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Overview of minimal invasive surgery in gynecological practice at Patan Hospital: a descriptive study

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Abstract

Introduction: Minimal invasive surgery (MIS) is recognized as a gold standard for treating various gynecological disorders. Laparoscopy offers well-documented advantages over trans-abdominal procedures like early recovery and shorter hospital stays. Similarly, Hysteroscopy represents another perspective of MIS, used for diagnostic and therapeutic purposes. With the advancement in technology, many of the hysteroscopic procedures are done as an office procedure enhancing patient satisfaction while facilitating definitive diagnosis. This study evaluates their clinical outcomes and temporal trends.

Method: This retrospective, cross-sectional study analyzed 273 patients who underwent laparoscopy or hysteroscopy at the Patan Hospital from October 16, 2022–October 15, 2025. Data regarding patient demographics, surgical indications, intraoperative variables, and postoperative complications were obtained from Operation Theater records and medical files. Statistical analysis was performed to calculate frequencies and evaluate temporal trends.

Result: The study included 113 laparoscopic and 160 hysteroscopic surgery. Ovarian pathology was the primary indication for laparoscopy 83(73.45%), while AUB dominated hysteroscopic cases 108(67.50%). The adoption of MIS rose significantly from 11% in 2022 to 24% by 2024. Although major organ injuries were rare with 1(0.88%) case each, the conversion rate to open surgery was 7.07%. Most laparoscopic patients, 73(64.60%) were successfully discharged within two days.

Conclusion: MIS practice at-Patan Hospital is successfully evolving, characterized by increasing case volume and a strategic shift toward more complex procedures like laparoscopic hysterectomy. Despite technical challenges and a notable learning curve reflected in conversion rates, MIS provides a safe and effective alternative to conventional open surgery.

Keywords: Laparoscopy, Hysteroscopy, Port Site Infection



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Introduction

Minimally invasive surgery (MIS) involves techniques performed through small incisions or natural orifices, using specialized instruments and advanced endoscopic or robotic systems. Primary modalities of MIS include laparoscopy, hysteroscopy, and robot-assisted surgery - now considered the gold standard for numerous gynecological disorders.¹ Its advantages over trans-abdominal procedures are well known, including decreased intraoperative blood loss, shorter hospital stays, and fewer complications.² This evolution stems from continuous improvements in instrumentation, techniques, and surgical expertise.³ Globally, MIS adoption has been substantial. Turkish data showed a 44.70% laparoscopic hysterectomy rate over 24 years (1995–2018), with similar trends emerging in Nepalese tertiary centers.^{4,5}

Advancements in technology have enhanced the benefits of MIS, including greater diagnostic accuracy, less postoperative pain, shorter hospital stays and faster recovery.⁶ Consequently, International societies now advocate laparoscopy as the preferred approach for managing benign ovarian mass balancing complication risks with fertility preservation.⁷ Similarly, Hysteroscopy represents another perspective of MIS that serves diagnostic and therapeutic purposes, with operative hysteroscopy being main stay in the management of AUB.⁸ Office hysteroscopy now enables simple lesion removal and tissue biopsy, enhancing patient satisfaction while providing definitive histological diagnosis.

At Patan Hospital, MIS is well established across several surgical specialties, with increasingly complex procedures being performed routinely. However, despite a growing number of gynecologic MIS procedures, there is limited institutional data describing their utilization, indications, and outcomes. Such information is essential for evaluating current practice patterns and guiding future service development. Therefore, this study aimed to provide a comprehensive overview of minimally invasive gynecologic surgery at our institution.

Method

This hospital-based retrospective cross-sectional study was conducted in the Department of Obstetrics and Gynecology at Patan Hospital to evaluate the practice of minimally invasive surgery (MIS) in gynecology. All patients who underwent laparoscopic or hysteroscopic procedures for any gynecologic indication between October 16, 2022, and October 15, 2025, were considered eligible for inclusion. Patients who underwent open gynecologic surgery without a minimally invasive component, procedures

performed outside the study period, duplicate records, and records with incomplete data on key study variables were excluded.

A total enumeration sampling technique was employed, whereby all eligible cases during the study period were included. After applying the inclusion and exclusion criteria, 273 minimally invasive gynecologic procedures were analyzed, comprising 113 laparoscopic and 160 hysteroscopic procedures.

Eligible cases were identified from operation theater records, and data were extracted from patient medical records using a predesigned semi-structured proforma. Information collected included demographic characteristics (age, parity, and menopausal status), comorbidities, surgical indications, type of procedure performed, operative time, estimated blood loss, conversion to open surgery, duration of hospital stay, and perioperative complications.

Data were entered and analyzed using Microsoft Excel. Categorical variables were summarized using frequencies and percentages. Trends in the frequency and types of minimally invasive gynecologic procedures over the study period were also assessed.

Ethical approval was obtained from the Institutional Review Committee of PAHS (IRC-PAHS). Patient confidentiality was maintained by anonymizing all collected data and removing personal identifiers. As this was a retrospective chart review with no direct patient contact, a waiver of informed consent was obtained from the institutional review committee.

Result

A total of 273 minimally invasive gynecological procedures were evaluated, consisting of 113 laparoscopies and 160 hysteroscopies. We found that most patients undergoing laparoscopy were in the reproductive age group, with 82 (72.56%) aged between 20 - 39 years. For hysteroscopy, the largest patient groups were aged 30–39 years, 60 (37.5%) and 40–49 years, 59 (36.88%). Most patients were premenopausal and multiparous with 100 (88.5%) and 79 (69.9%) patients in the laparoscopy group and 122 (76.25%) and 139 (86.88%) in hysteroscopy group respectively. Regarding comorbid conditions, hypertension and diabetes was infrequent in laparoscopic cases, though diabetes was noted in 21 (13.12%) of hysteroscopy patients, Table 1.

In laparoscopy, ovarian pathology was the leading indication for surgery, specifically benign ovarian cysts 32 (28.31%) and dermoid cysts 29 (25.66%). Ectopic pregnancy and infertility evaluation combined to comprise 16 (14.13%) of the surgeries. Hysteroscopic surgical procedures were most frequently indicated for AUB comprising 108 (67.48%) cases, including

Table 1. Clinical characteristics of women undergoing laparoscopic surgery (N=273)

Categories		Laparoscopy f (%)	Hysteroscopy f (%)
Age groups (year)	20 – 30	43(38.05%)	8(5.00%)
	30 – 39	39(34.51%)	60(37.50%)
	40 – 49	24(21.23%)	59(36.88%)
	≥ 50	7(6.19%)	33(20.62%)
Parity	Nulliparous	34(30.08%)	21(13.12%)
	Multiparous	79(69.9%)	139(86.88%)
Menopausal status	Premenopausal	100(88.5%)	122(76.25%)
	Postmenopausal	13(11.5%)	38(23.75%)
Comorbid Conditions	None	98(86.7%)	112(70.00%)
	Hypertension	6(5.3%)	15(9.38%)
	Diabetes	4(3.5%)	21(13.12%)
	Thyroid dysfunction	2(1.8%)	9(5.62%)
	Others (heart disease/Asthma)	3(2.7%)	3(1.88%)

Table 2. Indications for laparoscopy and hysteroscopic surgery (N=273)

Laparoscopy (N – 113)			Hysteroscopy (N – 160)		
Indications		f (%)	Indications		f (%)
AUB	AUB - P	1(0.88%)	Asymptomatic	Thickened endometrium	4(2.5%)
	AUB - A	1(0.88%)		Endometrial polyp	10(6.25%)
	AUB - L	10(8.84%)			
Ovarian	Dermoid	29(25.66%)	AUB	PMB	19(11.87%)
	Chocolate cyst	8(7.07%)		AUB - P	30(18.75%)
	Ovarian cyst	32(28.31%)		AUB	51(31.87%)
	Paratubal	4(3.53%)		AUB - A	5(3.12%)
	Complex	9(7.94%)		AUB - M	3(1.87%)
	Fibroma	1(0.88%)			
Ectopic Pregnancy	Ruptured	4(3.53%)	Amenorrhea	Primary	1(0.62%)
	Non - Ruptured	4(3.53%)		Secondary	1(0.62%)
Hydrosalpinx		2(1.76%)	Cancer	Endometrial	1(0.62%)
				Cervical	1(0.62%)
Infertility Evaluation			Primary subfertility		
			7(4.37%)		
			Septate uterus		
			1(0.62%)		
			Missing Cu - T		
			22(13.75%)		

symptoms related to thickened endometrium and endometrial polyps. Additionally, the removal of a missing Copper-T(Cu-T) accounted for 22 (13.75%) of all hysteroscopic procedures, Table 2.

We found that laparoscopic cystectomy was the most common type of laparoscopic procedure 46 (40.70%), followed by laparoscopic oophorectomy 24 (21.23%) and total laparoscopic hysterectomy 13 (11.50%). Diagnostic procedures made up the vast majority 138 (86.25%) of hysteroscopies, Table 3.

Table 3. Types of minimal invasive gynecological procedures (N=273)

Procedure	f (%)
Laparoscopy	
Diagnostic Laparoscopy	9(7.00%)
Laparoscopic Cystectomy	46(40.70%)
TLH ± BSO	13(11.50%)
Laparoscopic Oophorectomy	24(21.23%)
Laparoscopic Salpingectomy	10(8.84%)
Laparoscopy converted to Open	11(9.73%)
Hysteroscopy	
Diagnostic Hysteroscopy	138(86.25%)
Hysteroscopic Cu – T removal	22(13.75%)

Table 4. Course of laparoscopic surgery (N= 113)

Characteristics	Course	f (%)
Operative Time	< 30 min	8(7.07%)
	30 – 60 min	21(18.58%)
	60 – 90 min	23(20.35%)
	90 – 120 min	36(31.85%)
	>120 min	25(22.12%)
Estimated Blood loss	< 100	94(83.18%)
	100 - 200	7(6.19%)
	> 200	12(10.61%)
Conversion to open method	Dense Adhesions	5(4.40%)
	Excessive Bleeding	3(2.60%)
	Equipment Malfunction	2(1.76%)
	Surgical difficulty	1(0.88%)
Hospital Stay	≤ 2 days	73(64.60%)
	3 – 4 days	30(26.54%)
	≥ 5 days	10(8.84%)
Complications	Ureteric Injury	1(0.88%)
	Bowel Injury	1(0.88%)
	Bladder Injury	1(0.88%)
	Blood Transfusion	5(4.40%)
	Fever	6(5.30%)
	Abdominal Distention	10(8.84%)
	Port Site Infection	16(14.15%)

Table 5. Trend of gynecological laparoscopic surgery (N=273)

Year	Laparoscopy						Hysteroscopy	Percentage of Total Gynecology Surgery (%)
	Cystectomy	Salpingo - oophorectomy	Salpingectomy (U/L + B/L)	Hysterectomy	Diagnostic	Others		
2022	9(50.00%)	2(11.11%)	2(11.11%)	1(5.55%)	3(16.67%)	1(5.55%)	21	11%
2023	17(50.00%)	7(20.58%)	4 (11.76%)	3(8.82%)	3(8.82%)	0(0.00%)	40	19%
2024	17(36.95%)	12(26.08%)	4 (8.69%)	4(8.69%)	2(4.34%)	7(15.21%)	62	24%
2025 (till Oct 15)	3(20.00%)	3(20%)	2(13.33%)	5(33.33%)	1(6.67%)	1(6.67%)	37	18%
Total	46	24	12	13	9	9	160	

For laparoscopic procedures, most frequent operative time was between 90 and 120 minutes including 36 (31.85%) cases, and estimated blood loss was kept under 100 mL for 94 (83.18%) patients. While the majority of laparoscopic patients, 73 (64.60%) were discharged within two days, 11 (9.64%) cases required conversion to an open method, primarily due to dense adhesions or excessive bleeding. Complications remained relatively low throughout the study period. For hysteroscopy, no major complications such as perforation or fluid overload were recorded. In the laparoscopy group, injuries to adjacent organs were rare, with only 1 (0.88%) case each involving the ureter, bowel, and bladder. Other recorded postoperative issues included surgical site infections 16 (14.15%), abdominal distension 10 (8.84%), and fever 6 (5.33%), with 5 (4.40%) patients requiring a blood transfusion, Table 4.

The temporal trends of these procedures showed a steady growth in the adoption of minimally invasive techniques at Patan Hospital, with the percentage of MIS relative to total gynecological surgeries rising from 11% in 2022, 19 % in 2023 and 24% by 2024. While cystectomy was the most frequent laparoscopic procedure from 2022 through 2024, data from 2025 indicated a shift toward hysterectomy as the most common laparoscopic surgery type. Hysteroscopic procedures also showed a gradual increase over the period: 21 cases in 2022, 40 in 2023, and 62 in 2024, followed by 37 till October 15, 2025.

Discussion

The findings of this study highlight the growing role of minimally invasive surgery (MIS) within the gynecological practice at Patan Hospital, reflecting a global shift toward less invasive surgical modalities. Over the three-year study period, the proportion of MIS relative to total gynecological surgeries increased significantly from 11% in 2022 to 24% by 2024. This trend is consistent with local and global observations where laparoscopy and hysteroscopy are increasingly utilized in various benign conditions.⁹ While the adoption of MIS in the Department of Gynecology was previously noted to be comparatively limited,

the data confirms that the number of cases is now steadily increasing.

The surgical procedures at our center followed the established standard protocols.¹⁰ The majority of laparoscopic patients in the study were in age group of 20–39 years (72.56 %), and most were multiparous (69.91%) and premenopausal (88.52%), which is comparable to the study by S Devishi et al. in Pakistan.¹¹ This demographic profile suggests that MIS is being effectively utilized in a population where early recovery and a quick return to daily activities are of high priority. Ovarian pathology, specifically dermoid and benign cysts, was the most common indication for laparoscopy, accounting for over 50% of cases. Similar pattern of high cystectomy rate was also noted in a retrospective study conducted at Nepal Police hospital published in 2024.¹² This aligns with international recommendations that advocate for laparoscopic approaches to benign ovarian masses to minimize complications while preserving fertility.⁷ In contrast to the descriptive study conducted at MIDAT hospital published in 2018., where laparoscopic hysterectomy was the most common operation (36%), our study showed a lower frequency of 11.50%.¹³ This difference likely stems from our patient demographic, which was predominantly in the reproductive age group (20 - 39 years) and required fertility-preserving surgeries rather than hysterectomy. Additionally, during the early implementation phase, there was a strategic tendency to select lesser complex cases.

The laparoscopic outcomes in the study were generally favorable, reinforcing the well-documented advantages of MIS, such as reduced intraoperative hemorrhage and expedited recovery. In this study, 83.18% of cases were completed with an estimated blood loss of less than 100 mL, and 64.61% of patients were discharged within two days. These figures confirm that the transition to MIS is successfully reducing the burden of prolonged hospitalization. Despite these benefits, significant hemorrhage remains a concern in complex cases; 10.61% of procedures involved blood loss exceeding 200 mL, with 4.41% requiring blood transfusion. These results correlate closely with finding of a retrospective and descriptive study conducted in

Police General Hospital in Thailand published in 2012, who reported an average blood loss of 184 mL and a 3.51% transfusion rate.¹⁴ The operative duration most frequently ranged between 90 and 120 minutes, though a significant portion of cases exceed more than two hours. This may be partially attributed to the routine use of the open-entry (Hasson) technique as literature suggests gas leakage rates can reach 15% with this method compared to 9.51% with the Veress needle technique.¹⁵ Technical challenges related to gas leakage make surgery difficult by obscuring the surgical field, requiring frequent manipulations. Additionally, a substantial portion of operative time was consumed by specimen retrieval. While the core surgical objectives (e.g., cyst excision or hysterectomy) were often achieved early, the subsequent extraction of tissue through small ports or the vaginal vault required significant technical effort, particularly in cases involving fibroid uterus or large dermoid cysts.

MIS is generally associated with lesser complications. Similar to other study, major intraoperative complications involving adjacent organs (ureter, bowel, and bladder) occurred in only 0.88% of cases each.¹⁴ However, the conversion rate to open surgery was 7.07%, which is higher than a case-control study conducted in Australia (0.71%) and a retrospective cross sectional study conducted in Nepal (2.46%).^{12,16} Factors contributing to the higher conversion rate included unexpected surgical findings, dense adhesions (4.41%), and excessive bleeding (2.60%), as well as equipment malfunction (1.76%). While these figures suggest a steeper learning curve or higher case complexity at our center, the decision to convert remains a vital safety maneuver to prevent major intraoperative morbidity. Regarding postoperative complications, there were cases of postoperative fever, abdominal distention and port site infection without prolonging hospital stay. Of these complications, it is noteworthy to mention the incidence of port site infections, which was 14.15% which is much higher than other similar studies.¹² Although several factors contribute to surgical site infections, the approach to primary port opening is critically important. One of the systemic review and meta-analysis published in 2024 noted a significant association (RR = 3.17; 95% CI, 1.27–7.88; $p=0.01$) between the open-entry (Hasson) approach and a higher frequency of port-site wound infections compared to the closed method. Furthermore, the analysis showed no discernible heterogeneity ($p=0.44$, $I^2=0\%$), strengthening the association between the entry technique and wound outcomes.¹⁷ These findings suggest that the open approach, which was frequently utilized in our series, may have inadvertently contributed to the increased infection rate.

Hysteroscopy is a minimally invasive technique which

allows for direct visualization of the endometrial cavity, facilitating both diagnosis and immediate surgical intervention within a single session. High volume of hysteroscopy was performed during the study period which is significantly higher than similar other study.¹⁸ The demographic analysis of women undergoing hysteroscopy revealed a mean age of 42.6 years, with the clinical profile dominated by premenopausal (76.25%) and multiparous (86.88%) women indicating that the majority of hysteroscopic interventions were performed on women of reproductive age which corroborated well with the findings of a study conducted at Patan Academy of Health Sciences published in 2020.¹⁹ The procedure was predominantly performed for the evaluation of all forms of AUB which accounted for 67.5% as it remains the gold standard indication for this modality. Apart from this, other indications for hysteroscopy were in the evaluation of Thickened endometrium, Endometrial polyp, Amenorrhea, Primary subfertility and Septate uterus. The scope of the hysteroscopic procedure was primarily diagnostic, as the available hysteroscopic set was insufficient for operative intervention. Also, Hysteroscopy is a proven invaluable tool for the management of missing Cu-T cases, providing the direct visualization necessary to identify and retrieve devices that were either embedded or lacked visible strings. The 14% prevalence of hysteroscopic Cu-T removal observed in this study aligns with its role as a key intervention for missing devices, though some specialized centers report this figure reaching as high as 61%, reflecting the essential role of hysteroscopy in managing lost intrauterine device complications.²⁰ The absence of major hysteroscopic complications, such as uterine perforation or fluid overload, underscores the safety and diagnostic accuracy of this procedure at our center.

Despite these challenges, the temporal shift from cystectomy toward more complex procedures like total laparoscopic hysterectomy and surgeries for endometriosis by 2025 indicates growing surgical expertise and technical capacity within the department. The effectiveness of these procedures at our center is likely due to improvements in surgical methods and the growing expertise of the surgical team.

Conclusion

This study demonstrates the practice of MIS at Patan Hospital as a safe and effective alternative to open surgery, offering minimal blood loss and shortened hospital stays. While laparoscopic cystectomy and oophorectomy were most frequent, the rising trend in technically demanding procedures like total laparoscopic hysterectomy reflects a maturing institutional learning curve. However, higher-than-

expected port-site infections and conversions to laparotomy highlight technical challenges requiring refined protocols, including selective closed-entry techniques and enhanced infection control. As surgical proficiency and infrastructure improve, MIS is poised to become the mainstay of gynecological care.

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Conflict of Interest

None

Funding

None

Author Contribution

Concept, design, planning: PS; Literature review: PS; Data collection/analysis: PS, RS, BS, JC, AY, SA; Draft manuscript: PS, RS, BS, JC, AY, SA; Revision of draft: PS Final manuscript: PS; Accountability of the work: PS, RS, BS, JC, AY, SA.

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