

Outcome of Laparoscopic Ventral Hernia Repair in a Tertiary Centre: A Descriptive Cross-Sectional Study

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ABSTRACT

Introduction: Laparoscopic ventral hernia repair (LVHR) is commonly performed at various centers as preferred method for ventral hernia repair. LVHR provides symptom relief and/or hernia resolution while minimizing recurrence rates. This study aimed to evaluate outcomes of LVHR in a tertiary center.

Methods: This observational study was conducted in Department of Surgery at Manipal Teaching Hospital, Pokhara, Nepal, from April 1, 2022, to February 28, 2025, following approval from Institutional Review Board (MCOMS/IRC/503/GA). A total of 138 patients were included in study. All laparoscopic hernia repairs (IPOM, IPOM PLUS, SCOLA, TRAM) were performed using three reusable access ports. Patients were discharged on third postoperative day and followed up at one, three, and six months to assess immediate and late complications. Convenience sampling was employed, and data analysis was conducted using SPSS (version 21.0), with a significance level set at $p < 0.05$.

Results: The average age of participants was 51.23 ± 14.81 years, consisting of 75 males (54.3%) and 63 females (45.7%). The median surgical duration was 60 minutes (IQR: 50-85 minutes). Among 138 patients with ventral hernia, 66.7% (92 patients) had primary hernias, 33.3% (46 patients) had incisional hernias. The surgical technique most commonly employed was IPOM plus, performed in 131 instances (94.9%). A total of 11 patients (7.97%) encountered complications, with seroma being most common at 4 occurrences (2.9%), followed by surgical site infection in 2 instances (1.4%). Iatrogenic bowel perforation occurred in 1 case (0.7%), ileus in 1 case (0.7%), recurrence in 1 case (0.7%), mesh infection in 1 case (0.7%), and left iliac fossa ecchymosis in 1 case (0.7%). There was no statistically significant difference in complication rates between primary and incisional hernias ($p=0.18$).

Conclusions: LVHR represents a safe and effective surgical approach for ventral hernia repair, exhibiting minimal complication rates, which aligns with findings from similar studies.

Key words: *Hernia; laparoscopic; outcome.*



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INTRODUCTION

Ventral hernias of abdomen are non-inguinal, non-hiatal defects in abdominal wall fascia, resulting in the protrusion of organs or tissues from anterior abdominal wall. This can occur spontaneously as a primary ventral hernia or due to a previous surgical incision as an incisional hernia. Laparoscopic ventral hernia repair (LVHR) is frequently performed as preferred method due to its minimally invasive nature. Both primary and incisional hernias significantly affect patients' quality of life.[1]

LVHR alleviates symptoms and cures hernia while minimizing recurrence. Despite its rising popularity, there remains considerable debate regarding best approach to ventral hernia repair.[2] A key advantage of laparoscopic repair is placement of mesh without extensive subcutaneous dissection, resulting in smaller wounds, shorter hospital stays, fewer complications, reduced pain, and quicker recovery. However, LVHR is more expensive due to cost of mesh, laparoscopic tools, and general anesthesia, though reduced hospital stay can make it cost-effective.

We aimed to evaluate the success and complication rates of LVHR, both immediate and delayed in a tertiary center.

METHODS

This observational study was conducted in the Department of Surgery of Manipal Teaching Hospital, Pokhara, Nepal from 01 April 2022 to 28 February 2025 after approval from Institutional review board (Reference ID: MCOMS/IRC/503/GA). The written and informed consent was taken from all the participants. Pre-operative diagnosis primary or recurrent ventral hernia was confirmed with clinical and ultrasound scan in all cases. All consenting patients who underwent elective laparoscopic ventral hernia repair, during the study period were enrolled in the study. A total of

138 patients participated in the study. Convenience sampling technique was used. Patient's whose operations were converted to open procedures, patients who had, obstructed or strangulated ventral hernia were excluded from the study.

All the patients received prophylactic antibiotic with injection ceftriaxone 1gm at the induction of anesthesia. All of the laparoscopic repairs of hernia (IPOM, IPOM PLUS, SCOLA, TRAM) was done with three reusable access ports. Pneumoperitoneum was created via closed technique using veress needle from the palmer's point for epigastric and umbilical hernia. However, umbilical port was made for spigelian, upper and lower abdominal primary and incisional hernia. A 30-degree laparoscope was inserted and rest two ipsilateral/ contralateral 5mm working port were inserted under the visual guidance. After diagnostic survey we inspected the types, site, size, number of defects of hernia and the types of repairs was planned. The hernial content if present was reduced, adhesiolysis (if required) was performed. Haemostasis was achieved and the defect was closed primarily with the help of prolene 1 extracorporeal suture using suture passer then appropriate size composite mesh was placed and fixed with absorbable tackers. Patient with defect size more than 5 cm and difficult to appose the sheath margin underwent simple IPOM repair. The surgery was performed by multiple surgeons with varied level of experience. In the post operative period, injection ceftriaxone 1gm iv bd was prescribed for 2 days followed by oral cefixime 200 mg bd for next five days. Post operative pain was managed with injection Paracetamol 1gm tds, inj. ketorolac 30 mg iv tds for 48 hours and opioids analgesic if required. Wound site dressing was done after three days and repeated in next three to four days. The staplers were removed on 10th day in the absence of infection. Most of the patient were discharged

on 3rd post-operative days and they were follow-up on 1 month, 3 months, 6 months, 1 year and 2-year period.

Data analysis was done in SPSS (version 21.0 for windows). The normality of the data was checked using Kolmogorov-Smirnov test. Quantitative data presented as mean±sd or median (IQR) and analyzed using student t test or Mann-Whitney U whichever was appropriate. Qualitative data presented as number/percentage and analyzed with chi square or Fischer's exact test whichever was appropriate. Test of significance $p < 0.05$ was considered significant.

RESULTS

The average age of the participants in the study was 51.23 ± 14.81 years, comprising 75 males (54.3%) and 63 females (45.7%). The median duration of surgery was 60 minutes (IQR: 50-85 minutes).

Among the 138 patients with ventral hernia, the majority had primary hernias, which represented 66.7% (92 patients), while 33.3% (46 patients) had incisional hernias, as detailed in Table 1.

Table 1: Types of Ventral Hernia (n=138)

Diagnosis	Number	Percentage
Primary hernia	92	66.7%
Epigastric hernia	23	16.7
Paraumbilical hernia	10	7.2
Umbilical hernia	55	39.9
Spigelian hernia	4	2.9
Incisional hernia	46	33.3

The most frequently utilized surgical technique was IPOM plus, performed in 131 cases (94.9%), followed by IPOM only, TARM, and SCOLA, as illustrated in Table 2.

Table 2: Various Surgical Techniques (n=138)

Surgical Procedure	Number	Percentage
IPOM PLUS	131	94.9
IPOM only	4	2.9
TARM	2	0.7
SCOLA	1	1.4

IPOM: Intraperitoneal Onlay Mesh,
TARM: Trans Abdominal Retromuscular Repair,
SCOLA: Subcutaneous Onlay Laparoscopic Approach.

Of these, only 11 patients (7.97%; 95% CI: 4.5% to 13.7%) experienced complications, with seroma being the most prevalent at 4 cases (2.9%; 95% CI: 0.8% to 7.3%) followed by surgical site infection in 2 cases (1.4%; 95% CI: 0.4% to 5.1%) as indicated in Table 3.

Table 3: Complications (n=138)

Complications	Number	Percentage
None	127	92
Iatrogenic bowel perforation	1	0.7
Seroma	4	2.9
SAIO/ileus	1	0.7
Surgical site infection	2	1.4
Recurrence	1	0.7
Mesh infection	1	0.7
Left iliac fossa ecchymosis	1	0.7

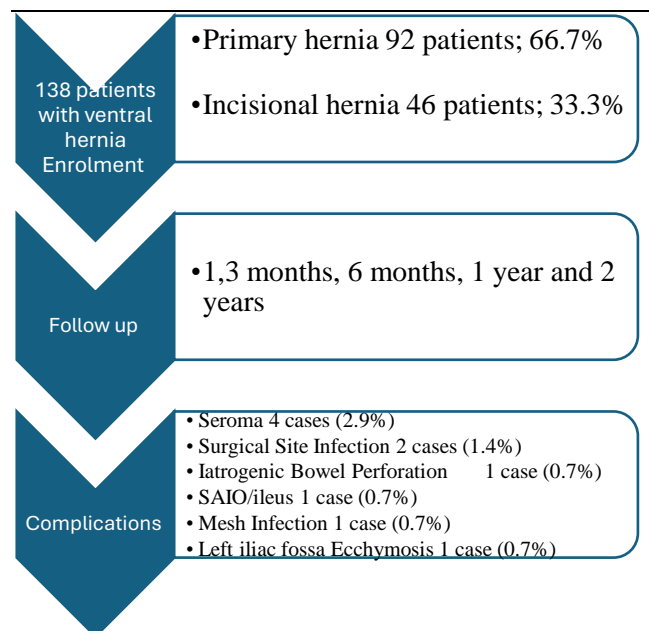


Figure 1: Flowchart illustrating the process of patient enrolment, follow-up, and associated complications.

Figure 1 illustrates the patient enrollment, follow-up at multiple intervals, and complications observed in 138 ventral hernia cases that were operated.

There was no significant difference in complication rates between primary and incisional hernias ($p=0.18$), as shown in Table 4.

Table 4: Comparison of complications between incisional hernia and primary (n=138)

Complications	Incisional hernia	Primary hernia	Total
No	40	87	127
Yes	6	5	11
Total	46	92	138
p value	0.18		

DISCUSSION:

Primary ventral hernias like epigastric and umbilical hernia along with incisional hernia used to be repaired in anatomical layers with sutures. However, when repaired with suture only with or without double brisement surgery wherever feasible has shown high recurrences 10-54% in umbilical hernia only. [3][4] Umbilical hernia alone accounts 6-14% being the second frequent hernia in adult after inguinal hernia.[5] Even in our study umbilical hernia when combined with paraumbilical hernia accounts 47.1% being the frequently occurring hernia of all. Incisional hernia has become the common healthcare burden after laparotomy done by surgeon or gynecologist. Despite advancement in newer suture procurement and abdominal wall closure technique the rate of incisional hernia has been reported as high as 15 to 20 % following laparotomy.[6] Various patient related factors, disease related and technical factors has been mentioned for poor closure of wound leading to incisional hernia. [5-7] Use of prosthesis mesh either polypropylene or composite even for a small ventral hernia defect has shown promising result reducing recurrence

rate.[7][8] In our study we had recurrence of only 0.7% in only one patient who had underwent IPOM PLUS. However, the recurrence was from the one of the defects which was small and had been closed with suture only. The composite mesh could not cover all other Swiss cheese defects. The less percentage of recurrence might because of decreased year of follow up , as it has been stated that the actual recurrence can only be estimated after 10 years only.[9] In one meta-analysis the recurrence was 8.7% after laparoscopic IPOM with follow up of 2 to 35 months period duration.[10] Study also has shown that while using non absorbable tackler for mesh fixation the recurrence is lower to absorbable tackler (18%vs 28.5%) at median 40 months follow up.[11]

Laparoscopic ventral hernia repair, though generally a safe surgery, has certain incidence of seroma development as complication. In our study seroma is the commonest complication with 2.9% of all surgeries performed the reason behind might be as most of our ventral hernia repair has been done as IPOM PLUS and minimal use of electrocautery.[12] Studies has also shown that the incidence of seroma is less in IPOM PLUS when compared to IPOM only. In a recent study the seroma incidence was almost equal to ours i.e. 3.5% in IPOM PLUS group, as most of our patient has under gone IPOM PLUS, however, 5.5% in IPOM group.[13] In another recent study seroma has been noticed in 36% in IPOM PLUS group which is very high in contrast to its technical repair treatment. As nevertheless, this approach closes the space between the mesh and the overlying defect decreasing the space for seroma formation.[14] In one patient who had underwent SCOLA developed seroma and took 1 month duration for complete resolute. Patient had to undergo multiple aspiration and then finally had to keep drain placement for prolong time period. There are studies where it has shown that the incidence of seroma is higher and takes

longer time to resolve in SCOLA when compared to IPOM PLUS.[15,16]

Surgical site infection (SSI) in any surgery is unwanted complication but it's a bitter truth a surgeon has to face. We had SSI in 2 patients (1.4%) one in incisional hernia patient next in patient who had undergone IPOM PLUS for spigelian hernia, both had umbilical port SSI which was managed with dressing only(Figure 2). In contrast to our result, Ali et al study showed the SSI was found higher in IPOM group (14%) than IPOM PLUS (3%).[17] Similar comparable rate of SSI was done in recent study which had 2.7 and 3.5% of SSI in IPOM and IPOM PLUS group.[13] In a study done by Sholapur et al though the number of study is less the superficial SSI was found to be 8% in IPOM PLUS group.[14] None of our patient developed hematoma but one patient has ecchymosis patches in left lateral flank around 10mm port site which resolved in self on 4 weeks follow up period time.

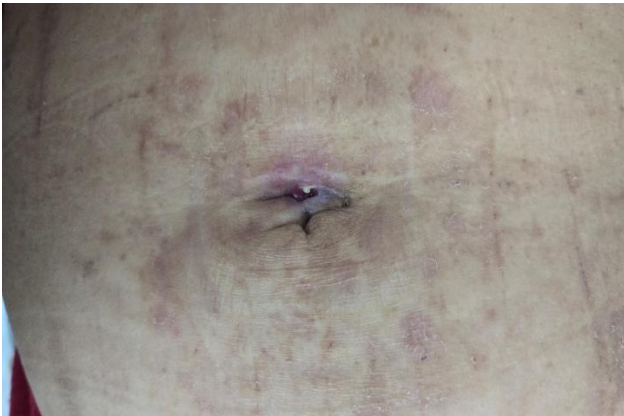


Figure 2: Picture of SSI of umbilical port infection post IPOM PLUS.

Mesh infection can be associated with contaminated surgical field, prolonged surgery time and early wound infection[18] In our study patient presented to us after 2 years of previous IPOM PLUS surgery with pain and swelling with signs of inflammation around previous operated site and findings was confirmed by

ultrasonography. He later underwent laparoscopic implantation of mesh and drainage of pus (Figure 3). He was operated later after 3 months duration with open onlay mesh hernioplasty. Mesh infection after laparoscopic ventral hernia repair has been mentioned with rate of as low as 0 to 3.6%.

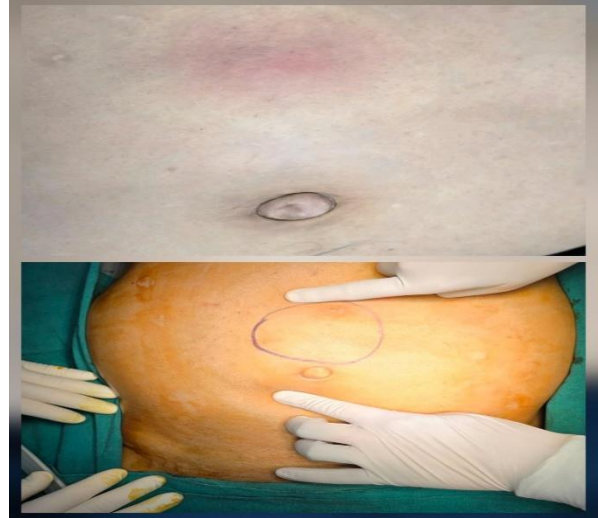


Figure 3: a. Swelling in supraumbilical area with sign of inflammation.

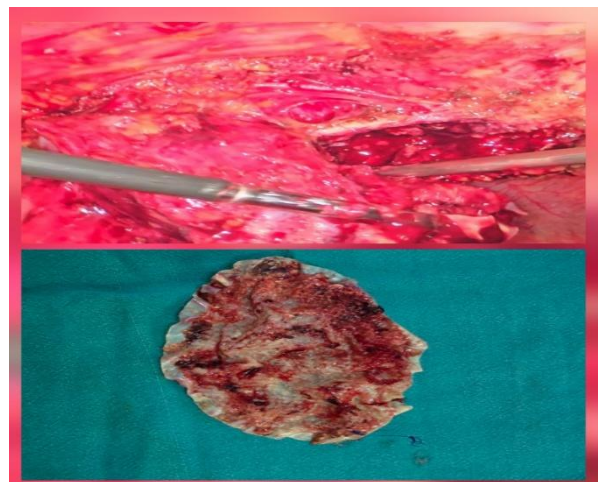


Figure 3: b. Infected mesh being removed with adherent bowel at previous operated site.

Iatrogenic enterotomy though rare complication can cause a potential consequence following laparoscopic ventral hernia repair. The literature research in enterotomy during ventral hernia repair done laparoscopically has shown to be 1.78% out of 3925 cases.[19] In our study we had enterotomy in one patient (0.7%) while doing LVHR in incisional hernia patient who had

midline incision for bowel perforation surgery prior. As the enterotomy was small with no contamination, the enterotomy was repaired laparoscopically and IPOM PLUS was done in same setting. Patient was discharged with no complication however the length of this patient was more when compared to other patients. Literatures have mention that provided there is no contamination IPOM PLUS can be performed in same setting. If enterotomy cannot be performed laparoscopically a small laparotomy incision away from hernia site can be made laparoscopic guided, repair of enterotomy extracorporeally and perform LVHR after closure of incision. If in doubt after repair of enterotomy TARM or preperitoneal placement of mesh can be done after through wash of the peritoneal cavity. Whenever there is a gross contamination it's better to do primary repair of hernia without mesh for patient safety and decrease the postoperative mesh infection and enterocutaneous fistula development or two staged hernia repair can be planned [20–22]

This study presents several important limitations that should be acknowledged. Primarily, the use of convenience sampling compromises the generalizability of the findings, as the patient cohort may not accurately reflect the broader population, potentially introducing selection bias. Additionally, the lack of patient-reported outcomes—such as postoperative pain scores and satisfaction—reduces the ability to assess the procedure's full clinical and personal impact. Furthermore, key factors like postoperative pain (both acute and chronic) and hernia defect size were not captured, despite their relevance to clinical outcomes, recurrence risk, and overall patient satisfaction. The absence of standardized measures for these variables constrains the ability to evaluate the comparative effectiveness and safety of laparoscopic ventral hernia repair (LVHR) across diverse patient groups. Another limitation of this analysis is the absence of

adjustments for potential confounding variables. The calculated complication was based on raw proportions, without accounting for factors such as patient age, comorbid conditions, surgical technique, or hernia characteristics. This lack of adjustment may limit the ability to isolate the effect of the intervention itself and could impact the validity and generalizability of the findings.

Future studies should be conducted to address these issues to enhance the validity and relevance of their conclusions.

CONCLUSIONS

In conclusion, LVHR is a safe and effective surgical option for ventral hernia repair, offering numerous benefits over open surgery. While most patients experience positive outcomes, a subset may face complications or dissatisfaction. The choice or type of LVHR repair can be made with respect to surgeon known or preferred technique keeping in mind about the cost effectiveness and complication expectation. Continued focus on patient-centered outcomes and individualized treatment approaches is essential to optimize results and patient satisfaction.

CONFLICT OF INTEREST

None

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None

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