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Review Article

Role of intraperitoneal onlay mesh in actuality for hernia

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ABSTRACT

This review evaluates the current evidence and outcomes associated with minimally invasive ventral and incisional hernia repairs, focusing on the use of intraperitoneal onlay mesh (IPOM). Long-term data indicate that IPOM is effective and safe in appropriately selected patients, with low recurrence and complication rates comparable to other surgical techniques. Advances in minimally invasive approaches, including minimum incisional laparoscopic Only surgery (MILOS), extended totally extraperitoneal (eTEP), and robotic-assisted repairs, have demonstrated benefits such as reduced postoperative pain, fewer wound complications, and shorter hospital stays compared to traditional open methods. The choice of surgical technique and mesh placement should be individualized, considering patient factors, hernia characteristics, and available technology to optimize outcomes. Emerging evidence supports the growing role of minimally invasive hernia repair as a standard approach in modern surgical practice.

Keywords: Ventral hernia, Minimally invasive surgery, Intraperitoneal mesh

INTRODUCTION

Intraperitoneal onlay mesh (IPOM) has become a cornerstone in the surgical management of ventral and incisional hernias, particularly with the advent of minimally invasive techniques such as laparoscopy and robotics. Its widespread use is supported by a substantial body of evidence demonstrating favorable long-term outcomes, especially for small to medium-sized hernias. Recent comprehensive studies have shown that minimally invasive IPOM procedures are associated with low rates of mesh-related complications, such as adhesions, erosion, or infection, as well as low recurrence rates when performed in carefully selected patients. Moreover, the minimally invasive approach offers additional benefits, including reduced postoperative pain, shorter hospital stays, quicker return to daily activities, and improved cosmetic results compared to open repair. These advantages, combined with the durability of the repair, make IPOM a preferred option in many clinical scenarios. The choice of mesh material, fixation technique, and precise positioning remain critical factors influencing success, emphasizing the importance of a tailored approach based on hernia size, location, patient comorbidities, and surgeon experience. While the evidence supports the safety and effectiveness of minimally invasive IPOM, it is essential to recognize that technical expertise and appropriate patient selection are pivotal to achieving optimal outcomes.

Ongoing innovations in mesh technology, fixation methods, and surgical techniques continue to enhance the safety profile and durability of repairs. Overall, minimally invasive IPOM is a robust and reliable technique for managing small to medium ventral hernias, offering an excellent balance of low complication rates, durability, and patient-centered benefits, making it a mainstay of contemporary hernia surgery.[1]

WHAT DOES EVIDENCE SAY?

In the context of abdominal wall reconstruction, comparative studies indicate that onlay placement of resorbable synthetic mesh may be associated with lower recurrence rates, fewer surgical site occurrences, and reduced costs compared to biologic mesh placed intraperitoneally, suggesting that the choice of mesh type and position should be individualized based on patient and defect characteristics.[2] For parastomal hernias, both sublay and IPOM positions are associated with lower recurrence rates, and IPOM is considered a standard option, especially when using meshes designed to minimize visceral adhesions.[3]

Prophylactic use of IPOM after midline laparotomy has been shown in randomized controlled trials to significantly reduce the incidence of incisional hernia over long-term follow-up, without an increase in mesh-related complications during extended observation periods.[4-6] However, increased early postoperative pain and prolonged wound healing in cases of surgical site infection have been reported with IPOM.[6] Despite these benefits, current international guidelines from the European and American Hernia societies do not recommend routine prophylactic synthetic IPOM due to concerns about adhesive complications, and instead favor retromuscular mesh placement when feasible.[7]

When comparing IPOM to totally extraperitoneal sublay repair (TES) for ventral hernias, both techniques demonstrate similar safety and efficacy, but TES may offer advantages in postoperative pain, quality of life, and cost-effectiveness, albeit with longer operative times.[8]

Minimally invasive hernia repair techniques-including MILOS, eTEP, and laparoscopic/robotic approaches-have been compared to traditional open methods in multiple recent studies. Compared to open sublay repair, both MILOS and eTEP are associated with significantly lower rates of postoperative complications, infections, reoperations, and chronic pain, as well as shorter hospital stays and faster recovery, without compromising recurrence rates.[1-3] MILOS, for example, demonstrated fewer surgical and general complications, lower recurrence, and less chronic pain than both open sublay and laparoscopic IPOM repairs, while allowing for the placement of large retromuscular meshes with low morbidity.[1] Similarly, eTEP repair showed a significantly lower complication rate and shorter hospitalization compared to open sublay, despite being used for smaller defects and larger mesh sizes.[2]

For ventral hernia repair, minimally invasive approaches (laparoscopic or robotic) generally result in less postoperative pain, improved cosmetic outcomes, and lower wound complication rates compared to open techniques, though operative times may be longer and the technical demands higher.[3] Robotic approaches allow for larger mesh placement and improved ergonomics, but do not show significant differences in complications or recurrence compared to open or laparoscopic methods.[4]

In the context of inguinal hernia repair, laparoscopic techniques (TAPP and TEP) offer less initial pain, earlier return to normal activities, and similar recurrence rates compared to open mesh repairs, but require general anesthesia and carry a small risk of major vascular or visceral injury.[5] Open mesh repairs (e. g., Lichtenstein) remain the standard for many patients, particularly those with significant comorbidities, due to the possibility of local anesthesia and shorter operative times.[5,6] Sutureless and minimally invasive open techniques, such as the Trabucco repair, have also demonstrated low complication and recurrence rates, with outcomes comparable to standard open mesh repairs and some advantages in terms of postoperative pain and neuralgia.[7,8]

Table 1: Key points about minimally invasive ventral and incisional hernia repairs, focusing on IPOM.

Aspects	Details
Main technique	IPOM repair
Efficacy and safety	Low recurrence and complication rates in well-selected patients
Long-term data	Supportive evidence showing durability and safety of minimally invasive procedures
Mesh placement options	Onlay (IPOM), retromuscular, sublay
Comparison with other techniques	Similar safety and efficacy; robotic and eTEP repairs offer less pain and faster recovery
Emerging approaches	MILOS, eTEP, robotic-assisted repairs
Postoperative benefits	Reduced pain, fewer wound complications, shorter hospital stays
Technical considerations	Longer operative times, higher technical demands in minimally invasive methods
Patient selection	Critical for optimizing outcomes; individualization based on hernia size, location and the patient health

IPOM VERSUS IPOM (+)

The classic IPOM technique for ventral or incisional hernia repair involves laparoscopic placement of a synthetic mesh directly onto the peritoneal surface, covering the hernia defect without primary closure of the fascial defect ("bridging" the defect). The mesh is fixed to the abdominal wall, typically with tacks and/or transfascial sutures, and is designed to prevent hernia recurrence by reinforcing the weakened area. This approach is often referred to as "simple IPOM" or sIPOM in the literature.[9-20]

The IPOM plus (IPOM+) technique modifies the classic approach by incorporating primary closure of the hernia defect (fascial closure) before mesh placement. After laparoscopic reduction of hernia contents, the fascial edges are approximated-usually with intracorporeal or transfascial sutures-followed by placement of the mesh as in the classic IPOM. The rationale is to restore abdominal wall continuity and function, reduce seroma formation, and potentially decrease recurrence and bulging rates.[9-13]

Main complications associated with both techniques include:

Seroma formation

Both sIPOM and IPOM+ are associated with postoperative seroma, but some studies suggest a lower incidence with IPOM+ or with additional techniques such as peritoneal bridging.[9,10,13]

Mesh bulging

Mesh bulging is more frequently observed in classic IPOM compared to IPOM+, with one study reporting 9 cases in sIPOM versus 4 in pIPOM, though this difference was not statistically significant.[9,10,13]

Hernia recurrence

Multiple studies demonstrate that IPOM+ (with fascial defect closure) is associated with lower recurrence rates compared to classic IPOM (bridging technique). For example, one study found a recurrence rate of 10% in the sIPOM group versus 0% in the IPOM+ group at 12 months ($p=0.018$), indicating statistical significance for reduced recurrence with IPOM+. Another multicenter prospective trial with 36 months of follow-up found similar recurrence rates between sIPOM and pIPOM (IPOM+), with 4 recurrences in pIPOM and 5 in sIPOM, and no statistically significant difference ($p>0.05$). These findings suggest that while some studies show a statistically significant reduction in recurrence with IPOM+, others do not, likely due to differences in patient selection, defect size, and technique.[9,10,13]

Chronic pain

Both techniques can result in postoperative pain, but IPOM+ may be associated with increased early postoperative pain due to fascial closure, though long-term pain rates are similar.[9,12,14]

Surgical site infection

Both approaches carry a risk, but rates are generally low and similar between techniques.[9,10]

Mesh-related complications

These include mesh infection, adhesions, and, rarely, enterocutaneous fistula, particularly in complex or open IPOM cases.[15]

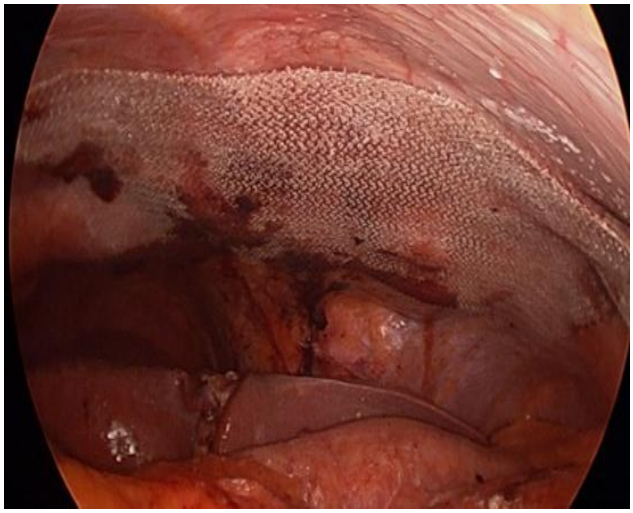

Figure 1: Intraperitoneal Onlay mesh.

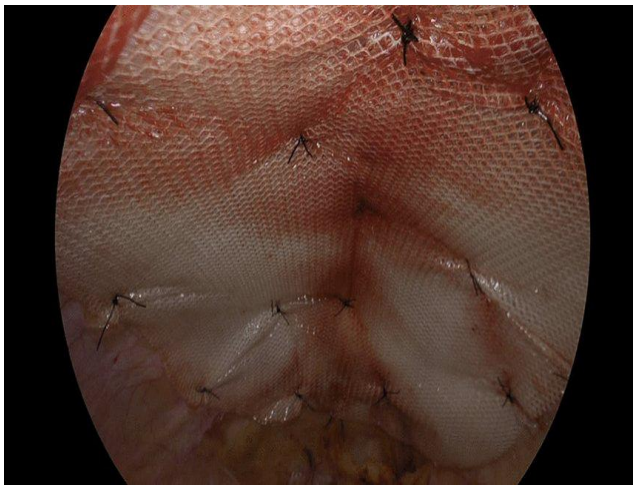

Figure 2: Mesh fixed to the anterior abdonminal wall in IPOM plus.

CONCLUSION

IPOM has established itself as a fundamental component in the treatment of ventral and incisional hernias, particularly within the context of minimally invasive surgical approaches. Extensive long-term data reinforce its safety and effectiveness when applied judiciously in appropriately selected patients, demonstrating low incidences of postoperative complications and hernia recurrence. The selection of mesh type-whether synthetic or biologic-the placement position relative to the abdominal wall, and the specific surgical technique should be tailored to each patient's individual characteristics, including hernia size, location, tissue quality, and overall health status.

Advancements in minimally invasive techniques such as the MILOS, eTEP, and robotic-assisted repairs have emerged as superior options in many cases. These approaches consistently show improved postoperative outcomes, including reduced postoperative pain, fewer wound complications, shorter hospital stays, and faster return to daily activities, all without a significant increase in hernia recurrence rates when compared to traditional open repair methods. Although these minimally invasive modalities offer significant benefits, considerations related to operative duration, technical complexity, and the need for specialized training or equipment remain relevant factors influencing their widespread adoption.

As surgical technology continues to evolve, ongoing innovations-such as improved mesh materials, enhanced fixation methods, and refined technique protocols-are contributing to better outcomes and fewer complications. Personalized treatment strategies, which take into account patient-specific factors and surgical expertise, are increasingly recognized as key to optimizing results. By customizing approaches to hernia repair based on individual clinical scenarios, surgeons can maximize the benefits of minimally invasive techniques while minimizing drawbacks like operative time and technical difficulty.

In summary, the integration of evolving minimally invasive techniques and carefully selected mesh strategies has significantly advanced ventral and incisional hernia management. Continued research and technological progress promise to further refine these methods, emphasizing the importance of tailored surgical plans that prioritize patient safety, recovery, and long-term durability within contemporary hernia surgery.

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REFERENCES

1. Reinpold W, Schröder M, Berger C, Jennifer N, Schröder A, Hukauf M, et al. Mini- Or Less-Open Sublay Operation (MILOS): A New Minimally Invasive Technique for the Extraperitoneal Mesh Repair of Incisional Hernias. Ann Surg. 2019;269(4):748-55.
2. Looft P, Alfarawan F, Bockhorn M, El-Sourani N. Beyond Traditional Repair: Comparing eTEP and Open Sublay for Ventral Hernia Repair. J Clin Med. 2025;14(8):2586.
3. González De Godos A, Sánchez González J, López Rodríguez B, et al. Comparative Approach for Abdominal Wall Reconstruction After Ventral Hernia: Open Versus Minimally Invasive Surgery. Hernia. 2025;29(1):69.
4. Rodrigues-Gonçalves V, Verdaguer-Tremolosa M, Martínez-López P, Fernandes N, Bel R, López-Cano M. Open vs. Robot-Assisted Preperitoneal Inguinal Hernia Repair. Are They Truly Clinically Different? Hernia. 2024;28(4):1355-63.
5. Fitzgibbons RJ, Forse RA. Groin Hernias in Adults. N Eng J Med. 2015;372(8):756-63.
6. Amid PK. Groin Hernia Repair: Open Techniques. World J Surg. 2005;29(8):1046-51.
7. Bruni PG, Cavalli M, Aiolfi A, et al. Primary Unilateral Not Complicated Inguinal Hernia With an Effective, Cheap, Less Invasive, and Easy Operation: The Trabucco Repair. Hernia. 2019;23(3):555-60.
8. Olmi S, Delcarro A, Ciccarese F, Adelinda AGZ, Matteo U, Giovanni C. Sutureless Inguinal Hernia Repair Techniques: A Comparison Between Laparoscopic and Open Methods. J Laparoendosc Adv Surg Tech A. 2025;35(6):451-7.
9. Ali F, Sandblom G, Wikner A, Wallin G. Laparoscopic Ventral and Incisional Hernia Repair Using Intraperitoneal Onlay Mesh With Peritoneal Bridging. Hernia. 2022;26(2):635-46.
10. Pizza F, D'Antonio D, Lucido FS, Brusciano L, Mongardini FM, Dell'Isola C, et al. IPOM Plus Versus IPOM Standard in Incisional Hernia Repair: Results of a Prospective Multicenter Trial. Hernia. 2023;27(3):695-704.
11. Mitura K, Skolimowska-Rzewuska M, Garnysz K. Outcomes of Bridging Versus Mesh Augmentation in Laparoscopic Repair of Small and Medium Midline Ventral Hernias. Surg Endoscopy. 2017;31(1):382-8.
12. Rasador ACD, Silveira CAB, Fernandez MG, Dias YJM, Martin RRH, de Figueiredo SMP. Minimally Invasive Intraperitoneal Onlay Mesh Plus (IPOM +) Repair Versus Enhanced-View Totally Extraperitoneal (E-Tep) Repair for Ventral Hernias: A Systematic Review and Meta-Analysis. Surgical Endoscopy. 2025;39(2):1251-60.
13. Gómez-Menchero J, Balla A, García Moreno JL, Bohorquez AG, 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.
14. Chuah YHD, Lloyd A, Sahebally SM. IPOM Versus eTEP as Minimally Invasive Approaches for Ventral/Incisional Hernias: A Systematic Review and Meta-Analysis. Hernia. 2025;29(1):144.
15. Vierstraete M, Molnar A, Berrevoet F. Open Intraperitoneal Onlay Mesh Repair With Anterior Component Separation as a Bail-Out Procedure in the Management of Complex Hernias. Hernia. 2024;28(3):887-93.
16. Hoffmann H, Kirchhoff P. Adhesions After Laparoscopic IPOM-How Serious Is the Problem? J Abdominal Wall Surg. 2025;4:14126.
17. Chuah YHD, Lloyd A, Sahebally SM. IPOM versus eTEP as minimally invasive approaches for ventral/incisional hernias: a systematic review and meta-analysis. Hernia. 2025;29(1):144.
18. Gopalakrishnan G, Selvaraja V, Krishnakumar R. Intraperitoneal Onlay Mesh Repair (IPOM) versus Intraperitoneal Onlay Mesh Repair with Closure of

Fascia Defect (IPOM Plus) for Ventral Hernias: Retrospective Analysis of Postoperative Outcomes. JMSCR. 2024;12(08):8-13
19. Tien TPD, Ngoc HN. Laparoscopic Intraperitoneal Onlay Mesh Plus (IPOM Plus) With Mobilizing the Urinary Bladder for Suprapubic Incisional Hernia Repair: A Case Report. Cureus. 2024;16(11):e73117.
20. Slavu IM, Filipoiu F, Munteanu O, Tulin R, Ursuț B, Dogaru IA, et al. Laparoscopic intraperitoneal onlay mesh (IPOM) in the treatment of ventral hernias: technique discussion points. Cureus. 2024;16(5):e61199.

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