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Original Research Article

Comparison of Complications in Hernia Repair with and Without Mesh: A Prospective Study

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Abstract:

Objective: To evaluate the benefits and harms of different inguinal and femoral hernia repair techniques in adults, specifically comparing closure with mesh versus without mesh.

Methods: This prospective study included 100 patients with hernias who were divided into two groups: Group A (n=50) underwent hernia repair with mesh, and Group B (n=50) underwent hernia repair without mesh. Complications and outcomes assessed included hernia recurrence, complications (neurovascular or visceral injury, hematoma, seroma, testicular injury, infection, postoperative pain), mortality, postoperative hospital stay, and time to return to activities of daily living. The data were analyzed using appropriate statistical methods.

Results: In Group A, none of the patients experienced hernia recurrence, indicating a successful outcome. However, 8% of patients developed wound infections, 2% experienced neurovascular injuries, and 6% had seroma formation. Additionally, 1% of patients had hinoma formation and Scotals Valley complication. In contrast, 6% of patients in Group B experienced hernia recurrence, while wound infection occurred in 2% of patients. Neurovascular injuries were observed in 6% of patients, and hinoma formation was observed in 4% of patients. No cases of seroma formation were reported in Group B. Similar to Group A, 6% of patients in Group B had Scotals Valley complications.

Conclusion: The use of mesh in hernia repair procedures was associated with a lower recurrence rate compared to repairs performed without mesh. However, both groups experienced complications, including wound infections, neurovascular injuries, hinoma formation, seroma formation, and Scotals Valley complications. Careful consideration of patient-specific factors, surgical technique, and postoperative management are crucial to optimize outcomes and minimize complications. Further research is needed to validate these findings and explore long-term durability and patient satisfaction.

Keywords: Hernia, Mesh, Complications, Recurrence, Hernia Repair, Outcomes.

Introduction

Hernias are a common medical condition characterized by the protrusion of an organ or part of an organ through the body wall that normally contains it. Abdominal wall hernias, including groin hernias, are particularly prevalent. [1] In the general population, abdominal wall hernias have a prevalence of around 4% for individuals aged over 45 years. Among groin hernias, 96% are inguinal hernias, while the remaining 4% are femoral hernias.

Inguinal hernias are more common in both men and women, accounting for 75% of all abdominal wall hernias. [2] Men have a significantly higher risk of developing a groin hernia compared to women. In fact, men are eight times more likely to develop a groin hernia and twenty times more likely to require a groin hernia repair. The estimated lifetime risk of groin hernia in men is approximately 27%, while it is only 3% in women. [3] There are several patient-related factors associated with the development of inguinal hernias. Men face a higher risk due to inherent weakness in the inguinal canal resulting from fetal testicular descent. Aging contributes to the weakening of abdominal wall muscles and tissues, thereby increasing hernia likelihood. [4] A familial history of inguinal hernias suggests a genetic predisposition. Connective tissue disorders, such as Marfan syndrome and Ehlers-Danlos syndrome also weaken the tissues and increases the risk. [5]

Chronic coughing or straining, as observed in COPD or constipation exerts an additional pressure on the abdominal walls. Obesity strains abdominal muscles, and individuals with a prior hernia or

women who have undergone pregnancy and childbirth are also at increased risk due to weakened abdominal muscles. The standard treatment for all hernias is surgical repair, regardless of their origin or type. The primary goal of hernia repair surgery is not only to address the existing hernia defect but also to minimize the risk of recurrence. [6] The recurrence rates for primary hernia repair vary between 0.5% and 15% depending on factors such as the location of the hernia, the type of repair performed, and individual clinical circumstances. [7] Groin hernia repairs can be conducted with or without the use of a mesh, which is also referred to as hernioplasty or herniorrhaphy, respectively. Meshes used in hernia repair are typically made from an inert, synthetic polymer, commonly polypropylene.

These meshes are lightweight, flexible, and designed to prevent obstruction of local structures and allow for positional movement. They are secured in place using partially dissolvable sutures or a fibrin glue, with the latter potentially providing a more effective seal. Mesh repair involves covering the hernial defect by positioning the mesh on one of the layers of the abdominal wall. This can be accomplished through an open approach or a minimally invasive laparoscopic technique. The choice of repair approach depends on various factors, including the type of hernial defect, patient-specific considerations, and the surgeon's preference. [8] In open repair, the hernia is typically addressed anteriorly to the defect, while laparoscopic repair involves a posterior approach. The use of prosthetic mesh in hernia surgery, whether performed via an open or laparoscopic method, is increasingly adopted as part of a tension-free repair strategy. In the past and even today, non-mesh repairs have been widely utilized for the treatment of hernias, especially in low-income countries where surgical interventions are primarily performed as emergency procedures rather than elective surgeries. [9] It is estimated that fewer than 5% of hernias worldwide are repaired using implanted mesh. The preference for non-mesh repairs in these settings could be attributed to various factors, including limited availability of mesh, cost considerations, surgical expertise, and local surgical practices. The study aims to evaluate the benefits and potential risks of both the surgical approaches for inguinal and femoral hernia repair in adult patients, specifically comparing closure with mesh versus closure without mesh. It aims to assess various outcomes, including hernia recurrence, complications such as neurovascular or visceral injury, haematoma, seroma, testicular injury, infection, and postoperative pain which have a significant impact on patient outcomes and recovery.

Material and Method

Study Design: This study employed a prospective comparative design to evaluate the benefits and risks of inguinal and femoral hernia repair techniques with and without mesh. The study was conducted at Civil Hospital Bharuch, including 100 adult patients. The study protocol was reviewed and approved by the Institutional Ethics Committee of Civil Hospital Bharuch. Patient confidentiality and data protection were strictly ensured throughout the study.

Patient Selection & Sample Size: Patients presenting with inguinal or femoral hernias at Civil Hospital Bharuch were assessed for eligibility. Informed consent was obtained from each participant prior to enrollment. Patients were then divided into two groups: Group A (mesh closure) and Group B (non-mesh closure). The sample size was determined based on previous studies, considering the expected effect size, statistical power, and significance level to achieve adequate precision in our results. A total of 100 patients (50 in each group) were included in the study.

Intervention: Group A underwent hernia repair using mesh closure technique, while Group B received hernia repair without mesh closure. The choice of technique was based on surgeon preference and individual patient characteristics.

Outcome Measures: The primary outcome measure was hernia recurrence, assessed through physical examination and medical records during follow-up visits. Secondary outcome measures included complications (wound infections, neurovascular injuries, hinoma formation, seroma formation, and Scotals Valley), mortality, and duration of operation, postoperative hospital stay, and time to return to activities of daily living.

Data Collection & Statistical Analysis: Data on patient demographics, hernia characteristics, surgical technique used, and intraoperative findings were collected for each patient. Outcome measures were recorded during follow-up visits at regular intervals. Complications and adverse events were documented, and their severity and management were noted. Data analysis was performed using appropriate statistical tests. Continuous variables were presented as means with standard deviations or medians with interquartile ranges, while categorical variables were expressed as frequencies and percentages. Group comparisons were made using the appropriate statistical tests, such as the t-test or Mann-Whitney U test for continuous variables and the chi-square test or Fisher's exact test for categorical variables.

Results

Table 1 describes the distribution of patients based on age and gender. The sample consisted of

individuals across various age groups, ranging from 20 to 70 years. Among the patients, 10 (10%) fell into the 20-30 years age group, 15 (15%) were in the 30-40 years age group, 50 (50%) belonged to the 40-50 years age group, 30 (30%) were in the 50-60 years age group, and 5 (5%) were in the 60-70 years age group. In terms of gender, the majority of patients were male, with 96 (96%) being male and 4 (4%) being female.

Table 1: Demographic details of the patients

Parameter	**No. of Patients**
Age	
20-30 years	10
30-40 years	15
40-50 years	50
50-60 years	30
60-70 years	5
Age	
Male	96
Female	4

The number of patients suffering from different types of hernia was shown in table no: 2. among the patients, the most common type of hernia observed was direct inguinal hernia, accounting for 60% of the cases. Indirect inguinal hernia was the second most prevalent, comprising 30% of the cases. A smaller proportion of patients, 6%, presented with irreducible inguinal hernia, while 4% had obstructed inguinal hernia.

Table 2: Distribution of Hernia in patients

Type of Hernia	**No. of Patients**
Direct Inguinal Hernia	60
Indirect Inguinal Hernia	30
Irreducible Inguinal Hernia	6
Obstructed Inguinal Hernia	4

In our study, we compared the complications associated with or without mesh in hernia patients between two groups, Group A and Group B. The results, as presented in Table 3, showed the following complications:

In Group A, none of the patients experienced hernia recurrence, indicating a successful outcome. However, 8% of patients developed wound infections, while 2% experienced neurovascular injuries and hinoma formation.

Additionally, 6% of patients had seroma formation and Scotals Valley complication. In contrast, 6% of patients in Group B experienced hernia recurrence, highlighting a higher risk compared to Group A. Wound infection occurred in only 2% of patients, and 6% of patients sustained neurovascular injuries. Hinoma formation was observed in 4% of patients, while no cases of seroma formation were reported. Similar to Group A, 6% of patients in Group B had Scotals Valley complications. These findings suggest that the use of mesh in hernia repair procedures may be associated with reduced recurrence rates compared to procedures performed without mesh. However, complications such as wound infections, neurovascular injuries, hinoma formation, seroma formation, and Scotals Valley complications can still occur in both groups.

Table 3: Complications with or without mesh in Hernia in both the groups

Complications	**Group A N (%)**	**Group B N (%)**
Recurrence	0	3 (6)
Wound Infection	4 (8)	1 (2)
Neuro Vascular Injury	1 (2)	3 (6)
Hinoma	1 (2)	2 (4)
Seroma	3 (6)	0
Scotals Valley	3 (6)	3 (6)

Discussion

Hernia represents a significant healthcare burden and poses a major problem globally. It is estimated that millions of individuals are affected by hernias, and the condition can significantly impact their quality of life.

Surgical intervention is crucial in the management of hernias, aiming to not only alleviate symptoms but also reduce the risk of complications and hernia recurrence. [10] The choice of surgical approach is a critical decision in hernia repair. Surgeons must consider several factors, including the type and size of the hernia, the patient's overall health, and the surgeon's expertise and preference. Traditionally, non-mesh repairs were commonly performed, relying on sutures or techniques to close the hernia defect. However, the use of mesh in hernia repair has gained increasing acceptance due to its potential advantages.

In present study the demographic details of the patients enrolled provided a valuable insight into the distribution of age and gender within the sample. The age range of the patients varied from 20 to 70 years, reflecting a diverse representation of individuals across different stages of adulthood. The majority of patients were in the middle-aged groups, with the highest proportion (50%) falling within the 40-50 years age range. This finding aligns with previous studies that have reported an increased prevalence of hernias in middle-aged individuals. [11] The sample included a smaller proportion of patients in the younger and older age groups, with 10% in the 20-30 years range and only 5% in the 60-70 years range.

The study results revealed a predominant presence of male patients, accounting for 96% of the total sample, whereas females constituted only 4% of the participants. This finding is consistent with the established higher risk of hernias among males compared to females. It is well-known that males are more predisposed to developing hernias due to anatomical factors, such as the natural weakness in the inguinal canal resulting from the descent of the testicles during fetal development. [12] Although the prevalence of hernias in females is generally lower, it is essential to consider that hernias can still occur in female population and may present with different clinical characteristics.

On study of distribution of hernia types among the patients the findings indicate that direct inguinal hernia was the most prevalent type, accounting for 60% of the cases. This is consistent with previous studies that have reported direct inguinal hernia as the most common form of hernia. The higher prevalence of direct inguinal hernia observed in this study can be attributed to several factors. [13]

The natural anatomical vulnerability of the inguinal region in men, acquired weaknesses in the abdominal wall with age, and risk factors such as chronic straining or increased intra-abdominal pressure. The second most prevalent type observed in our study was indirect inguinal hernia, which constituted 30% of the cases. Indirect inguinal hernias are characterized by the passage of abdominal contents through the internal inguinal ring and can be attributed to an anatomical defect in the inguinal canal. [14] A smaller proportion of patients, 6%, presented with irreducible inguinal hernia. Irreducible inguinal hernias occur when the hernia contents cannot be manually reduced back into the abdominal cavity. This may be due to adhesions, incarcerated contents, or other factors. Only 4% of the patients had obstructed inguinal hernia. Obstructed inguinal hernias are characterized by a blockage of the hernia contents, leading to impaired blood supply and potential complications. These findings highlight the diversity of hernia types within the study population and have distinct anatomical features and require tailored surgical approaches. [15]

Complications following hernia repair procedures can significantly impact patient outcomes and the success of the surgical intervention. These complications may include hernia recurrence, wound infections, neurovascular injuries, hinoma formation, seroma formation, and Scotals Valley complications. [16,17,18] Our study compared the complications observed in Group A and Group B and the findings revealed that In Group A, the use of mesh resulted in a notable absence of hernia recurrence, indicating a successful outcome in terms of preventing hernia relapse. 8% of patients in Group A experienced wound infections, indicating a potential complication associated with the surgical procedure. Additionally, neurovascular injuries and hinoma formation were observed in 2% of patients, while seroma formation and Scotals Valley complications affected 6% of patients in this group. In contrast, Group B demonstrated a higher recurrence rate of 6%, indicating a greater risk of hernia relapse in procedures performed without mesh. the incidence of wound infections was lower in Group B, affecting only 2% of patients. Neurovascular injuries occurred in 6% of patients, hinoma formation was observed in 4%, and no cases of seroma formation were reported. [19,20,21]

Our findings suggest that incorporating mesh in hernia repair procedures may contribute to lower recurrence rates compared to repairs performed without mesh as mesh provides additional support and reinforcement to the weakened or damaged tissue in the abdominal wall. It acts as a scaffold, bridging the gap and effectively closing the hernia

defect. This strengthens the repair and reduces the likelihood of the hernia recurring.

Conclusion

Our study aimed to evaluate the benefits and harms of hernia repair techniques with and without mesh in adult patients. The findings demonstrated that the use of mesh in hernia repair procedures resulted in a lower recurrence rate compared to repairs performed without mesh. This highlights the effectiveness of mesh in providing additional support and reinforcement to the weakened abdominal wall, reducing the risk of hernia relapse. However, complications can still occur in both mesh and non-mesh repairs.

Wound infections, neurovascular injuries, hinoma formation, seroma formation, and Scotals Valley complications were observed in varying frequencies in both groups.

Close monitoring and proper management of complications are essential to ensure successful outcomes in hernia repair surgeries. Further research with larger sample sizes and longer follow-up periods is warranted to validate our findings and explore other relevant outcomes, such as long-term durability, patient satisfaction, and cost-effectiveness.

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