disorders are an important cause of morbidity in women. However, the use of minimally invasive techniques has been adopted to a large extent in different healthcare institutions. Comparative studies on clinical outcomes and recovery after laparoscopic and open abdominal hysterectomy are needed to identify the most effective and safe surgical approach in local health care settings [11]. Such evidence may result in improved surgical decision making, more appropriate resource utilization, and improved patient care.

Therefore, the present study was conducted to compare the perioperative and postoperative outcomes between the two surgical approaches. The objectives of this study are to compare operative time, blood loss, postoperative pain, length of hospital stay, complication rates, recovery profile and overall clinical outcome in women undergoing hysterectomy for benign gynecologic conditions. The findings are expected to provide important evidence regarding the relative benefits and limitations of laparoscopic compared to open abdominal hysterectomy and contribute to optimization of surgical management strategies for women requiring definitive treatment of benign uterine diseases.

Methodology

Study Design: This study was designed as a hospital-based prospective comparative observational study to assess and compare the clinical outcomes and postoperative recovery following laparoscopic hysterectomy and open abdominal hysterectomy

among women undergoing surgery for benign gynecological conditions. The study aimed to evaluate perioperative parameters, postoperative complications, hospital stay, recovery profile, and return to normal activities.

Study Area: The study was conducted in the Department of Obstetrics & Gynecology and General Surgery at Maharshi Vishwamitra Autonomous State Medical College (MVASMC) Ghazipur, Uttar Pradesh, India.

Study Duration: The study was carried out over a period of one year

Sample Size: A total of 125 women undergoing hysterectomy for benign gynecological conditions were included in the study. Eligible patients were enrolled consecutively during the study period and allocated into two groups according to the surgical approach adopted:

- Group A: Laparoscopic Hysterectomy (LH)
- Group B: Open Abdominal Hysterectomy (AH)

Study Population: The study population comprised women diagnosed with benign gynecological conditions requiring hysterectomy who attended the Department of Obstetrics and Gynaecology of the study hospital in Ghazipur, Uttar Pradesh, during the study period. Patients presenting with conditions such as symptomatic uterine fibroids, abnormal uterine bleeding refractory to medical treatment, adenomyosis, chronic pelvic pain, and other benign uterine disorders were evaluated for eligibility. A total of 125 women meeting the inclusion criteria and scheduled for either laparoscopic hysterectomy or open abdominal hysterectomy were consecutively enrolled in the study. The participants were divided into two groups based on the surgical approach adopted, and their perioperative and postoperative outcomes were compared.

Data Collection: Data were collected prospectively using a predesigned and structured case record form after obtaining written informed consent from all participants. Baseline demographic characteristics including age, parity, body mass index, residence, and relevant medical and surgical history were recorded. Clinical details such as presenting symptoms, indication for hysterectomy, associated comorbidities, and preoperative investigation findings were documented. Intraoperative data including operative time, estimated blood loss, need for blood transfusion, and any surgical complications were noted. Postoperative information regarding pain scores, time to ambulation, duration of hospital stay, postoperative complications, and time taken to resume normal daily activities was collected through direct patient assessment and review of hospital records. All data were recorded systematically and maintained confidentially for subsequent statistical analysis.

Inclusion Criteria

- Age between 30 and 65 years
- Diagnosed with benign gynecological conditions requiring hysterectomy
- Planned for either laparoscopic or open abdominal hysterectomy
- Fit for surgery under anesthesia
- Willing to participate and provide informed consent

Exclusion Criteria

- Histologically confirmed or suspected gynecological malignancy
- Pregnancy-related indications for hysterectomy
- Emergency hysterectomy
- Severe pelvic inflammatory disease requiring alternative management
- Patients with major medical illnesses contraindicating laparoscopic surgery
- Patients undergoing vaginal hysterectomy
- Patients unwilling to participate

Procedure: All participants underwent detailed preoperative assessments, including clinical examination and routine investigations such as complete blood count, liver function tests, renal function tests, blood sugar levels, coagulation profile, electrocardiography, chest radiography (where indicated), and pelvic ultrasonography. Patients were allocated into two groups based on the surgical technique employed by the treating surgeon.

Statistical Analysis: The data collected were entered into Microsoft Excel and analyzed using the Statistical Package for Social Sciences (SPSS) version 26.0. Continuous variables such as age, operative time, estimated blood loss, duration of hospital stay, and time to return to normal activities were expressed as mean $\pm$ standard deviation (SD). Categorical variables such as indications for surgery, postoperative complications, need for blood transfusion, and type of hysterectomy were presented as frequencies and percentages. Comparisons between the laparoscopic hysterectomy and open abdominal hysterectomy groups were performed using the Independent Student's t-test for continuous variables and the Chi-square test or Fisher's exact test for categorical variables, as appropriate. A p-value of less than 0.05 was considered statistically significant. The results were presented in the form of tables and graphs to facilitate comparison of clinical outcomes and recovery parameters between the two surgical approaches.

Result

Table 1 demonstrates that the open abdominal hysterectomy group (n = 63) and the laparoscopic hysterectomy group (n = 62) had similar baseline demographic and clinical characteristics. The mean age of participants was comparable between the two

groups (44.8 ± 6.2 years vs 45.6 ± 5.9 years; $p=0.462$). Similarly, no statistically significant difference was found with respect to BMI, parity status and indications for surgery like fibroid uterus, abnormal uterine bleeding and adenomyosis ($p>0.05$

for all variables). The results suggest that the two groups were well matched at baseline and therefore provided a reliable comparison of surgical outcomes.

Table 1: Baseline Demographic and Clinical Characteristics of Patients (n=125)			
Variable	Laparoscopic Hysterectomy (n=62)	Open Abdominal Hysterectomy (n=63)	p-value
Mean Age (years)	44.8 ± 6.2	45.6 ± 5.9	0.462
BMI (kg/m ²)	24.9 ± 3.4	25.2 ± 3.8	0.671
Multiparous	48 (77.4%)	50 (79.4%)	0.785
Fibroid Uterus	34 (54.8%)	36 (57.1%)	0.796
AUB	18 (29.0%)	17 (27.0%)	0.802
Adenomyosis	10 (16.1%)	10 (15.9%)	0.973

Table 2 presents significant differences between the two surgical approaches that were seen in the comparison of intraoperative outcomes. The mean operative time was longer in the laparoscopic group (108.4 ± 22.6 minutes) than in the open abdominal group (92.5 ± 18.4 minutes, $p<0.001$). However, laparoscopic hysterectomy was associated with significantly less intraoperative blood loss ($148.6 \pm$

62.8 ml vs. 322.7 ± 104.2 ml; $p<0.001$) and less need for blood transfusion (4.8% vs. 17.5%; $p=0.026$). Intraoperative complications were less frequent in the laparoscopic group but the difference was not statistically significant (3.2% vs 9.5%; $p=0.143$). However, laparoscopic hysterectomy had better intra-operative safety with longer operating time.

Table 2. Intraoperative Outcomes			
Parameter	Laparoscopic (n=62)	Open Abdominal (n=63)	p-value
Operative Time (min)	108.4 ± 22.6	92.5 ± 18.4	$<0.001^*$
Blood Loss (ml)	148.6 ± 62.8	322.7 ± 104.2	$<0.001^*$
Blood Transfusion Required	3 (4.8%)	11 (17.5%)	0.026*
Intraoperative Complications	2 (3.2%)	6 (9.5%)	0.143

Table 3 illustrates that patients who underwent laparoscopic hysterectomy experienced significantly improved postoperative recovery. On day one, the mean postoperative pain score was significantly lower in the laparoscopic group (3.6 ± 1.2) than in the abdominal group (6.5 ± 1.4 ; $p<0.001$). The laparoscopic group also showed earlier ambulation (14.2

± 4.1 hours vs 27.8 ± 6.4 hours; $p<0.001$), shorter hospital stay (2.7 ± 0.8 days vs 5.9 ± 1.3 days; $p<0.001$), and rapid return to normal daily activities (16.8 ± 4.5 days vs 32.4 ± 7.8 days; $p<0.001$). These results indicate that laparoscopic hysterectomy is associated with better postoperative recovery and faster recovery.

Table 3. Postoperative Recovery Outcomes			
Parameter	Laparoscopic (n=62)	Open Abdominal (n=63)	p-value
Pain Score (VAS Day-1)	3.6 ± 1.2	6.5 ± 1.4	$<0.001^*$
Time to Ambulation (hours)	14.2 ± 4.1	27.8 ± 6.4	$<0.001^*$
Hospital Stay (days)	2.7 ± 0.8	5.9 ± 1.3	$<0.001^*$
Return to Daily Activities (days)	16.8 ± 4.5	32.4 ± 7.8	$<0.001^*$

Table 4 shows that complications after the laparoscopic hysterectomy were seen less often than those seen in the open abdominal hysterectomy group. Wound infection was seen in 3.2% in the laparoscopic group and in 15.9% in the abdominal group which was statistically significant ($p=0.015$). Febrile morbidity and urinary tract infection were also lower in the laparoscopic group but this did not reach sta-

tistical significance. The overall complication rate was significantly lower in women undergoing laparoscopic hysterectomy (11.3%) than those undergoing open abdominal hysterectomy (38.1%; $p<0.001$). These results demonstrate a definite benefit of the minimally invasive approach in reducing postoperative morbidity.

Table 4. Postoperative Complications

Complication	Laparoscopic (n=62)	Open Abdominal (n=63)	p-value
Wound Infection	2 (3.2%)	10 (15.9%)	0.015*
Febrile Morbidity	3 (4.8%)	9 (14.3%)	0.072
Urinary Tract Infection	2 (3.2%)	5 (7.9%)	0.266
Total Complications	7 (11.3%)	24 (38.1%)	<0.001*

Table 5 shows the overall clinical outcome assessment showed better results in the laparoscopic hysterectomy group. Excellent recovery was achieved in 71.0% of patients undergoing laparoscopy as compared to only 36.5% in the group of abdominal hysterectomy. In contrast, open abdominal hysterectomy was more often associated with fair or poor recovery (23.8% versus 6.4%). Additionally, patient

satisfaction scores were significantly better in the laparoscopic group (8.9 ± 1.1) than the abdominal group (6.8 ± 1.6 ; $p < 0.001$). These results indicate that laparoscopic hysterectomy has better overall clinical outcomes, higher patient satisfaction and better quality of postoperative recovery than conventional open abdominal approach.

Table 5. Overall Clinical Outcomes and Patient Satisfaction

Outcome	Laparoscopic (n=62)	Open Abdominal (n=63)	p-value
Excellent Recovery	44 (71.0%)	23 (36.5%)	<0.001*
Good Recovery	14 (22.6%)	25 (39.7%)	
Fair/Poor Recovery	4 (6.4%)	15 (23.8%)	
Patient Satisfaction Score (0–10)	8.9 ± 1.1	6.8 ± 1.6	<0.001*

Discussion

The present study compared clinical outcomes and recovery profile of laparoscopic hysterectomy and open abdominal hysterectomy in women with benign gynecological conditions undergoing surgery. The two groups were similar in terms of age, BMI, parity and indications for surgery at baseline, thus reducing the risk of selection bias and allowing us to attribute the difference in outcomes to the surgical approach. The mean age of the participants in the laparoscopic and abdominal groups was 44.8 ± 6.2 years and 45.6 ± 5.9 years, respectively, with no significant difference between the groups. A landmark randomized trial, the Dutch evaluate study, also reported similar baseline comparability, with demographic and clinical characteristics well balanced between the laparoscopic and abdominal hysterectomy groups, allowing for valid comparison of perioperative outcomes (Garry et al., 2004). Similarly, the systematic review by Nieboer et al. (2009) showed that age, parity, and surgical indications were generally comparable between studies investigating different hysterectomy techniques" [12].

One of the important findings in the present study was the operative time, which was significantly longer in the laparoscopic hysterectomy group (108.4 ± 22.6 minutes) than in the open abdominal hysterectomy group (92.5 ± 18.4 minutes). This observation agrees with earlier reports that show the requirement for additional time in minimally invasive procedures due to technical difficulty of laparoscopic dissection and intracorporeal suturing. Garry et al. (2004) found a significantly longer operative duration in laparoscopic procedures compared with abdominal surgery. A Cochrane review by Nieboer

et al. (2009) also found that laparoscopic hysterectomy had a longer operative time but several postoperative advantages. On the other hand, Sculpher et al. (2004) found that as surgeons become more experienced and progress along the learning curve, differences in operative duration become less pronounced, emphasizing the importance of surgical expertise in optimizing outcomes [13].

Except for the prolonged operation time, laparoscopic hysterectomy had obvious advantages intraoperatively. Mean blood loss was significantly less in the laparoscopic group (148.6 ± 62.8 ml) than in the abdominal group (322.7 ± 104.2 ml) and the need for blood transfusion was also significantly less (4.8% vs 17.5%). These results are very comparable to those reported by Johnson et al. (2005) who reported significantly lower blood loss and transfusion rates in women undergoing laparoscopic hysterectomy. Similarly, Aarts et al. (2015) found that minimally invasive hysterectomy approaches reliably result in lower intraoperative blood loss compared to abdominal hysterectomy. These positive results are probably due to the better visualization provided by laparoscopy and the possibility of obtaining adequate vascular control. Intraoperative complications were less frequent in the laparoscopic group in this study, but not significantly so, which is in line with several previous reports showing similar overall safety profiles between the two approaches (Nieboer et al., 2009) [14].

The differences between the groups were greatest in the postoperative recovery period. Laparoscopic hysterectomy patients had significantly lower postoperative pain scores (3.6 ± 1.2 compared to 6.5 ± 1.4), ambulated earlier (14.2 ± 4.1 compared to

27.8 $\pm$ 6.4 hours), had shorter hospital stay (2.7 $\pm$ 0.8 compared to 5.9 $\pm$ 1.3 days) and returned to routine daily activity much earlier (16.8 $\pm$ 4.5 compared to 32.4 $\pm$ 7.8 days). These findings strongly support the benefits of minimally invasive surgery and are consistent with many prior studies. The evaluate trial showed significantly less postoperative pain and faster recovery in women undergoing laparoscopic hysterectomy compared with those undergoing abdominal hysterectomy (Garry et al., 2004). Similarly, Candiani et al. (2009) found that patients undergoing laparoscopic surgery had shorter hospital stays and returned to their normal activities sooner. Similar observations were reported by Walsh et al. (2009) who concluded that laparoscopic hysterectomy provides better post-operative rehabilitation and better quality of life during the early recovery period. These beneficial effects are probably due to the smaller abdominal incisions and the reduced tissue trauma of laparoscopy [15].

Postoperative morbidity was also significantly less in the laparoscopic group. Wound infection developed in only 3.2% of laparoscopic cases vs. 15.9% of abdominal cases and the overall complication rate was significantly lower (11.3% vs. 38.1%). These findings are consistent with those described by Aarts et al. (2015) who observed lower rates of wound related complications and postoperative morbidity following laparoscopic hysterectomy. Also, the systematic review by Johnson et al. (2005) found reduced postoperative infection and overall complication rates in women who had minimally invasive hysterectomy. In the present study, febrile morbidity and urinary tract infections were less frequent in the laparoscopic group but the difference was not statistically significant. Comparable patterns have been described in earlier studies showing greater reductions in minor complications in laparoscopy but not always reaching statistical significance due to small sample sizes (Nieboer et al., 2009) [16].

Overall clinical outcome also showed a significant benefit of laparoscopic hysterectomy. The excellent recovery outcomes in women who underwent laparoscopic surgery was 71.0% which was significantly higher than the abdominal group (36.5%). Fair or poor recovery outcomes were almost four times more frequent following abdominal hysterectomy. Furthermore, patients who underwent laparoscopy had significantly higher patient satisfaction scores (8.9 $\pm$ 1.1 vs. 6.8 $\pm$ 1.6). These results concur with those of Kluivers et al. (2007) [17], where they found significantly higher patient satisfaction and better postoperative quality of life following laparoscopic hysterectomy. Wright et al. (2013) [18], similarly, reported that minimally invasive hysterectomy was associated with improved patient-reported outcomes and improved recovery experiences. Higher satisfaction ratings may be associated with decreased postoperative pain, shorter hospital stay,

faster return to normal activities, and better cosmetic results with laparoscopy.

In conclusion, the results of the present study are consistent with the growing evidence that laparoscopic hysterectomy has substantial advantages over open abdominal hysterectomy for benign gynecological disorders. Although operative time is still longer, the benefits of reduced blood loss, decreased transfusion requirements, faster recovery, fewer postoperative complications, and greater patient satisfaction strongly support the adoption of laparoscopic hysterectomy as the preferred surgical approach whenever feasible. These results support previous recommendations from randomized trials and systematic reviews that minimally invasive hysterectomy should be the standard of care for appropriately selected patients.

Conclusion

The present study shows that laparoscopic hysterectomy is a safe and effective alternative to open abdominal hysterectomy for the management of benign gynecological conditions. Although laparoscopic approach was associated with longer operative time, it was associated with significant advantages in terms of decreased intraoperative loss, lower blood transfusion requirements, decreased postoperative pain, earlier ambulation, shorter hospital stay and faster return to normal daily activities. Also, laparoscopic surgery was linked to fewer complications postoperatively, especially wound infections, leading to improved overall clinical outcomes and greater patient satisfaction. These results indicate better perioperative safety, recovery and quality of postoperative care of laparoscopic hysterectomy compared to traditional abdominal approach. When appropriate surgical expertise and facilities are available, laparoscopic hysterectomy should be the treatment of choice for women requiring hysterectomy for benign gynecological disorders.

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