Section: Obstetrics and Gynaecology

Original Research Article

LAPAROTOMY AS A SELECTIVE SAFETY STRATEGY IN THE ERA OF ADVANCED LAPAROSCOPIC HYSTERECTOMY: A FIVE-YEAR RETROSPECTIVE REVIEW

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Received : 05/04/2026
Received in revised form : 17/05/2026
Accepted : 02/06/2026

Keywords:
Laparoscopic hysterectomy, laparotomy, patient safety, surgical conversion, complex pelvic disease.

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DOI: 10.47009/jamp.2026.8.3.159

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2026; 8 (3); 882-886

ABSTRACT

Background: Minimally invasive hysterectomy has become the preferred surgical approach for most benign gynaecological conditions. Despite this transition, laparotomy continues to be required in selected difficult cases. **Aim:** This study evaluated the role of planned laparotomy and conversion to open surgery in a tertiary care laparoscopic gynaecology unit. **Materials and Methods:** A retrospective review of all hysterectomies performed between January 2021 and December 2025 was conducted. Surgical routes, indications for planned open surgery, reasons for conversion, and major complications were analysed. **Results:** A total of 391 hysterectomies were performed during the study period. Among 352 laparoscopic attempts, 346 were completed laparoscopically, giving a completion rate of 98.3%. Six cases required conversion to laparotomy (1.7%), and 11 cases were planned as open procedures. Most conversions were strategic rather than reactive. Most planned laparotomies and conversions occurred in cases with dense pelvic adhesions, endometriosis, large uterine or adnexal masses, anatomical distortion, or when malignancy is suspected. Symptomatic fibroids in women aged 40–50 years were the most common indication for hysterectomy. Major complications included two ureterovaginal fistulae, one rectovaginal fistula, and one intraoperative ureteric transection following difficult laparoscopic hysterectomies. **Conclusions:** In contemporary minimally invasive gynaecologic surgery, planned laparotomy and strategic conversion should be regarded as selective safety strategies rather than indicators of surgical failure.

INTRODUCTION

Hysterectomy remains one of the most commonly performed major gynaecological procedures worldwide. Over the last two decades, advances in minimally invasive surgery have substantially transformed hysterectomy practice, with laparoscopic hysterectomy increasingly replacing abdominal hysterectomy because of benefits including reduced postoperative pain, shorter hospital stay, faster recovery, and lower wound morbidity.[1]

Despite widespread adoption of minimally invasive techniques, open abdominal hysterectomy remains important in selected complex cases. The American College of Obstetricians and Gynaecologists (ACOG) recommends minimally invasive hysterectomy whenever feasible while recognising that severe adhesions, advanced endometriosis, distorted anatomy, large pelvic masses, prior surgeries, suspected malignancy, and technical limitations may necessitate planned laparotomy or conversion to open surgery as a safety strategy rather than an indication of surgical failure.[2]

The present study was undertaken to evaluate the continuing role of laparotomy and conversion to open surgery in a tertiary care centre with an established laparoscopic gynaecology practice. The study analysed trends in hysterectomy routes, indications for planned laparotomy, reasons for conversion, and noteworthy complications associated with difficult hysterectomy cases over a five-year period.

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MATERIALS AND METHODS

This retrospective observational study was conducted in the Department of Obstetrics and Gynaecology of a tertiary care centre between January 2021 and December 2025.

Inclusion Criteria

All patients undergoing hysterectomy for gynaecological indications during the study period were included. Data were retrieved from hospital medical records, operative notes, discharge summaries, and histopathology reports.

Exclusion Criteria

Women who underwent hysterectomy for obstetric indications were excluded from the study.

Primary outcome

Evaluation of the role and frequency of planned laparotomy and conversion to laparotomy during hysterectomy in a tertiary laparoscopic gynaecology unit.

Secondary outcomes

Secondary outcomes included classification of conversions as strategic or reactive, indications for planned laparotomy, reasons for conversion from laparoscopy to laparotomy, major intraoperative and postoperative complications, minimally invasive completion rates, and annual trends in hysterectomy route during the five-year study period.

Data entry

Clinical data were retrieved from hospital medical records, operative notes, discharge summaries, and histopathology reports. Age at hysterectomy, surgical route, and the most probable preoperative clinical diagnosis were recorded. Patients were categorised according to the route of hysterectomy into laparoscopic hysterectomy completed laparoscopically, vaginal hysterectomy, planned open abdominal hysterectomy, and conversion from laparoscopy to laparotomy.

Conversions were further classified as strategic or reactive. Strategic conversion referred to elective conversion due to anticipated technical difficulty, distorted anatomy, severe adhesions, or suspected malignancy before the occurrence of a major complication, whereas reactive conversion referred to conversion following an intraoperative complication or uncontrolled surgical event.

Histopathology reports were reviewed. Intraoperative, postoperative, and readmission-related major complications, including bowel injury, fistula formation, and urogenital tract injury, were documented.

The following variables were analysed: age distribution, clinical indications for hysterectomy, annual surgical route trends, indications for planned laparotomy, and reasons for conversion, minimally invasive surgical completion rates, and major surgical complications.

Statistical Analysis

Microsoft Excel software (Microsoft® Corp., Redmond, WA) was used for data entry and tabulation. Descriptive statistical analysis was performed using frequencies, percentages, and rates. No inferential statistical analysis was performed because of the small number of conversion and complication cases.

RESULTS

During the study period, 391 hysterectomies were performed for various gynaecological indications. Two additional emergency hysterectomies performed for placenta praevia and invasive mole were excluded from the study.

Age distribution

A total of 391 hysterectomies were performed during the study period. Most patients belonged to the 40–50 years' age group (Table 1).

Clinical indications

Fibroid uterus was the commonest indication for hysterectomy, accounting for 51.9% of cases (Table 2).

Surgical route distribution

Among 352 laparoscopic attempts, 346 procedures were completed laparoscopically, resulting in an overall completion rate of 98.3%. Six cases required conversion to laparotomy. Eleven procedures were planned as open abdominal hysterectomies (Figure 1, 2 & Table 3).

Figure 1. Flow diagram showing distribution of hysterectomy surgical routes during the study period

Planned open hysterectomy cases

Planned open hysterectomy was mainly performed in cases involving suspected malignancy, extensive adhesions, very large fibroids, or associated procedures requiring laparotomy (Table 4).

Conversion to laparotomy

Most conversions occurred in the setting of severe adhesions, complete POD obliteration, advanced endometriosis, large masses, or suspected malignancy (Table 5). Five of the six conversions were strategic.

Major intra-operative or post-operative complications during the study period

Case 1: Ureterovaginal fistula (2023)

Following TLH BSO performed for adenomyosis, the patient developed a ureterovaginal fistula. Operative findings included a bulky adenomyotic uterus with severe pelvic distortion, deeply buried adnexa, and complete POD obliteration. Symptoms developed on postoperative day five, and laparoscopic ureteric reimplantation using a Boari flap was successfully performed.

Case 2: Ureterovaginal fistula (2023)

Severe endometriosis with bilateral endometriotic cysts buried within the ovarian fossae and dense POD adhesions complicated another TLH BSO procedure. Despite routine ureteric tracing, no intraoperative injury was recognised. The patient presented on postoperative day six with a ureterovaginal fistula and subsequently underwent successful laparoscopic

ISSN (O): 2687-5365; ISSN (P): 2753-6556

ureteric reimplantation with Boari flap reconstruction.

Case 3: Rectovaginal fistula (2024)

A rectovaginal fistula developed after difficult TLH performed for adenomyosis with severe pelvic adhesions. Conservative management resulted in complete spontaneous closure. This case has been accepted for publication separately because of its unusual clinical course.

Case 4: Intraoperative ureteric transection (2025)

During laparoscopic hysterectomy for an endometriotic cyst densely adherent within the ovarian fossa and POD, severe anatomical distortion resulted in the ureter being mistaken for the infundibulopelvic ligament. The injury was recognised immediately intraoperatively, and laparoscopic ureteric reimplantation with Boari flap reconstruction was completed during the same surgical setting without requiring conversion to laparotomy.

All patients recovered without long-term morbidity following prompt multidisciplinary management involving the urology and general surgery teams, highlighting the importance of collaborative care in managing complex laparoscopic complications.

Table 1: Age distribution of patients undergoing hysterectomy

Age group (years)	Total (N = 391)	Percentage (%)
<35	10	2.6
36-39	41	10.5
40-45	108	27.6
46-50	109	27.9
51-55	57	14.6
56-60	25	6.4
>60	36	9.2

Table 2: Primary clinical indications for hysterectomy

Indication	Total (N = 391)	Percentage (%)
Fibroid	203	51.9
Adenomyosis	39	10.0
Ovarian pathology including endometriosis	46	11.8
Pelvic organ prolapse	28	7.2
Malignancy	6	1.5
Others (AUB, CIN, Hyperplasia, polyp)	69	17.6

Table 3: Annual distribution of hysterectomy surgical routes

Year	Total hysterectomies	Laparoscopic attempted	Completed laparoscopically	Converted to laparotomy	Planned open hysterectomy	Vaginal hysterectomy	Total open rate (%)	Minimally invasive completion rate (%)
2021	44	31	30	1	5	8	13.6	96.8
2022	86	80	78	2	2	4	4.7	97.5
2023	71	65	65	0	1	5	1.4	100.0
2024	84	73	70	3	2	9	6.0	95.9
2025	106	103	103	0	1	2	0.9	100.0
Total	391	352	346	6	11	28	4.3	98.3

Table 4: Clinical indications and rationales for planned open hysterectomy

YEAR	Clinical diagnosis	Documented reason for choosing open surgery
2021	LSIL	Not documented
	Ovarian fibroma 5x5 cm	Not documented
	Ovarian malignancy	Staging laparotomy
	Multiple fibroid	20 weeks size with rectal adhesions in the pouch of Douglas (POD)
	Cervical malignancy	Staging laparotomy
2022	Subserous fibroid 10x10 cm	Not documented
	Ovarian malignancy	Staging laparotomy
2023	16 weeks size fibroid	Not documented
2024	15x15 cm broad ligament fibroid	Not documented
	Multiple myomas with adenomyosis	Extensive adhesions involving bowel, bladder, omentum, and buried adnexa
2025	AUB with incisional hernia	Concurrent hernia repair

Table 5: Clinical characteristics of conversions to laparotomy

YEAR	INDICATION	Intraoperative findings	Size	Reason for conversion	Conversion type	Histopathology
2021	Endometriosis	Obliterated POD with adherent rectum	Bulky uterus	Dense adhesions	Strategic	Benign

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2022	Fundal myoma	Dense bowel and omental adhesions with bowel injury	10x7 cm fundal myoma	Bowel injury during adhesiolysis	Reactive	Benign
	Tubo-ovarian mass	POD obliterated with rectal adhesions	Bulky uterus, TO mass 5x5 cm	Dense adhesions	Strategic	High grade ovarian carcinoma
2024	Large fibroid	Obliterated POD with limited working space	30×30 cm fibroid	Limited pelvic access	Strategic	Benign
	Uterine mass	Friable fungating bleeding mass	24 weeks uterus	Suspicion of malignancy	Strategic	High grade Endometrial Stromal Sarcoma
	Ovarian mass	Fixed ovarian mass adherent to bowel and POD	Normal uterus, 10x10 cm ovarian mass	Dense adhesions	Strategic	Benign haemorrhagic cyst

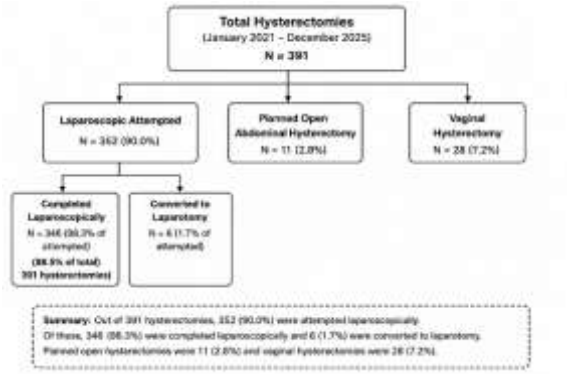

Figure 1: Flow diagram showing distribution of hysterectomy surgical routes during the study period

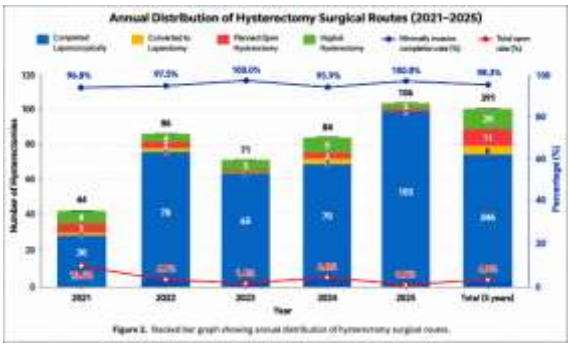

Figure 2: Stacked bar graph showing annual distribution of hysterectomy surgical routes

DISCUSSION

This five-year retrospective review demonstrates that laparoscopic hysterectomy has become the dominant surgical approach in our institution, with an overall minimally invasive completion rate of 98.3% among attempted laparoscopic procedures. The findings highlight the continuing selective role of laparotomy in complex cases despite widespread adoption of minimally invasive hysterectomy.

Fibroid uterus constituted the majority of hysterectomy indications in this series, followed by adenomyosis and ovarian pathology including endometriosis. The majority of patients belonged to the 40–50 years' age group, consistent with the recognised epidemiological profile of benign hysterectomy indications.

An earlier institutional review from our centre evaluating hysterectomies performed between 2021 and 2023 demonstrated similar trends, including the predominance of minimally invasive hysterectomy and symptomatic fibroids as the leading indication. The present study expands upon that dataset by incorporating an additional two years of surgical experience, with particular emphasis on planned laparotomy and conversion in complex laparoscopic hysterectomy.[3]

The overall laparotomy rate in this review remained low at 4.3%, including conversions from planned laparoscopic procedures. Previous studies have identified increasing uterine size, adhesions, adnexal pathology, operative complexity, and surgeon experience as important factors influencing conversion and complication rates during minimally invasive hysterectomy.[4,5]

In our institution, conversion to laparotomy was mainly required in patients with dense adhesions, limited pelvic access, inadvertent bowel injury, suspected malignancy, complete pouch of Douglas obliteration with dense rectal adhesions, or very large pelvic masses causing distorted anatomy, restricted operative visualisation, and an increased risk of visceral injury during laparoscopic dissection. These findings support the concept that laparotomy has evolved from a routine operative route into a selective safety strategy in advanced minimally invasive gynaecologic practice. Previous multicentre studies have similarly demonstrated that strategic conversion to laparotomy represents an important safety decision during complex laparoscopic hysterectomy and is associated with greater surgical experience and institutional laparoscopic volume.[6] These findings are consistent with ACOG recommendations supporting minimally invasive hysterectomy whenever feasible while recognising the continuing role of laparotomy in selected complex cases.[2]

Most conversions were strategic rather than reactive, with five of the six conversions classified as strategic and only one classified as reactive, reflecting proactive intraoperative judgment in technically unsafe conditions. Only one conversion followed intraoperative bowel injury.

The observed conversion rate of 1.7% falls within the reported range of 0% to 19% in published laparoscopic hysterectomy series, supporting the safety and feasibility of minimally invasive

ISSN (O): 2687-5365; ISSN (P): 2753-6556

hysterectomy within experienced tertiary laparoscopic units.[7,8] Previous studies have further proposed that conversion should be regarded as a marker of appropriate surgical judgment rather than operative failure.[7] A recent meta-analysis similarly identified adhesions, elevated BMI, operative complexity, and surgeon experience as important factors influencing conversion rates during laparoscopic hysterectomy.[8]

The major complications identified in this study predominantly occurred in the setting of advanced endometriosis or severe pelvic distortion. Both ureterovaginal fistulae developed in patients with complete POD obliteration and deeply buried adnexa, highlighting the recognised difficulty of identifying occult thermal or devascularisation injuries of the ureter despite tracing the ureter in such cases. The intraoperative ureteric transection further demonstrated the anatomical complexity associated with severe endometriosis. Immediate intraoperative recognition and successful laparoscopic ureteric reimplantation prevented the need for conversion to open surgery, illustrating how advanced laparoscopic reconstructive capability may reduce the need for laparotomy.

Prophylactic ureteric catheterisation during complex laparoscopic gynaecologic surgery remains controversial. While prophylactic ureteric catheter placement may improve ureteric identification in selected complex cases involving pelvic adhesions and distorted anatomy, current evidence remains insufficient to support its routine use because of inconsistent data and potential catheter-related morbidity.[9,10] Routine preoperative ureteric stenting or cystoscopic ureteric identification was not practiced in our institution. Instead, ureteric identification relied primarily on meticulous dissection and direct intraoperative visualisation, with selective conversion to laparotomy in cases of unsafe anatomy.

These findings reinforce the importance of maintaining open surgical capability within advanced laparoscopic centres, where early conversion in unsafe operative conditions should be regarded as a patient safety decision rather than surgical failure. The present study supports the evolving concept that conversion to laparotomy should be interpreted as a marker of sound surgical judgment rather than operative failure.

Limitations

This study was limited by its retrospective design, incomplete documentation in a small number of planned laparotomy cases, and the small number of conversions available for statistical analysis. However, strengths of the study include detailed operative documentation and inclusion of all hysterectomies performed in a high-volume tertiary laparoscopic gynaecology unit over a five-year period.

CONCLUSION

Laparoscopic hysterectomy was the predominant surgical route in our series, with high minimally invasive completion rates and low overall laparotomy rates. Planned laparotomy and strategic conversion remained essential in selected complex pelvic pathologies involving distorted anatomy, severe adhesions, advanced endometriosis, and suspected malignancy. In contemporary minimally invasive gynaecologic practice, laparotomy has evolved from a routine surgical route into a selective safety strategy.

Acknowledgments

None

Conflicts of Interest Statement

The authors declare that there are no conflicts of interest regarding the publication of this article.

Funding Statement

No external funding was received for this study.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556