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Original article

Short-Term and Long-Term Outcomes of Mesh Versus Non-Mesh Repair in Emergency Inguinal Hernia Surgery

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Abstract
Emergency inguinal hernia repair represents a significant surgical challenge due to the urgent nature of presentations, often complicated by incarceration, strangulation, bowel obstruction, and tissue ischemia. These conditions increase morbidity and mortality compared with elective hernia surgery, necessitating prompt diagnosis and immediate intervention. Surgical repair remains the definitive treatment, with techniques broadly categorized into mesh-based (tension-free) and non-mesh (tissue-based) repairs. Non-mesh methods, such as Bassini, Shouldice, and McVay, have historically been used but are associated with tension at the repair site, higher recurrence rates, and prolonged recovery. Mesh-based repairs, particularly tension-free techniques, provide stronger reinforcement, reduce recurrence, and improve functional recovery, though concerns about infection, chronic pain, and foreign body complications persist. Short-term outcomes in emergency settings are influenced by factors such as tissue viability, contamination, patient comorbidities, obesity, and smoking. Mesh placement during contaminated or emergent cases may increase morbidity, although surgical site infection rates do not necessarily rise. Long-term outcomes consistently show that mesh repairs achieve lower recurrence rates and comparable chronic pain levels compared with non-mesh repairs, while tissue-based techniques remain relevant in selected patient populations. Evidence underscores the importance of individualized surgical planning, careful technique selection, and optimization of modifiable risk factors to improve both short- and long-term outcomes. This review highlights current evidence on clinical outcomes following emergency inguinal hernia repair, emphasizing the balance between patient safety, recurrence prevention, and quality of life.
Keywords. *Emergency Inguinal Hernia, Mesh Repair, Short-Term Outcomes, Chronic Pain.*

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Introduction

Inguinal hernia is the most frequently diagnosed type of hernia, affecting a substantial proportion of the population. Epidemiological studies suggest that approximately one-third of males will develop an inguinal hernia at some point in their lifetime. The incidence shows two age peaks, with the highest occurrence during childhood and in adults aged 50 years and older. Diagnosis is primarily based on clinical examination, which identifies a palpable mass in the inguinal region; however, in complicated cases, some patients may present with signs of intestinal obstruction. Surgical repair remains the definitive and only curative treatment for inguinal hernias, making it one of the most commonly performed operations worldwide. These procedures are typically conducted electively under local, spinal, or general anesthesia [1].

Hernias are characterized by the abnormal protrusion of an organ or part of an organ through the surrounding body wall. Groin hernias, which include inguinal hernias (96%) and femoral hernias (4%), are among the most common types and often present with discomfort or pain. These hernias are highly prevalent, with an estimated lifetime risk of 27% in men. In certain cases, groin hernias may present as emergency conditions, leading to complications such as incarceration, obstruction, or strangulation of the herniated contents [2]. Surgical intervention remains the definitive treatment for hernias, with inguinal hernia repair among the most frequently performed surgical procedures worldwide. Two main surgical approaches are commonly utilized: herniorrhaphy, which relies on tissue-based repair without mesh, and hernioplasty, which involves the use of prosthetic mesh for reinforcement. Although both techniques are widely practiced, there is a noticeable preference for mesh repair in high-income countries due to its lower long-term recurrence rates. Nevertheless, in emergency settings, the choice between mesh and non-mesh repair requires careful consideration, as factors such as

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contamination, tissue viability, and risk of postoperative complications may influence both short-term outcomes and long-term results, including recurrence and quality of life [3].

Recurrence after inguinal hernia repair remains a major clinical concern and continues to represent one of the most important indicators of long-term surgical success or failure. Several factors have been identified as contributors to hernia recurrence, including the type of surgical technique employed, the presence of previous repairs or re-recurrence, and a positive family history. Despite these recognized determinants, limited attention has been given to non-technical and patient-related factors that may also influence postoperative outcomes and the likelihood of recurrence. Understanding these variables is particularly important in emergency inguinal hernia surgery, where operative conditions are often less favorable and the choice between mesh and non-mesh repair may significantly affect both short-term recovery and long-term recurrence rates. Therefore, evaluating how different repair techniques interact with surgical and patient-related factors is essential to improving outcomes and reducing the burden of hernia recurrence [4].

Insufficient consensus and limited comparative evidence is addressing both short-term outcomes (such as postoperative complications, infection, hospital stay, and mortality) and long-term outcomes (including recurrence, chronic pain, and quality of life) between mesh and non-mesh repair techniques. Therefore, a clear evaluation and comparison of the safety and effectiveness of mesh versus non-mesh repair in emergency inguinal hernia surgery is needed to guide clinical decision-making and improve patient outcomes. The main study question is: How do mesh and non-mesh repair techniques compare in terms of short-term complications, long-term recurrence, and overall clinical outcomes in patients undergoing emergency inguinal hernia surgery?

The study aims to compare the short-term postoperative complications between mesh and non-mesh repair in emergency inguinal hernia surgery. Study is significant as it aims to provide evidence-based data comparing the short-term and long-term outcomes of mesh versus non-mesh repair in emergency inguinal hernia cases. The findings may help clarify the safety, effectiveness, and potential risks of each technique, enabling surgeons to make more informed choices tailored to patient conditions. Furthermore, the results of this study may contribute to improving patient care by reducing postoperative complications, minimizing recurrence rates, shortening hospital stays, and enhancing overall quality of life. It may also assist in developing clinical guidelines and standardized protocols for the management of emergency inguinal hernia repair. Ultimately, this research will add to the existing body of surgical literature and support better clinical outcomes, healthcare efficiency, and cost-effective management strategies

Methods

Study Tools

A comprehensive review and analysis of published clinical studies addressing mesh and non-mesh techniques in emergency inguinal hernia repair. Evaluation of the principles of tension-free (mesh-based) repair versus tissue-based (non-mesh) repair and their theoretical effects on healing, infection risk, and recurrence.

Data Collection Sources

The data for this study will be gathered from a range of reputable scientific databases, including PubMed, ScienceDirect, the Cochrane Library, and Wiley Online Library. The focus will be on published experimental and clinical studies that address emergency inguinal hernia repair, alongside systematic reviews and meta-analyses comparing mesh and non-mesh techniques. Additional sources include surgical textbooks and medical journals that discuss operative methods, complications, and long-term outcomes.

Study Sample

The study sample comprises scientific articles, clinical trials, retrospective studies, and systematic reviews published within the last ten years that address emergency inguinal hernia repair using either mesh or non-mesh techniques, with special emphasis placed on studies reporting postoperative complications, surgical site infection rates, length of hospital stay, recurrence rates, chronic pain, and long-term functional outcomes.

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Analytical Methods

To analyze the collected data, several analytical methods will be employed. Descriptive analysis will summarize findings from previous studies regarding short-term and long-term surgical outcomes. Critical analysis will evaluate the strengths, weaknesses, and methodological quality of the included studies. Comparative analysis will compare reported outcomes between mesh and non-mesh repair to identify differences in effectiveness and safety. Finally, interpretive analysis will link clinical findings with physiological and surgical principles to explain variations in recurrence, infection, and recovery.

Results

The analysis reveals significant global variation in the frequency of emergency inguinal hernia repairs, which is closely tied to the anatomical and pathophysiological background of the condition. In many high-income Western countries, the majority of groin hernias are managed electively, with only a small proportion of patients requiring urgent surgical intervention. This stands in stark contrast to low-resource settings, particularly in sub-Saharan Africa, which report substantially higher rates of emergency hernia presentations. These disparities are often linked to factors such as delayed diagnosis, limited access to healthcare facilities, and the inadequate availability of elective surgical services, forming a critical basis for evaluating the short- and long-term outcomes of the repair techniques employed in these varied contexts.

The frequency of emergency groin hernia repairs shows considerable variation across different regions of the world. In many high-income Western countries, the majority of hernia cases are managed electively, and only a small proportion of patients require urgent surgical intervention. In contrast, low-resource settings, particularly in sub-Saharan Africa, report substantially higher rates of emergency hernia presentations. These disparities are often related to factors such as delayed diagnosis, limited access to healthcare facilities, and inadequate availability of elective surgical services.

Such delays in timely intervention significantly increase the risk of adverse outcomes; therefore, this guidance assists surgeons in making informed decisions regarding technique selection in emergency inguinal hernia repair. Mesh repair should be considered the preferred approach in the absence of significant contamination, offering superior long-term recurrence prevention without increased chronic pain. Non-mesh repair remains a valuable alternative in contaminated fields or when mesh is contraindicated. Ultimately, the optimal outcome depends not on a universal technique but on the thoughtful, individualized application of surgical principles, careful patient selection, and systematic attention to perioperative risk modification. Through such tailored approaches, surgeons can optimize both short-term recovery and long-term quality of life for patients requiring emergency groin hernia repair. incarceration or strangulation of herniated tissues can result in irreversible bowel ischemia, tissue necrosis, and the subsequent need for bowel resection. These observations underscore the importance of early recognition and prompt surgical management to prevent serious complications and improve patient outcomes in regions where emergency presentations are more common [5].

Indeed, early intervention especially within the first few hours of symptom onset—may prevent ischemic injury, whereas delayed treatment is strongly associated with higher postoperative complications and mortality. These observations emphasize the importance of understanding the biological mechanisms and time-dependent progression of strangulation to improve patient survival and recovery. Several anatomical and patient-related factors have been identified as contributors to the development of complicated or emergency hernias. Femoral hernias, due to their narrow anatomical canal, carry a higher likelihood of incarceration and strangulation compared with inguinal hernias. Additionally, female sex, advanced age, and the presence of comorbidities such as cardiovascular disease or diabetes have been linked to an increased risk of emergency presentation and poorer surgical outcomes. Mortality rates are also higher among elderly patients and those with compromised general health status. Despite these recognized risk factors, current international guidelines highlight the limited availability of high-quality evidence regarding emergency groin hernia management and stress the need for further research to clarify predictors of complications and optimize treatment strategies [6].

These comprehensive datasets provide an invaluable resource for understanding both the immediate and enduring consequences of emergency hernia surgery, offering a more holistic view of the disease burden. Taken together, the anatomical, physiological, and clinical factors discussed form the essential theoretical and practical foundation for the study of emergency groin hernias, emphasizing the need for ongoing improvements in surgical strategies to optimize both short- and long-term patient outcomes [7].

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Surgical Repair Techniques (Mesh Versus Non-Mesh Repair)

Inguinal hernia remains one of the most frequently encountered surgical conditions worldwide and accounts for a substantial proportion of general surgical interventions. It occurs when abdominal contents protrude through a weakened area in the inguinal canal, often resulting in discomfort, pain, and an increased risk of serious complications such as incarceration or strangulation. Consequently, surgical repair represents the only definitive treatment and has long been considered one of the most commonly performed operations in clinical practice. Over the years, continuous advancements in operative strategies have aimed to minimize recurrence, reduce postoperative pain, and improve overall functional recovery. However, despite these developments, debate persists regarding the most appropriate surgical technique, particularly when balancing effectiveness, safety, and patient-centered outcomes [8].

Historically, tissue-based or non-mesh repairs have served as the foundation of inguinal hernia surgery, representing the standard approach for many decades. Classic techniques, including Bassini, Shouldice, and McVay repairs, focused on closing the hernia defect by approximating and suturing the patient's own tissues. While these methods achieved acceptable outcomes and were widely practiced, they were inherently associated with tension at the repair site, which could lead to increased postoperative discomfort, prolonged recovery periods, and a higher likelihood of hernia recurrence. The limitations of these traditional tissue-based approaches, particularly their reliance on the patient's native tissues under tension, prompted the surgical community to seek alternative strategies that could provide more robust reinforcement of the abdominal wall while minimizing complications and improving long-term durability [9].

Clinical Outcomes of Mesh Versus Non-Mesh Repair in Emergency Surgery

The choice between mesh and non-mesh repair remains a topic of considerable debate. While mesh-based techniques are widely recognized for reducing recurrence rates in elective surgery, their use in emergency cases raises concerns regarding infection risk and mesh-related complications, especially in potentially contaminated operative fields. Conversely, tissue-based repairs may avoid foreign material implantation but could be associated with higher tension on tissues and increased recurrence. Therefore, comparing short-term outcomes—such as postoperative complications, surgical site infection, hospital stay, and early mortality—with long-term outcomes—including recurrence, chronic pain, and quality of life—is essential to determine the most effective and safest approach. Understanding these clinical outcomes provides evidence-based guidance for surgeons and contributes to improving decision-making, optimizing patient care, and enhancing overall prognosis in emergency inguinal hernia management [10].

Short-Term Clinical Outcomes Following Emergency Mesh and Non-Mesh Repair

In emergency settings, where patients present with infected mesh after previous hernia repair, the choice between immediate replacement of the mesh and simple removal during the index operation remains controversial. Evidence from database studies indicates that short-term complications are common in both strategies, with reported 30-day morbidity rates around 35–40%. These complications include surgical site infections, wound healing issues, and other early postoperative adverse events. Although smaller, single-center studies have reported lower morbidity rates, these often exclude high-risk cases such as giant hernias, patients on steroids, or emergent surgeries, which limits their generalizability. In contrast, larger studies incorporating diverse patient populations and multiple hospitals provide a more representative assessment of short-term outcomes across real-world clinical practice. The findings consistently indicate that concurrent mesh placement during infected mesh removal is associated with higher short-term morbidity, even though the rates of surgical site infections may not differ significantly [11].

Several patient-related factors have been identified as contributing to adverse short-term outcomes following emergency hernia repair. Elevated body mass index (BMI) and a history of smoking are consistently associated with higher postoperative morbidity, including complications and recurrence. These findings highlight the importance of preoperative interventions such as weight reduction and smoking cessation, even in emergency scenarios, to minimize the risk of postoperative complications. Evidence suggests that structured preoperative counseling and optimization of modifiable risk factors can reduce the incidence of complications and improve recovery, thereby interrupting the cycle of reoperation and repeated interventions often observed in patients with mesh infections.

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Long-Term Outcomes and Prognosis After Emergency Mesh and Non-Mesh Repair

Long-term follow-up is essential for evaluating the outcomes of inguinal hernia repair, particularly regarding recurrence, chronic pain, and overall functional recovery. Numerous studies have shown that mesh-based repair techniques are generally superior to non-mesh approaches in preventing hernia recurrence over extended periods. In cohorts with follow-up periods exceeding ten years, recurrence rates were significantly lower in patients undergoing mesh repair compared to those receiving non-mesh repair, highlighting the durability and long-term effectiveness of mesh reinforcement. Nearly half of all recurrences occurred within the first three years after surgery, emphasizing the importance of continuous monitoring even after initial recovery. [12] Interestingly, factors such as patient age, obesity, comorbidities, or surgeon experience were not consistently associated with recurrence, suggesting that the repair technique itself is a key determinant of long-term success. [13] Randomized clinical trials further support the advantages of mesh repair. In studies comparing mesh and non-mesh techniques, recurrence rates over three years were significantly lower in the mesh groups, while postoperative complications, pain, and quality of life outcomes were largely similar between the two methods. These findings indicate that mesh repair not only reduces recurrence but also remains safe and cost-effective, even in emergency surgical settings. Comparisons of newer non-mesh tissue-based techniques, such as the Desarda method, with traditional suture repairs like Shouldice, suggest comparable early postoperative outcomes, including pain, complication rates, and functional recovery. However, non-mesh techniques often require shorter operative times and may allow faster return to daily activities [14].

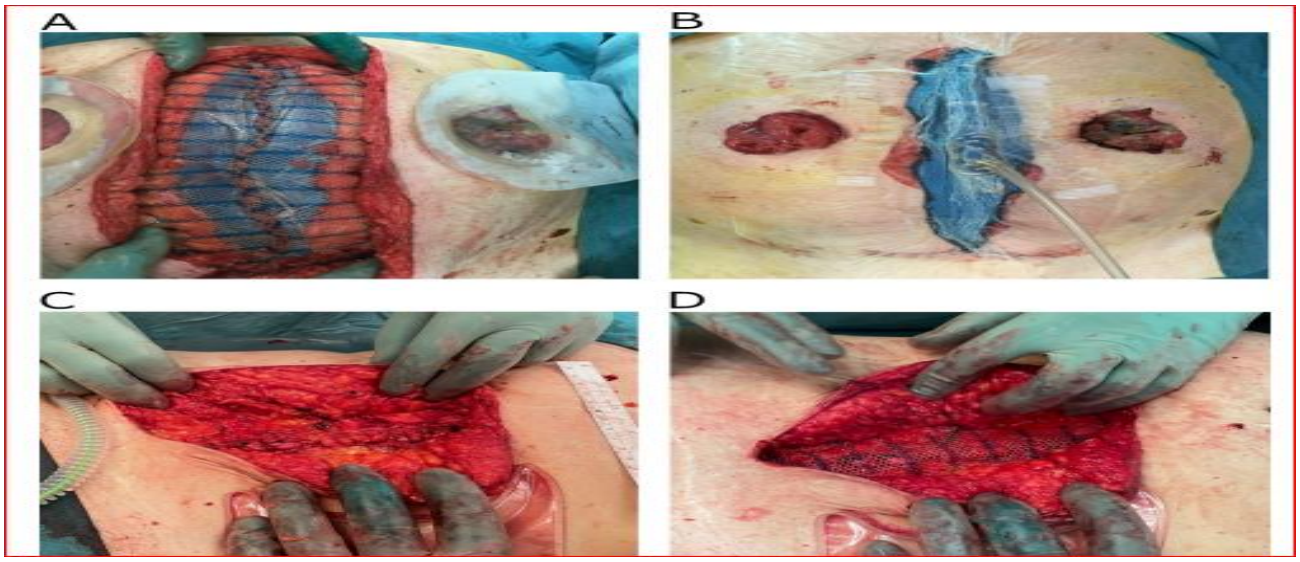

Figure 1. Two patients treated for burst abdomen. With large intraabdominal volume and/or loss of fascial domain, intraabdominal draping, mesh-mediated traction (A) and negative pressure therapy (B) was applied to the wound. When fascial closure was possible, mass-closure continuous suturing was used (C). If no contraindications were identified, an on-lay synthetic, partial absorbable mesh was augmented (D)

Chronic postoperative pain is another critical factor influencing long-term prognosis. Evidence indicates that a small percentage of patients experience persistent pain following hernia repair, regardless of whether mesh is used. [15] Analyses show no significant difference in long-term pain prevalence between mesh and non-mesh repairs, and the use of lightweight mesh may reduce discomfort and improve patient comfort without increasing recurrence rates. These findings suggest that appropriate selection of mesh type can optimize long-term outcomes while maintaining the benefits of reduced recurrence [16]. The comparative analysis of emergency inguinal hernia repair techniques demonstrates that mesh-based repair offers superior long-term durability, with significantly lower recurrence rates and faster functional recovery compared to non-mesh methods, while both techniques show comparable rates of short-term postoperative complications such as seroma and hematoma. Although surgical site infection rates were slightly higher in contaminated emergency cases where mesh was used, this difference was not consistently statistically significant, and non-mesh repair was associated with shorter

operative time, particularly beneficial for unstable or high-risk patients. Length of hospital stay did not differ markedly between groups, though complications prolonged hospitalization, and chronic postoperative groin pain occurred at similar low rates in both approaches. Critically, patient-related factors such as obesity, smoking, advanced age, and comorbidities were strongly associated with increased morbidity regardless of technique, and emergency presentations involving strangulation or bowel resection significantly worsened outcomes. Based on these findings, mesh repair should be the preferred technique in the absence of significant contamination, while non-mesh repair remains a reasonable option in contaminated fields or when mesh is contraindicated. Recommendations emphasize individualized patient selection, preoperative optimization of modifiable risk factors, strict aseptic protocols, and adequate surgeon training in both techniques. The use of lightweight or biocompatible mesh materials is advised to reduce chronic pain, and structured follow-up programs should be established to monitor complications and patient-reported outcomes, with further multicenter randomized studies needed to strengthen the evidence base.

Conclusion

In conclusion, this review provides evidence-based guidance for surgeons confronting the difficult decision of technique selection in emergency inguinal hernia repair. Mesh repair should be considered the preferred approach in the absence of significant contamination, offering superior long-term recurrence prevention without increased chronic pain. Non-mesh repair remains a valuable alternative in contaminated fields or when mesh is contraindicated. Ultimately, the optimal outcome depends not on a universal technique, but on the thoughtful, individualized application of surgical principles, careful patient selection, and systematic attention to perioperative risk modification. Through such tailored approaches, surgeons can optimize both short-term recovery and long-term quality of life for patients requiring emergency groin hernia repair.

Conflict of interest. Nil

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