

Original Research Article

Optimizing ventral hernia repair: our experience with laparoscopic intra-peritoneal onlay mesh plus

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ABSTRACT

Background: Ventral hernia repair remains a challenge, with laparoscopic techniques showing potential for lower recurrence and complications. This study aimed to assess the efficacy of the Laparoscopic intra-peritoneal Onlay mesh plus (LIPOMPlus) approach in ventral hernia repair.

Methods: This observational study was conducted at Ibn Sina medical college hospital, Dhaka, Bangladesh, from August 2016 to December 2017, enrolling 75 patients with ventral hernias. Patient demographics, perioperative data, and postoperative outcomes were recorded and analyzed. The primary endpoints included recurrence, postoperative complications, and patient satisfaction.

Results: The mean age was 45.6 ± 12.3 years, with a female predominance (53.3%). The average operative time was 95 ± 20 minutes, and the mean hospital stay was 3.2 ± 1.1 days. Complications were minimal: seroma (1.3%), hematoma (2.7%), port site infection (4%) and/or mesh infection (1.3%), and mesh rejection (1.3%). Only 2.7% of patients experienced hernia recurrence. Patients reported high satisfaction (mean score of 8.7 ± 1.3), and the mean time to return to normal activities was 14 ± 4 days.

Conclusions: The LIPOMPlus technique for ventral hernia repair demonstrated low complication and recurrence rate, high patient satisfaction, and a favorable recovery profile. These findings support LIPOMPlus as a viable and effective approach for ventral hernia management, warranting further investigation in diverse settings.

Keywords: Ventral hernia, Laparoscopic repair, LIPOMPlus, Intraperitoneal mesh

INTRODUCTION

Ventral hernia repair is a common surgical procedure designed to treat defects in the abdominal wall, with the aim of restoring anatomical integrity and preventing complications such as pain, incarceration, or strangulation of abdominal contents.¹ The global incidence of ventral hernias is increasing, partly due to factors such as rising obesity rates, an aging population, and a growing number of patients undergoing abdominal surgeries, which increase the risk of incisional hernias.² As a result, hernia repair has become one of the most

frequently performed procedures in general surgery.³ Traditional open repair methods, although effective, often involve significant tissue dissection and lengthy recovery periods, leading to the exploration of alternative minimally invasive techniques, such as laparoscopic approaches.^{4,5} In particular, the LIPOMPlus technique has garnered attention for its potential to reduce recurrence rates and postoperative complications, while promoting faster recovery and better cosmetic outcomes.⁶

Historically, ventral hernias were managed using open surgical repair techniques, often with primary suture

repair.⁷ However, high recurrence rates associated with simple suture repairs prompted the introduction of mesh implants to reinforce the abdominal wall.⁴ Mesh repairs significantly lowered recurrence rates, but the open technique still carried risks, including wound infections, seroma formation, and extensive scarring.⁸ With advancements in surgical technology, laparoscopic repair methods have become popular due to their minimally invasive nature.⁹ The laparoscopic approach generally involves placing a mesh within the peritoneal cavity, secured with tacks or sutures to reinforce the weakened area.¹⁰ Studies suggest that laparoscopic techniques, compared to open surgery, may result in fewer wound complications, reduced postoperative pain, shorter hospital stays, and faster return to daily activities.³ Despite these advantages, the use of intraperitoneal mesh presents challenges, such as the risk of adhesion formation, mesh migration, or erosion into surrounding tissues.¹¹

The LIPOMPlus technique is an advanced form of laparoscopic ventral hernia repair, combining the benefits of intraperitoneal mesh placement with additional fixation strategies to enhance stability and reduce recurrence rates.¹² In LIPOMPlus, a composite mesh is typically used, which has an anti-adhesive barrier on the side facing the viscera to minimize the risk of adhesion formation.¹³ Additionally, the mesh is fixated securely, either with absorbable or non-absorbable sutures and tacks, to maintain its position and resist intra-abdominal pressures that could lead to recurrence.¹⁴ This technique represents an evolution in laparoscopic hernia repair, addressing some limitations associated with earlier methods by improving mesh integration and reducing adverse outcomes.¹¹ Various studies have highlighted the effectiveness of LIPOMPlus in achieving lower recurrence rates compared to traditional laparoscopic techniques, particularly in patients with larger hernia defects or those at higher risk for recurrence.⁶ Nevertheless, as with any surgical intervention, the technique carries potential risks, including seroma, infection, and rare cases of mesh rejection.⁸

Evaluating the outcomes and effectiveness of the LIPOMPlus technique is critical, especially in regions like Bangladesh, where healthcare infrastructure and resources may pose additional challenges.¹² In low- and middle-income countries, access to advanced surgical care and follow-up may be limited, which underscores the need to assess the safety, feasibility, and outcomes of techniques like LIPOMPlus in diverse healthcare settings.⁵ Additionally, patient demographics and comorbidities can vary significantly across regions, potentially impacting surgical outcomes.⁶ The LIPOMPlus technique, while showing promise in reducing recurrence and improving postoperative recovery, requires further investigation into its applicability and effectiveness in such settings.¹³

This research aimed to enhance understanding of the

LIPOMPlus technique, adding to the growing body of literature on minimally invasive hernia repair and informing best practices in ventral hernia management across diverse healthcare environments.

METHODS

This observational study was conducted at Ibn Sina medical college hospital, Dhaka, Bangladesh, over a 1-year period from August 2016 to December 2017, involving 75 patients who underwent ventral hernia repair using the LIPOMPlus technique. Patients were selected based on their diagnosis of ventral hernia and suitability for laparoscopic repair, with inclusion criteria covering both primary and incisional hernia cases. Exclusion criteria included patients with contraindications to laparoscopic surgery, severe comorbidities preventing safe anesthesia, recurrent hernias after previous LIPOM, Irreducible and/or obstructed hernia or prior intra-abdominal mesh placements. Detailed data on patient demographics, hernia type, hernia size, comorbid conditions, and prior surgical history were collected preoperatively. Perioperative data, including operative time, mesh size, and hospital length of stay, were documented, with intraoperative complications such as bleeding or bowel injury carefully noted. Postoperative outcomes were monitored and included assessment of seroma, hematoma, port site infection and/or mesh infection and any signs of mesh rejection, alongside the hernia recurrence rate and time to return to normal activities. Patient satisfaction was measured using a standardized scale from 1 to 10 at follow-up visits, assessing various aspects such as postoperative pain, ease of returning to daily activities, aesthetic satisfaction with the surgical site, and overall quality of life improvement following the procedure. In our study follow-up duration was 5 years but few patients were failed to continue follow up. Data were analyzed using descriptive statistics to determine the frequency of outcomes, with results presented as means and standard deviations for continuous variables and percentages for categorical variables using SPSS software version 25. Informed consent was provided by all patients participating in the study.

RESULTS

Table 1 provides an overview of the baseline characteristics of the 75 patients included in this study. The mean age of the participants was 45.6 years with a standard deviation of 12.3 years. Gender distribution showed a slightly higher proportion of females (53.3%) compared to males (46.7%). The average body mass index (BMI) was 27.8, with a standard deviation of 4.5, indicating that many patients fell within the overweight range. Comorbidities were common among the study population: 20% of patients had diabetes, 24% had hypertension, and 16% had a history of previous abdominal surgery.

Table 1: Patient demographics and baseline characteristics, (n=75).

Characteristics	N	Percent (%)
Age (in years)	45.6±12.3	
Gender		
Male	35	46.70
Female	40	53.30
BMI (Mean±SD)	27.8±4.5	
Comorbidities		
Diabetes	15	20
Hypertension	18	24
Prev abdominal surgery	12	16

Table 2 summarizes the characteristics of the hernias in the study population. The majority of hernias were primary (64%), while the remaining 36% were incisional hernias. The average hernia defect size was 6.2 cm², with a standard deviation of 2.1 cm², indicating a moderate range of defect sizes among patients. Hernia location varied, with the most common being umbilical/paraumbilical hernias (40%), followed by incisional hernias (30.7%) and epigastric hernias (29.3%).

Table 2: Hernia characteristics.

Characteristics	N	Percent (%)
Hernia type		
Primary	48	64
Incisional	27	36
Average hernia defect size (cm²)	6.2±2.1	
Hernia location		
Epigastric	22	29.30
Umbilical/paraumbilical	30	40
Incisional	23	30.70

Table 3 presents the perioperative data for patients who underwent ventral hernia repair using the LIPOMPlus technique. The mean operative time was 95 minutes with a standard deviation of 20 minutes, reflecting a moderate duration for the laparoscopic procedure. The average length of hospital stay was 3.2 days, with a standard deviation of 1.1 days, indicating a relatively short recovery time. Intraoperative complications, such as minor bleeding or technical issues, were observed in 2.7% of patients (2 cases). The average mesh size used during surgery was 12.4 cm², with a standard deviation of 3.6 cm², tailored to each patient's hernia defect size.

Table 3: Perioperative data.

Variables	N	Percent (%)
Mean operative time (min)	95±20	
Length of hospital stay (days)	3.2±1.1	
Intraoperative complications	2	2.70
Mesh size (Mean±SD, cm²)	12.4±3.6	

Table 4: Postoperative outcomes and complications.

Outcome	N	Percent (%)
Postoperative complications		
Seroma	1	1.33
Hematoma	2	2.70
Port site infection	3	4
Mesh infection	1	1.33
Mesh rejection	1	1.33
Hernia recurrence	2	2.70
Mean time to return to normal activities (days)	14±4	
Patient satisfaction (1-10 scale)	8.7±1.3	

Table 4 outlines the postoperative outcomes and complications among the patients who underwent ventral hernia repair with the LIPOMPlus technique. Overall, postoperative complications were relatively low, with seroma occurring in 1.3% of patients (1 cases), hematoma in 2.7% (2 cases), port site infection in 4% (3 cases) and/or mesh infection in 1.3% of patients (1 cases) and mesh rejection in 1.3% (1 case). Hernia recurrence was also low, observed in 2.7% of patients (2 cases). The mean time for patients to return to normal activities was 14 days, with a standard deviation of 4 days, reflecting a relatively quick recovery. Patient satisfaction was high, with an average score of 8.7 out of 10 and a standard deviation of 1.3, indicating positive postoperative experiences.

DISCUSSION

The findings from this study add valuable insights into the outcomes and efficacy of the LIPOMPlus technique for ventral hernia repair, particularly in a single-center setting in Bangladesh. Our results demonstrate that LIPOMPlus can be an effective technique with favorable postoperative outcomes, low recurrence rates, and high patient satisfaction, aligning with other studies on minimally invasive hernia repair methods.

The LIPOMPlus technique has evolved from the traditional laparoscopic intraperitoneal Onlay mesh (IPOM) procedure. By improving mesh fixation and minimizing adhesion risks, LIPOMPlus addresses some limitations associated with the standard IPOM method. This technique's efficacy is underscored by the low complication rates observed in our study, which are comparable to or even lower than rates reported in earlier studies. For example, a study by Perrone et al on laparoscopic ventral hernia repairs noted that perioperative complications remain a challenge in IPOM repairs due to the risk of adhesions and mesh-related issues, but our findings indicate that the refinements in the LIPOMPlus technique, such as the use of a composite mesh with anti-adhesive barriers, may mitigate some of these comparative studies between open and laparoscopic approaches have shown significant advantages in favor of laparoscopic techniques regarding recovery time,

postoperative pain, and overall patient outcomes.¹⁵ Loh et al observed that laparoscopic repairs generally result in shorter hospital stays and faster recovery compared to open repairs, an advantage that we also noted in our study with an average hospital stay of just 3.2 days.¹⁶ The minimally invasive nature of LIPOMPlus minimizes tissue dissection and trauma, potentially reducing postoperative pain and accelerating recovery, as evidenced by our finding of an average time of 14 days for patients to return to normal activities.

The technical refinement of the LIPOMPlus technique addresses one of the most significant challenges in intraperitoneal mesh repairs: recurrence. While recurrence rates in traditional laparoscopic IPOM repairs range from 5% to 20% depending on the study and population, we observed a low recurrence rate of 2.7%, which is consistent with findings from other advanced laparoscopic techniques. Zhuang et al introduced the totally visceral sac separation (TVS) technique for incisional hernias, a procedure that also shows low recurrence rates but requires advanced training and has limited applicability in low-resource settings.¹⁷ Our study suggest MPlus can achieve comparable outcomes in reducing recurrence without the complexity and specialized equipment required by techniques like TVS, making it a more accessible option.

Another significant aspect of LIPOMPlus is patient satisfaction. Our study reported high patient satisfaction, with an average score of 8.7 out of 10, reflecting positive perceptions regarding postoperative pain, recovery, and cosmetic outcomes. This high satisfaction rate is supported by Bindal et al who found that minimally invasive hernia repair techniques, including LIPOMPlus, lead to better aesthetic outcomes and quicker return to daily activities compared to open surgery.¹⁸ This is especially relevant where patient-centered care and quality of life post-surgery are priorities, and it highlights the potential of LIPOMPlus to meet these needs effectively.

The issue of mesh selection and positioning is a critical factor in the success of hernia repairs, particularly when considering adhesion risks, mesh stability, and patient safety. Studies such as those by Yang and Yeow et al compared intraperitoneal and extraperitoneal mesh placements, noting that while extraperitoneal mesh can reduce the risk of adhesions, it is technically more demanding and may not be suitable for all hernia types.^{19,20} LIPOMPlus leverages a composite mesh barrier, effectively reducing adhesion risk without necessitating complex placement.²¹ Our study observed low rates of complications like seroma, hematoma, and port site infection, which may be attributed to the protective layer on the mesh, preventing direct contact with viscera. Notably, the single case of mesh infection was successfully managed conservatively with a prolonged course of broad-spectrum antibiotics.

Long-term outcomes are also essential in evaluating the hernia repair techniques. In a long-term follow-up study, Bingener et al found that laparoscopic repairs are associated with fewer long-term complications and recurrences compared to open techniques, underscoring the durability of laparoscopic repairs.²² Although our study did not focus on long-term follow-up, the low red complication rates observed suggest that LIPOMPlus could potentially provide sustained benefits similar to those reported by Bingener et al and should be evaluated further in long-term studies to confirm these preliminary findings.²²

However, while the LIPOMPlus technique has demonstrated significant benefits, it is essential to recognize potential limitations. For instance, Tsimoyiannis et al highlighted the learning curve associated with laparoscopic IPOM repairs, which applies to LIPOMPlus as well. Surgeons require proficiency in advanced laparoscopic techniques to perform LIPOMPlus effectively, which may limit its availability in centers with limited resources.²³ The cost of composite mesh with anti-adhesive properties could also be a constraint in low-resource settings. Nevertheless, studies like Muysoms et al suggest that the long-term savings from reduced complications and recurrences may offset initial costs, especially in high-risk populations where recurrence would otherwise require additional surgeries.²⁴

Limitations

This study has several limitations. Firstly, it was conducted at a single center with a relatively small sample size of 75 patients, which may limit the applicability of the findings to broader populations. Secondly, the study's observational design does not allow for direct comparison with other hernia repair techniques, such as open or robotic-assisted methods. Additionally, this study lacks long-term follow-up, which is critical to fully assess recurrence rates, mesh durability, and the potential for late-onset complications. In our study follow-up duration was 5 years but few patients were failed to continue follow up. Finally, the cost of the LIPOMPlus technique, particularly the composite mesh, could be prohibitive in low-resource settings and warrants economic evaluation.

CONCLUSION

In conclusion, our findings support the effectiveness of the LIPOMPlus technique in hernia repair, with favorable postoperative outcomes, low recurrence rates, and high patient satisfaction. This technique appears to offer significant advantages over traditional open and standard IPOM repairs, particularly in terms of patient recovery and recurrence prevention. Future research should focus on long-term outcomes of LIPOMPlus, particularly in diverse healthcare settings, to confirm its utility and durability.

Recommendations

Future studies should focus on multicenter trials with larger patient cohorts to validate these findings across different settings. A randomized controlled trial comparing LIPOMPlus with other hernia repair methods would provide more robust evidence of its relative efficacy. Long-term follow-up studies are also essential to assess outcomes such as recurrence, mesh durability, and late complications.

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REFERENCES

1. Ali F, Sandblom G, Wikner A, Wallin G. Laparoscopic ventral and incisional hernia repair using intraperitoneal onlay mesh with peritoneal bridging. *Hernia*. 2022;2(2):635-46.
2. Prasad P, Tantiya O, Patle NM, Khanna S, Sen B. Laparoscopic ventral hernia repair: a comparative study of transabdominal preperitoneal versus intraperitoneal Onlay mesh repair. *J Laparoendosc Adv Surg Techn*. 2011;21(6):477-83.
3. Haque MR, Alam M, Hossain SS, Khan L, Islam MA. Laparoscopic Intra Peritoneal Onlay Mesh Plus (IPOM Plus) repair of Ventral Hernias—Experience in a Tertiary Hospital. *J Bangladesh College Physicians Surgeons*. 2023;41(2):150-5.
4. Chelala E, Baraké H, Estievenart J, Dessily M, Charara F, Allé JL. Long-term outcomes of 1326 laparoscopic incisional and ventral hernia repair with the routine suturing concept: a single institution experience. *Hernia*. 2016;20:101-10.
5. Gomez-Menchero J, Balla A, García Moreno JL, Gila Bohorquez A, Bellido-Luque JA, Morales-Conde S. Laparoscopic intracorporeal rectus aponeuroplasty (LIRA) technique versus intraperitoneal Onlay mesh (IPOM plus) for ventral hernia repair: a comparative analysis. *Hernia*. 2024;28(1):167-77.
6. Gokcal F, Morrison S, Kudsi OY. Short-term comparison between preperitoneal and intraperitoneal Onlay mesh placement in robotic ventral hernia repair. *Hernia*. 2019;23:957-67.
7. Huang X, Shao X, Cheng T, Li J. Laparoscopic intraperitoneal Onlay mesh (IPOM) with fascial repair (IPOM-plus) for ventral and incisional hernia: a systematic review and meta-analysis. *Hernia*. 2024;28(2):385-400.
8. Wang T, Tang R, Meng X, Zhang Y, Huang L, Zhang A, et al. Comparative review of outcomes: single-incision laparoscopic total extra-peritoneal sub-layer (SIL-TES) mesh repair versus laparoscopic intraperitoneal onlay mesh (IPOM) repair for ventral hernia. *Updates in Surgery*. 2022;74(3):1117-27.
9. Jani K. Laparoscopic intra-peritoneal Onlay mesh plus repair for ventral abdominal wall hernias-is there substance to the hype. *Mini-invasive Surg*. 2018;2(5):14.
10. Eriksen JR, Gögenur I, Rosenberg J. Choice of mesh for laparoscopic ventral hernia repair. *Hernia*. 2007;11:481-92.
11. Ali F, Wallin G, Fathalla B, Sandblom G. Peritoneal bridging versus fascial closure in laparoscopic intraperitoneal onlay ventral hernia mesh repair: a randomized clinical trial. *BJS open*. 2020;4(4):587-92.
12. Obonna GC, Obonna MC, Mishra RK. Comparison of Different Types of Mesh in Intraperitoneal Onlay Mesh Ventral Hernia Surgery. *World*. 2022;15(2):104.
13. Tran H, Saliba L, Chandratnam E, Turingan I, Hawthorne W. Strategies to minimize adhesions to intraperitoneally placed mesh in laparoscopic ventral hernia repair. *J Society Laparoendosc Surg*. 2012;16(1):89.
14. Fei Y. Compound repair of intraperitoneal Onlay mesh associated with the sublay technique for giant lower ventral hernia. *Annals of Plastic Surgery*. 2012;69(2):192-6.
15. Perrone JM, Soper NJ, Eagon JC, Klingensmith ME, Aft RL, Frisella MM, et al. Perioperative outcomes and complications of laparoscopic ventral hernia repair. *Surgery*. 2005;138(4):708-16.
16. Loh C, Tan L, Wijerathne S, Lee J, Wai L, Parameswaran R, Goh S, Oo AM, Lomanto D. Open versus laparoscopic intraperitoneal on-lay mesh repair: a comparison of outcomes in small ventral hernia. *Asian J Surg*. 2023;46(2):712-7.
17. Zhuang B, Zheng L, Yu S, Li G. An improved approach of totally visceral sac separation (TVS) for incisional hernia compared with laparoscopic intraperitoneal Onlay mesh plus repair (IPOM plus). *Scientific Rep*. 2023;13(1):18037.
18. Bindal V, Pandey D, Gupta S. Laparoscopic intraperitoneal Onlay mesh plus versus robotic transabdominal pre-peritoneal for primary ventral hernias: Our technique and outcomes. *J Minimal Access Surg*. 2024;10-4103.
19. Yang GP. From intraperitoneal onlay mesh repair to preperitoneal Onlay mesh repair. *Asian J Endoscopic Surg*. 2017;10(2):119-27.
20. Yeow M, Wijerathne S, Lomanto D. Intraperitoneal versus extraperitoneal mesh in minimally invasive ventral hernia repair: a systematic review and meta-analysis. *Hernia*. 2022;26(2):533-41.
21. Chowbey PK, Sharma A, Khullar R, Mann V, Baijal M, Vashistha A. Laparoscopic ventral hernia repair. *Journal of Laparoendoscopic & Advanced Surgical Techniques*. 2000;10(2):79-84.
22. Bingener J, Buck L, Richards M, Michalek J, Schwesinger W, Sirinek K. Long-term outcomes in laparoscopic vs open ventral hernia repair. *Arch Surg*. 2007;142(6):562-7.

23. Tsimoyiannis EC, Tassis A, Glantzounis G, Jabarin M, Siakas P, Tzourou H. Laparoscopic intraperitoneal onlay mesh repair of incisional hernia. *Surgical Laparoscopy Endoscopy Percutaneous Techn.* 1998;8(5):360-2.
24. Muysoms F, Daeter E, Mijnsbrugge GV, Claeys D. Laparoscopic intraperitoneal repair of incisional and

ventral hernias. *Acta Chirurgica Belgica.* 2004;104(6):705-8.

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