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Review Article

Impact of mesh use in paraesophageal hernia repair: a review of short- and long-term outcomes

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ABSTRACT

This review examines the role of mesh reinforcement in laparoscopic paraesophageal hernia repair (PEHR) by evaluating existing evidence on short-term and long-term outcomes. An extensive analysis of randomized controlled trials, cohort studies, and meta-analyses reveals that mesh use does not significantly impact perioperative morbidity, mortality, or immediate postoperative complications compared to primary suture repair. Additionally, long-term follow-up data show no substantial reduction in hernia recurrence or improvement in quality of life with mesh reinforcement. Although non-absorbable meshes are associated with a higher risk of mesh-related complications, biologic and biosynthetic meshes demonstrate fewer adverse events. Current evidence supports a selective use of mesh in high-risk or redo repairs rather than routine application. These findings underscore the importance of individualized patient assessment and careful consideration of the potential risks and benefits when deciding on mesh reinforcement in PEHR.

Keywords: Paraesophageal hernia, PEHR, Mesh reinforcement, Surgical outcomes, Recurrence rates, Short-term outcomes, Long-term outcomes, Mesh complications, Hernia repair, Minimally invasive surgery

INTRODUCTION

Paraesophageal hernias represent a particularly complex and challenging subtype of hiatal hernia, characterized by the protrusion of additional stomach or other abdominal contents through the esophageal hiatus into the mediastinum.[1,11] Unlike sliding hiatal hernias, paraesophageal hernias often involve the stomach or other organs migrating alongside or completely behind the esophagus, which can lead to significant symptoms such as chest pain, reflux, or even life-threatening complications like strangulation or incarceration. Due to their intricate anatomy and risk of serious complications, many cases of paraesophageal hernia require surgical intervention to restore normal anatomy, alleviate symptoms, and prevent potential emergent conditions.

The decision about the most effective surgical technique remains a subject of ongoing debate within the surgical community. Among the various options, the use of mesh reinforcement during repair has gained considerable attention. Mesh is viewed by some as a means to strengthen the hiatal repair, potentially reducing the recurrence rate that can be relatively high with traditional primary suture techniques. Despite its widespread adoption in clinical practice, the precise role, benefits, and potential drawbacks of mesh reinforcement in PEHR continue to be scrutinized. Multiple studies and systematic reviews have analyzed the advantages and disadvantages associated with mesh use, considering factors such as postoperative recurrence, complications, quality of life, and long-term outcomes.

This review aims to systematically assess the current state of evidence regarding the impact of mesh reinforcement in PEHR. The focus will be on both short-term results, including perioperative safety and immediate postoperative complications, as well as long-term outcomes such as recurrence rates, mesh-related complications, and overall patient quality of life. By synthesizing data from recent high-quality studies, this review seeks to provide clearer guidance for surgeons when considering mesh reinforcement as part of the surgical approach to paraesophageal hernias, ultimately optimizing patient care and surgical success.

LITERATURE REVIEW

This review examined existing studies on use of mesh in PEHR. To gather comprehensive and current information, we conducted a systematic search of online medical databases, including PubMed, Embase and Cochrane Library, covering publications up to October 2023. Our inclusion criteria encompassed studies that directly compared mesh reinforcement with no mesh during surgical repair and reported on key clinical outcomes such as hernia recurrence and postop complications.

We prioritized high-quality evidence, selecting randomized controlled trials, observational studies, and reviews that presented original data. To ensure the reliability and accuracy of the review process, two independent reviewers screened all articles, evaluated their methodological quality, and extracted relevant data. Any discrepancies between reviewers were resolved through discussion or consensus to maintain objectivity.

Data extracted from selected studies organized to analyze both short-term and long-term outcomes. Particular attention was given to recurrence rates, postoperative complications, and overall safety profiles associated with mesh use. Summarized results were then critically analyzed to assess effectiveness of mesh reinforcement, balancing benefits such as reduced recurrence against potential risks like mesh-related complications.

Ultimately, this review provides a clear synthesis of current evidence to inform clinical decision-making regarding the role of mesh in PEHR s, aiming to guide surgeons toward optimal patient outcomes based on the most reliable and up-to-date data available.

SHORT-TERM OUTCOMES

Mesh reinforcement during laparoscopic PEHR does not significantly impact perioperative morbidity, mortality, or the incidence of short-term complications when compared to primary suture repair. Numerous studies and comprehensive meta-analyses have consistently demonstrated that the addition of mesh does not lead to differences in 30-day postoperative outcomes, including common issues such as dysphagia, reflux symptoms like heartburn. need for reoperation. This holds true regardless of whether absorbable/non-absorbable meshes are employed. Furthermore, placement of mesh is not associated with an increased risk of immediate adverse events and large-scale database analyses further support conclusion that use of mesh doesn't elevate perioperative complication/mortality rates. Overall, current evidence indicates that mesh reinforcement is a safe adjunct in short-term management of PEHR, without adding significant risk during initial postoperative period.[3,4]

LONG-TERM OUTCOMES

The use of mesh in PEHR does not result in a significant reduction in hernia recurrence rates over the long term. High-quality meta-analyses and randomized controlled trials have consistently shown that both early recurrence (within six months) and late recurrence (beyond six months) occur at similar rates in patients undergoing mesh-reinforced repairs compared to those receiving suture-only repairs. This finding holds true regardless of the type of mesh used, indicating that mesh reinforcement may not provide a substantial advantage in preventing long-term hernia recurrence.[1,5,12-17] While some earlier meta-analyses suggested a modest reduction in mid-term recurrence with mesh, more recent and comprehensive analyses, as well as long-term follow-up data, do not support a clinically meaningful benefit in recurrence prevention.[5,7,8] Additionally, quality of life outcomes are not improved by mesh reinforcement; long-term follow-up shows sustained improvement in quality of life after PEHR, but no additional benefit from mesh.[6]

MESH-RELATED COMPLICATIONS AND MORBIDITY

Overall morbidity is higher with non-absorbable mesh, primarily due to mesh-related complications, although the absolute risk remains low.[1] Mesh erosion, infection, and need for mesh removal are rare but recognized risks, particularly with non-absorbable materials.[1,8] Absorbable and biologic meshes have not demonstrated a significant difference in recurrence or complication rates compared to each other or to suture repair.[1,2,6,17-20]

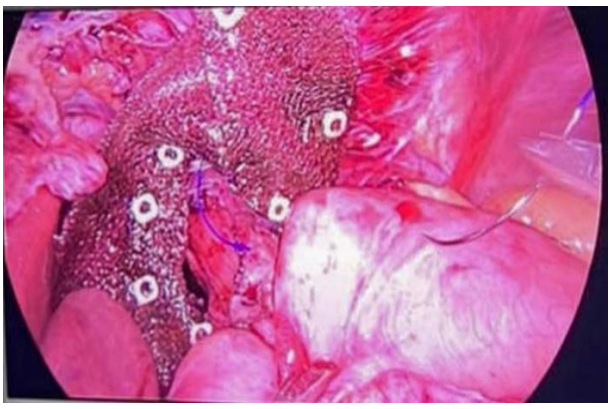

Figure 1: Absorbable H-shaped mesh for type IV hiatal hernia.

PATIENT SELECTION AND CURRENT CONSENSUS

Routine use of mesh in all patients undergoing PEHR is not supported by current evidence. Selective use may be considered in patients with high risk of recurrence, such as those with large hernias, significant hiatal tension, poor crural tissue quality, or in redo repairs, but even in these subgroups, the benefit remains unproven and must be weighed against the potential for mesh-related complications.[5,9] The trend in practice is toward more selective, individualized use of mesh rather than routine reinforcement.[5,9]

In summary, mesh use in PEHR does not improve short-term or long-term recurrence rates or quality of life, and may increase morbidity when non-absorbable mesh is used. Mesh should not be used routinely, but may be considered selectively in high-risk cases, with careful attention to patient and hernia characteristics.[1,5-9]

Table 1: Aspect and findings.

Aspect	Details/findings
Purpose of mesh use	Reinforcement of hiatal closure to reduce recurrence rates.
Short-term outcomes	No significant difference in perioperative morbidity, mortality, or complication rates compared to primary suture repair. Mesh does not increase early adverse events.
Long-term outcomes	No significant reduction in hernia recurrence with mesh reinforcement. Recurrence rates are similar between mesh and non-mesh repairs in long-term follow-up. Quality of life improvements are comparable regardless of mesh use.
Type of mesh	Absorbable, biosynthetic, and non-absorbable meshes studied. No consistent evidence showing superiority of one type over others. Non-absorbable meshes may have higher morbidity due to mesh-related complications.
Complications	Rare but notable risks include mesh erosion, infection, and need for mesh removal. Non-absorbable mesh associated with a higher risk of complications. Absorbable and biologic meshes show fewer complications.
Patient selection	Routine use not supported; recommended selectively for high-risk or redo surgeries. Careful patient assessment is critical.
Current clinical practice	Shift toward individualized, selective application of mesh rather than routine reinforcement.
Overall conclusion	Mesh does not improve recurrence or quality of life outcomes significantly and can increase morbidity in some cases. Use should be individualized based on patient risk factors.

CONCLUSION

In conclusion, although recent high-quality studies and meta-analyses suggest that mesh reinforcement does not consistently decrease long-term recurrence rates nor significantly improve patient-reported quality of life, this should not lead to a wholesale abandonment of mesh usage in all cases of PEHR. Instead, these findings highlight the importance of a nuanced, individualized approach to surgical planning. In particular, patients presenting with complex or high-risk features-such as large hernia defects, significant hiatal tension, or a history of prior recurrences-may derive considerable benefit from mesh reinforcement, as it can bolster the structural integrity of the repair and potentially reduce the likelihood of recurrence in those challenging scenarios.

Furthermore, advancements in mesh technology, including the advent of biologic and biosynthetic meshes, have contributed to a safer profile with fewer complications, better biocompatibility, and improved tissue integration. These innovations could make mesh reinforcement a more viable option even in cases where traditional synthetic meshes posed concerns about erosion or chronic pain. When used judiciously and with proper selection criteria, mesh has the potential to enhance the durability of hiatal repair without significantly increasing perioperative morbidity or long-term complications.

It is also important to recognize that surgical decision-making should always be tailored to the individual patient's overall health, anatomy, and specific risk factors. A standardized, one-size-fits-all approach is unlikely to yield optimal outcomes. Instead, surgeons must weigh the potential benefits of added reinforcement against the possible risks, considering patient preferences and specifics of each case. Enhanced preoperative assessment, intraop judgment, and postoperative follow-up are crucial components of this personalized strategy.

Ongoing research remains vital, as innovations in mesh materials and evolving techniques continue to improve safety profiles and efficacy. Large-scale, long-term studies are necessary to better define the patient populations that benefit most from mesh reinforcement and to establish evidence-based guidelines for its use. Ultimately, mesh remains a valuable tool within the surgeon's armamentarium for complex and high-risk hiatal hernia repairs. When applied appropriately, it can contribute to improved surgical durability, reduced recurrence, and favorable patient outcomes, reinforcing the importance of a balanced, patient-centered approach to hernia repair strategies.

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