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Original Research Article

A cross-sectional study to determine the challenges in minimally invasive gynaecological surgeries

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ABSTRACT

Background: Minimally invasive gynaecological surgery is widely practiced, yet it is associated with specific surgical and non-surgical challenges. This cross-sectional study aimed to assess the challenges and complications encountered during minimally invasive gynaecological surgeries at a tertiary healthcare centre.
Methods: A cross-sectional study was conducted from May 2022 to April 2023 at a tertiary care centre. All women undergoing laparoscopic gynaecological surgeries were included, excluding laparoscopic tubectomy and malignancy cases. Data were obtained from medical records and included age, parity, indication for surgery, intraoperative difficulties, duration of surgery, and postoperative outcomes.
Results: Most patients were aged 21-40 years (57.5%), belonged to the middle socioeconomic class (70%), and were multiparous (para 2-3). Common indications included abnormal uterine bleeding (38.8%), uterine fibroids (26.3%), and ovarian cysts/endometrioma (25%). Total laparoscopic hysterectomy was the most frequently performed procedure (33.8%), followed by diagnostic hysterolaparoscopy (18.8%). The overall complication rate was 31.25%, with major complications in 11.25% and minor complications in 20% of cases. Intraoperative bleeding requiring blood transfusion occurred in 6.25% cases, organ injuries in 3.75%, and conversion to laparotomy in 5%. Technical difficulties such as equipment issues or staff unavailability were noted in 12.25% cases. Postoperative complications included fever (10%), ureteric injury (2.5%), urinary tract infection (3.75%), stress urinary incontinence (2.5%), and vaginal cuff dehiscence (1.25%). Most surgeries lasted 121-180 minutes (45%).
Conclusions: Minimally invasive gynaecological surgeries are generally safe but not without risk. Higher complication rates may be related to procedural complexity and surgeon experience. Individualized patient assessment, surgical expertise, and adequate resources are essential to reduce complications.

Keywords: Minimally invasive surgery, Intraoperative complications, Postoperative complications, Non-surgical complications, Procedural complexity and surgeons experience

INTRODUCTION

Laparoscopic surgery, known as minimally invasive surgery (MIS) or keyhole surgery, is a contemporary surgical method where procedures are conducted at a distance from their actual location through small incisions typically ranging from 0.5 to 1.5 cm.[1] The advantages of modern laparoscopy include reduced blood loss, diminished postoperative discomfort, lower incidence of wound complications, minimized risk of adhesion development, shorter hospital stays, quicker resumption of daily activities, favourable aesthetic outcomes, and decreased treatment expenses compared to traditional open abdominal surgeries.[2]

In recent years, less invasive procedures have become preferred over traditional open surgeries in various medical settings. Research indicates that laparoscopy

presents numerous benefits compared to open surgery, including decreased blood loss during the operation, lower levels of postoperative pain, shorter hospital stays, and quicker recovery periods.[3]

Depending on the definitions and classifications utilized, adverse events (AEs) are linked to approximately 0.2-18% of conventional and 3-15% of robotic-assisted gynaecological laparoscopies, whether intra- or postoperative.[4] Fatalities stemming from laparoscopic procedures occur in about 0.02% (ranging from 0.01% to 0.03%) of cases, primarily attributed to injuries of major retroperitoneal vessels and occasionally bowel injuries.[5] In comparison to open surgery, laparoscopy for non-malignant conditions shows similar rates of severe complications (1.4%), but notably lower occurrences of "minor" complications (15.2% vs. 4.3-8.9%).[6]

The rise in endoscopic procedures has led to a notable increase in various complications affecting different bodily systems. A significant portion of these complications, around half, occurs during the initial entry phase. Complications related to the entry technique arise in about 0.3-1% of all laparoscopic procedures, with a mortality rate estimated at roughly 3.33 per 100,000 cases.[7]

During this phase, various types of injuries, such as vascular, urinary, and gastrointestinal, may be detected, with the remaining occurring either during or after surgery. Complications are commonly categorized as occurring at the entry stage, during the operation, or after the operation. The combined rate of major injuries upon initial presentation is noted as 1.1 per 1000.[8]

METHODS

The observational study was conducted at the Obstetrics and Gynaecology department of MTH Hospital and Mahatma Gandhi Medical College, Indore, over a 12-month period started from May 2022 to April 2023 following institutional approval. The sample size was calculated to be 80, based on a 95% confidence level and a margin of error of 7.5%. The study included all patients who underwent laparoscopic gynaecological surgery. The study assessed challenges faced before, during and after the minimally invasive gynaecological surgeries. Exclusion criteria were patients with malignancy, patients with severe comorbidities, patients who are not giving consent.

Study design

It was a cross-sectional observational study.

Study procedure

Laparoscopies were performed by experienced consultants. All patients received perioperative antibiotic prophylaxis with injection ceftriaxone single shot, 1 gm intravenously. Indwelling urinary catheter until mobilization on the first postoperative morning. For perioperative thromboembolism prophylaxis, low molecular weight heparin given in selective patients. (enoxaparin sodium 40 mg). Laparoscopy was performed in lithotomy position using the four port technique, specifics of the techniques used for different interventions. Every intraoperative complication was managed accordingly. After surgery, all patients were shifted to postoperative ward for 4-6 hours. Vitals monitoring done, then shifted to gynaecology ward. Blood count was sent on the first postoperative day. Before discharge from hospital Ultrasound scan of whole abdomen and pelvis was done. Most of the patients were routinely discharged on postoperative day 3.

RESULTS

Figure 1 shows the distribution of patients according to age and Table 1 shows the distribution of patients according to duration of surgery.

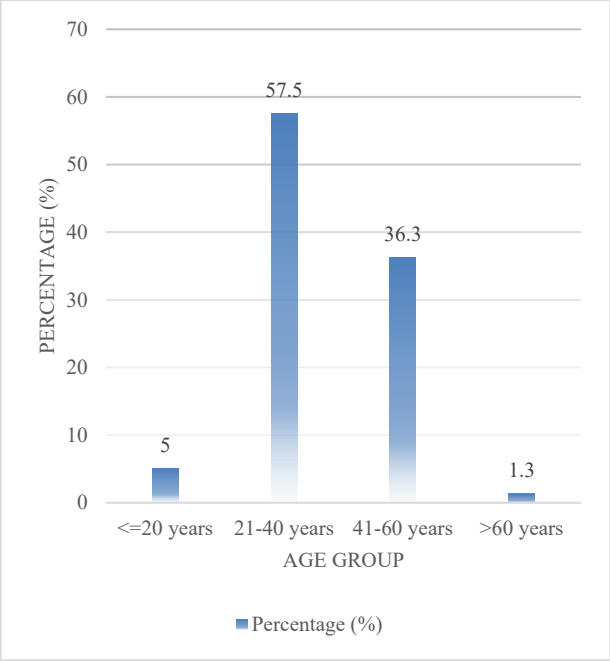

Figure 1: Distribution according to age.

Table 1: Distribution of patients according to duration of surgery (n=80).

Duration of surgery (in minutes)	Number	Percentage
≤60	12	15
61-120	18	22.5
121-180	36	45
>180	14	17.5
Total	80	100

In 12 (15%) patients, the duration of surgery was ≤60 minutes; in 18 (22.5%) patients, it was between 61-120

minutes; in 36 (45%) patients, It was between 121-180 minutes; and in 14 (17.5%) patients, it was more than 180 minutes.

Table 2: Preoperative non-technical complications (n=80).

Preoperative non - technical complications	Number	Percentage
Linen nonavailability	06	7.5
Delayed PAC fitness	05	6.25
OT/nursing staff non-available	02	2.5
Total	80	100

Table 3: Intraoperative technical complications (n=80).

Intraoperative technical complications	Number	Percentage
Appropriate size instrument not available	2	2.5
Total	80	100

Table 4: Intraoperative surgical complications (n=80).

Intraoperative surgical complications	Number	Percentage
Bleeding required blood transfusion	5	6.25
Bladder injury followed by laparotomy followed by bladder repair	1	1.25
Conversion to laparotomy	4	5
Repair of rectum followed by colostomy	1	1.25
Stomach injury (managed conservatively)	1	1.25
Anaesthesia related complications	3	3.75

Table 2 shows the distribution according to preoperative non-technical complications.

Table 3 shows the distribution according to intraoperative technical complications.

No intraoperative technical complications were seen in 78 (97.5%) patients.

Table 5 shows immediate postoperative surgical complications.

Table 5: Distribution according to immediate postoperative surgical complications (n=80).

Immediate (within 72 hr) postoperative surgical complications	Number	Percentage
Injury to ureter requiring DJ stenting done postoperative	2	2.5
Fever	8	10
Postoperative chest pain and bradycardia	2	2.5

Table 6: Distribution according to late postoperative surgical complications (n=80).

Late postoperative surgical complications	Number	Percentage
UTI	3	3.75
Vaginitis	2	2.5
Stress urinary incontinence	2	2.5
Post op abdominal pain	2	2.5
Vaginal cuff dehiscence	1	1.25
Readmission	2	2.5
Vesicovaginal fistula	1	1.25

Table 7: Distribution according to procedures performed (n=80).

Procedures	Number	Percentage
Total laparoscopic hysterectomy	27	33.8
DHL	15	18.8
Ovarian/paraovarian cystectomy	9	11.3
Diagnostic/therapeutic hysteroscopy	9	11.3
Myomectomy	6	7.5
Salpingectomy	4	5.0
Salpingoopherectomy	4	5.0
LAVH	2	2.5
Right sided non-communicating uterine horn excision	1	1.3
Adenomyomectomy	1	1.3
Laparoscopic recanalization	1	1.3

Table 6 shows the distribution according to late postoperative surgical complications.

Table 7 shows the distribution according to procedures performed.

Total laparoscopic hysterectomy and DHL were the most commonly performed procedures in our study.

Table 8: Distribution according to diagnosis (n=80).

Diagnosis	Number	Percentage
Abnormal uterine bleeding	31	38.8
Uterine fibroid	21	26.3
Ovarian cyst and endometrioma	20	25.0
Adenomyosis	11	13.8
Infertility	11	13.8
Endometrial polyp	9	11.3
Ectopic pregnancy	2	2.5
Uterine prolapse	2	2.5
Vaginal septum	1	1.3
Septate uterus	1	1.3
Hydrosalpinx/pyosalpinx	1	1.3
Recanalization	1	1.3

Table 9: Distribution of complications according to complexity of procedure (n=80).

Major procedure	Major complications	Minor complications	Non-technical problems
TLH	Bleeding-01 VVF-01 ureteric injury -02 bladder injury-01	Vaginal cuff dehiscence -01 Fever -02 UTI-02 Vaginitis -02 SUI-01 Anaesthesia related complications -03	Linen non-availability -03 OT staff shortage -01
LAVH	Bleeding-01 (conversion to laparotomy)	UTI-01	Linen non-availability -01
Myomectomy	00	Fever -01	Delayed PAC fitness-01
Right non-communicating horn excision	Bleeding -01		
DHL	Rectum injury-01 Stomach injury-01		Linen unavailability -01/ Instrument-NA-01
Cystectomy		Post operative pain-01	
Salpingectomy/salpingoopherectomy		Anaesthesia related complications-01 Fever-01	Linen unavailability -01
Hysteroscopic polypectomy			Instrument-NA-01

Table 8 shows the distribution according to diagnosis.

The most common diagnoses were abnormal uterine bleeding, uterine fibroid and ovarian cyst and endometrioma.

Table 9 shows complications according to complexity of the procedure.

DISCUSSION

The evolution of laparoscopy from a diagnostic tool to a modality for major surgical procedures has been rapid and represents one of the most important surgical advancements in the past 30 years. Laparoscopic gynaecologic surgery is associated with a low frequency of complications but is a procedure that is not without risk.

Although the incidence of complications decreases as surgeons gain experience with laparoscopy.[9] The growing difficulty of some procedures in gynaecologic surgery may increase the frequency of severe complications (visceral and great vessel injuries).[10]

The present study was planned with an objective to analyze the various challenges in the preoperative/Intraoperative

and post operative stages in laparoscopic gynaecological surgeries over one year.

In our study majority of patients 46 (57.5%) were in 21-40 age group followed by 29 (36.3%) patients in 41-60 years age group. The mean age of the patients was 36.49±9.49 years.[11-14]

For parity, majority of patients in our study were multiparous, para 2 and para 3 with 22 (27.5%) patients each whereas 19 (23.8%) patients were nulliparous and only 9 (11.3%) were primiparous.[15] The results of our study suggests that laparoscopic procedures can be done with same results all parity women. For socioeconomic status, majority of patients 56 (70%) belonged to middle [upper middle+lower middle] socioeconomic status. In the present study the most common diagnoses were abnormal uterine bleeding 31 (38.8%), followed by uterine fibroid 21 (26.3%) followed by ovarian cyst and endometrioma 20 (25%). Other diagnosis was adenomyosis 11 (13.8%), infertility 11 (13.8%), polyp 9 (11.3%), ectopic pregnancy 2 (2.5%), prolapse 2 (2.5%), vaginal septum 1 (1.3%), septate uterus 1 (1.3%), hydrosalpinx and hydrocolpos 1 (1.3%) and recanalization 1 (1.3%). Commonest indication was dysfunctional uterine bleeding followed by fibroid, PID, adenomyosis and chronic cervicitis.[16] This was in concurrence with our study.

In our study, complex surgery procedure like, total laparoscopic hysterectomy 27 (33.8%) was the most common procedure followed by simple surgery like, diagnostic hysterolaparoscopy (DHL) in 15 (18.8%) patients. Other procedures were ovarian/paraovarian cystectomy in 9 (11.3%), diagnostic/therapeutic hysteroscopy in 9 (11.3%), myomectomy in 6 (7.5%), salpingectomy in 4 (5%), salpingo-oophorectomy in 4 (5%), LAVH in 2 (2.5%), right sided non-communicating uterine horn excision in 1 (1.3%), adenomyomectomy in 1 (1.3%) and laparoscopic recanalization in 1 (1.3%).[16] The results of our study were in contrast to study done by Fuentes et al and Chaparon et al who reported moderate surgery as the most commonly performed laparoscopic procedure, i.e., 54.20% including unilateral adnexectomy (10.3%), bilateral adnexectomy (5.2%), salpingectomy (10.2%), cystectomy (26.1%), tubalplasty (0.2%), adhesiolysis (1.4%), ovarian drilling (0.2%) and iud removal (0.5%) followed by simple surgery (37.2%) with tubal ligation (30.7%), diagnostic laparoscopy (5.4%), laparoscopy and biopsy (0.6%) and coagulation 14 (0.5%). Complex laparoscopic procedures were least commonly (8.6%) performed with subtotal hysterectomy (1.3%), total hysterectomy (3.6%), LAVH (2.4%) and myomectomy (1.3%).

In the present study, the duration of surgery was 121-180 minutes in maximum number of patients 36 (45%) followed by 18 (22.5%) patients with duration as 61-120 minutes and 14 (17.5%) patients, it was more than 180 minutes. This can be justified as most common procedure performed in our study was complex surgery procedure like total laparoscopic hysterectomy.

Surgical complications can arise intra-operatively, early post-operatively or late. Further, they are categorized into major and minor complications. The former group of intraoperative complications included injury to the hollow organs of the viscera (intestine, bladder, or ureter) and bleeding or infection during laparoscopy or the postoperative period requiring additional intervention by laparoscopy or laparotomy. Deaths and severe medical pathologies that occurred during the postoperative period were also considered major complications. Minor complications were recorded when any of the following occurred: anaemia, mild bleeding or infection, fever, abdominal wall hematoma, urinary tract infection, postoperative urinary retention, and ileal paralysis.

In the present study we further categorized the complications into technical and non-technical complications to rule out and demarcate the stage of intervention from where the complication has aroused.

The total incidence of complication was 31.25%, i.e., 25/80. Major complications were seen in 11.25% patients whereas minor complications were observed in 20%. For technical and other complications an incidence of 12.25% was observed.

The frequency of major and minor complications according to our data was higher than as reported in previous anecdotal literature, i.e., between 0.2% to 3%. Fuentes et al. reported the frequency of major and minor complications as 1.93% with bleeding as the most frequent complication, with only 1 due to a major vessel injury. A total of 4.29% minor complications were reported. Aiwen et al reported an overall low incidence of major complications and minor complications in this study i.e., 0.51% (78/15,308) and 4.64% (711/15,308) respectively. reported overall 1.24% complications. There were 0.67% bladder injuries, 0.22% major vessels injury, 0.11% bowel injuries, 0.11%.

In our study, preoperatively, for non-technical complications majority of patients 67 (83.75%) reported none while 26.25% reported same. Challenges faced included unavailability of linen, potentially impacting sterility in 6 (7.5%) of cases; 5 (6.25%) of patients, a necessity for red cell concentrate (RCC), abnormal investigation reports, delay in reporting causes delayed PAC fitness; unavailability of operating theatre (OT) staff, and nursing staff on strike, each presenting unique hurdles in the preoperative phase.

Intraoperatively, majority of patients 78 (97.5%) reported no intraoperative technical complications. However, in 1 patient, the surgery was converted to laparotomy from Laparoscopic recanalization due to unavailability of small size instruments and in another patient, difficulty faced

during hysteroscopy because of unavailability of small hysteroscope in a case of DHL.

Similarly, for intraoperative surgical complications; majority of patients 65 (80%) reported no complications. However, 6.25% patients reported intraoperative bleeding requiring blood transfusion, 3.75% had injury to internal organs (stomach-1.25%, rectum-1.25%, bladder-1.25%) 5% were converted to laparotomy [1 laparotomy done because of technical issue,2 laparotomies for organ repair and 2 for bleeding], only 3.75% anaesthesia related complications seen. In a study done by Harkki-Siren et al 0.1% vascular injuries were seen. In a study done by Song et al major intraoperative complications occurred in 2.2% with bladder injury in 1.29%, bowel injury in 0.45% and ureteral injury in 0.05%.[19] In a study done by Jansen laparotomy rate was 3.3%, in 90% cases reason was bleeding and injury to organs as seen in our study. In a study done by Patel et al major intraoperative complications were reported in only 2.85% cases with maximum number of complications being hemorrhage 33.33% (4) followed by 16.67% (2) had bowel injuries, 25% (3) had urological injuries and 25% (3) anesthesia complications. In study done by Kumakiri et al 0.006% conversion occur due to technical issues, 0.13% urinary system injuries seen and 3.2% bowel injuries seen.[20]

None of the patients reported any postoperative technical complications. However, for postoperative surgical complications, 15% reported immediate postoperative complications like fever 8 (10%) ureteric injury 2 (2.5%), post op chest pain and bradycardia and 16.25% reported delayed complications like UTI 3 (3.75%), vaginitis 2 (2.5%), stress urinary incontinence 2 (2.5%), post op abdominal pain 2 (2.5%), vaginal cuff dehiscence 1 (1.25%), readmission 2 (2.5%) and vesicovaginal fistula 1 (1.25%).

Complications are closely related to the level of difficulty of the operation: complex procedures had an 8-fold higher risk of serious complications and a 7-fold higher risk of minor complications compared with technically simple procedures. The likelihood of conversion and failed laparoscopy was also related to the level of technical difficulty.

Among the laparoscopies done in this study, the surgery was converted to laparotomy from Laparoscopic recanalization due to unavailability of small size instruments and in another patient, difficulty faced during hysteroscopy because of unavailability small hysteroscope in a case of DHL. The risk of conversion to laparotomy increases with the level of difficulty of surgery and can be up to 45-fold higher for complex procedures than for simple procedures. A likely explanation is that the higher frequency of complications during complex operations obliges surgeons to reconvert to laparotomy more often to manage these events. In previous studies conversion done mostly because of haemorrhage (Chaparon et al and Pierre). It is important for major complications to be diagnosed promptly during laparoscopy so that corrective measures can be taken intraoperatively.

Laparoscopic surgery was a safe procedure in the cases we analyzed at our centre, but it is not without risks of serious complications, of which the surgeon should be aware. In light of the findings, each patient should be evaluated individually, and surgeons should adapt the procedure and their technical skills to the circumstances particular to each patient.

CONCLUSION

Laparoscopic surgery is widely accepted as effective method for treating gynaecological pathologies due to its better benefits such as better recovery, shorter hospital stays, less postoperative pain and lower blood loss. However in our study we conclude that there are many challenges faced including technical, non-technical and surgical issues at our centre .As newly growing laparoscopic institute the surgeons are getting trained every day in our institute there is a definite learning curve involved in the process of laparoscopic surgical training, our institute is getting evolved day by day .Hopefully in the future, our institute will evolve appropriately and the surgical skills will be at par with the existing world norms.

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