

Prosthetic Mesh Repair in Obstructed Inguinal Hernia: A Research Analysis

Dr. Shailendra Kumar¹, Dr. Ranjan Kumar²

¹Senior Resident Department of General Surgery JLNMCBhagalpur Bihar, India

²PG Resident Department of General Surgery JLNMCBhagalpur Bihar, India

Abstract: ***Introduction:** Inguinal hernia is a commonly encountered urgent condition in surgical clinics. An abdominal wall hernia is a protrusion of the abdominal tissues or organs through a weakness in the muscular structure of the wall of the abdomen. Inguinal and femoral hernias are usually classified together as groin hernias. **Objective of the study:** The main objective of the study was to compare the outcomes of different surgical techniques performed for inguinal hernia, and to evaluate the effect of prosthetic mesh repair in obstructed inguinal hernia. **Methodology of the study:** This retrospective study was performed with 70 patients who had been admitted to our hospital's emergency department between May 2018 and May 2019 to undergo surgery for a diagnosis of obstructed inguinal hernia. **Results:** The patients were divided into two groups based on the applied surgical technique. In Group 1, it was observed that eight of the patients had wound infections, while two had hematomas, four had seromas, and one had relapse. In Group 2, one of the patients had a wound infection, while three had hematomas, one had seroma, and none had relapses. In Group 3, it was observed that one of the patients had wound infections, while one had a hematoma, one patient had seroma, and none had relapses. In Group 4, seven of the patients had wound infections, while one had a hematoma, three had seromas, and one had a relapse. **Conclusion:** There were no significant differences between the two groups with respect to wound infection, seroma, hematoma, or relapse ($p > 0.05$). In urgent groin hernia repair surgeries, polypropylene mesh can be safely used even in the patients undergoing bowel resection.*

Keywords: Incarcerated, inguinal hernia, prosthetic mesh

1. Introduction

Worldwide, more than 20 million patients undergo groin hernia repair annually. The many different approaches, treatment indications and a significant array of techniques for groin hernia repair warrant guidelines to standardize care, minimize complications, and improve results. The main goal of these guidelines is to improve patient outcomes, specifically to decrease recurrence rates and reduce chronic pain, the most frequent problems following groin hernia repair. They have been endorsed by all five continental hernia societies, the International Endo Hernia Society and the European Association for Endoscopic Surgery. Inguinal hernia is a commonly encountered urgent condition in surgical clinics. An abdominal wall hernia is a protrusion of the abdominal tissues or organs through a weakness in the muscular structure of the wall of the abdomen. Inguinal and femoral hernias are usually classified together as groin hernias. It is believed that the prevalence of groin hernias in a population varies between 3% and 8%. Between 75% and 85% of all hernias are observed in men. Inguinal hernias account for 80–83% of all hernias (59% indirect inguinal hernias, 25% direct inguinal hernias, 5% femoral hernias). The most common hernias in both genders is inguinal hernia; however, femoral hernias are reported to be more common in women than in men¹⁻³.

Obstructed inguinal hernia is a commonly encountered urgent surgical condition, and tension-free repair is a well-established method for the treatment of non-complicated cases. However, due to the risk of prosthetic material-related infections, the use of mesh in the repair of strangulated or incarcerated hernia has often been the subject of debate. Recent studies have demonstrated that biomaterials represent suitable materials for performing urgent hernia repair. Certain studies recommend mesh repair only for

cases where no bowel resection is required; other studies, however, recommend mesh repair for patients requiring bowel resection as well⁴.

Tissue repair technique was preferred. Patients in Group 1 were further divided into two sub-groups: one consisting of patients undergoing bowel resection (Group 3), and the other consisting of patients not undergoing bowel resection (Group 4). Thus, Group 3 anti-biotherapy included patients who underwent mesh repair in addition to bowel resection, while Group 4 consisted of patients not assigned for bowel resection who underwent mesh repair.

All the patients were administered a single prophylactic dose of antibiotics; patients who underwent bowel resection received anti-biotherapy for an additional two to four days.

1.1 Ethical approval

Ethics committee approval was received for this study.

1.2 Statistical analysis

The Statistical Package for the Social Sciences (SPSS version 16.0) for Windows software package was used in data collection and statistical analysis. The Chi-square test and U test were used for statistical analysis. P values < 0.05 were considered to be statistically significant.

1.3 Objective of the study

The main objective of the study was to compare the outcomes of different surgical techniques performed for inguinal hernia, and to evaluate the effect of prosthetic mesh repair in obstructed inguinal hernia.

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2. Materials and Methods

This retrospective study was performed with 70 patients who had been admitted to our hospital's emergency department between May 2018 and May 2019 to undergo surgery for a diagnosis of obstructed inguinal hernia. Patients who died in the postoperative period due to systemic complications, as well as those who were lost during the follow-up period, were excluded from the study. The patients were divided into two groups based on the applied surgical technique. Group 1 consisted of 35 patients treated with mesh-based repair techniques, while Group 2 consisted of 35 patients treated with tissue repair techniques. The surgical technique to be applied was selected by the surgeons. The Lichtenstein procedure was used for obstructed inguinal hernia patients where mesh-based repair was preferred, while the Bassini procedure was used for obstructed inguinal hernia patients where the

3. Results

Mesh-based repair techniques were performed on the 35 patients comprising Group 1, while tissue repair techniques were performed on the 35 patients comprising Group 2. In this study, 81.5% of the patients were male, while 18.5% were female. Female patients had a significantly higher ratio of femoral hernia than male patients, while male patients had a significantly higher ratio of inguinal hernia than female patients ($p < 0.05$).

In Group 3 (table 1), 6.7% (1) of the patients had wound infections, while 6.7% had hematomas, 6.7% had seromas, and none had relapses. In Group 4, 7.2% of the patients had wound infections, while 1% had hematomas, 3% had seromas, and 1% had relapses. There were no statistically significant differences between the two groups in terms of wound infection, seroma, hematoma, or relapse ($p > 0.05$).

Table 1: Statistical analyses of complications for 70 patients who underwent surgical treatment with mesh-based repair

	Group 3 (Mesh-based repair with bowel resection)	Group 4 (Mesh-based repair without bowel resection)	Significant value P*
Wound infection	26.7%	7.1%	0.946
Hematoma	6.1%	3%	0.131
Seroma	6.3%	1%	0.497
Relapse	0%	1%	

P* < 0.05

In Group 3 and Group 4 (table 7), 26% and 7.1% of the patients had comorbidities, respectively. In Group 3, the mean age of the patients was 62.6 years (range: 32–82 years), the mean hospitalization time was 5.73 months (range: 5–7 months), and the mean follow-up period was 37.8 months (range: 6–67 months). In Group 4, the mean age of the patients was 52.1 years (range: 16–94 years), the mean hospitalization time was 1.7 months (range: 1–8 months), and the mean follow-up period was 33.7 months (range: 7–62 months). Patients belonging to Group 3 had significantly higher comorbidity rates, higher mean age, and longer hospitalization times ($p < 0.05$). There were no

statistically significant differences between the two groups in terms of the mean follow-up period ($p > 0.05$).

Table 2: Comorbidities, mean age, hospitalization time and follow-up period for 112 patients who underwent surgical treatment with mesh-based repair

	Group 3 (Mesh-based repair with bowel resection)	Group 4 (Mesh-based repair without bowel resection)	Significant value P*
Comorbidities	26.7%	7.1%	0.010
Mean age	62.67 S.D= 17.9	52.18 SD: 18.98	0.034
Hospitalization time	5.7 S.D= 0.70	1.78 SD: 18.98	<0.0001
Follow up period	37.86 S.D= 16.24	33.73 SD: 17.07	0.343

P* < 0.05

It was determined that (table 3) 8.92% of the patients in Group 1, and 20.51% of the patients in Group 2 had comorbidities. In Group 1, the mean age of the patients was 53.54 years (range: 16–94 years), the mean hospitalization time was 2.27 days (range: 1–8 days), and the mean follow-up period was 37.3 months (range: 6–67 months). In Group 2, the mean age of the patients was 49.41 years (range: 9–85 years), the mean hospitalization time was 2.12 months (range: 1–17 months), and the mean follow-up period was 40.1 months (range: 2–62 months). There were no statistically significant differences between the two groups in terms of mean age, hospitalization time, and follow-up period ($p > 0.05$).

Table 3: Comorbidities, mean age, hospitalization time and follow-up period for 70 patients who underwent surgical treatment for incarcerated hernias

	Group 1 (Mesh-based repair)	Group 2 (Tissue repair)	Significant value P*
Comorbidities	8.7%	20.1%	0.055
Mean age	53.54 S.D= 19.01	49.41 SD: 21.63	0.036
Hospitalization time	2.27 S.D= 1.58	49.41 SD: 2.78	0.234
Follow up period	37.86 S.D= 16.35	40.10 SD: 16.07	0.317

P* < 0.05

4. Discussion

Obstructed inguinal hernia is one of the most common urgent surgical conditions. Ten percent of patients with inguinal hernia present with incarceration, and require urgent surgical procedures. For inguinal hernias, the risk of strangulation varies between 0.29% and 2.9%. Nearly 15% of all inguinal hernia repairs are associated with relapses, and most of them occur following old surgical techniques that do not include a mesh-repair. Although modern inguinal hernioplasty techniques do not affect mortality rates following incarceration, they are highly effective in reducing the relapse rate⁷. The most commonly used prosthetic materials in tension-free mesh repair are polymers, polypropylene, and polyester. Polypropylene is the most preferred of these, since it provides the best prosthesis

leading to fibroblast activation. The pore size of the mesh is also important. With pore sizes larger than 75 μm , it is easier for macrophages to penetrate the tissue, which helps to minimize the risk of infection⁸.

Although tension-free mesh repair is considered to be the gold standard surgical procedure in inguinal hernia repair under elective conditions, it is not recommended for strangulated hernia repair since it may increase the risk of wound infection. However, recent studies have reported that strangulation is no longer a contraindication for tension-free mesh repair⁹⁻¹⁹. However, other studies report mesh as a potential cause of wound infection, describing that it may be necessary to perform mesh removal to limit the risk of infection²⁰⁻²¹.

Papaziogas et al.⁴ conducted a study of 75 patients with incarcerated hernia who underwent surgery in their study, where 33 patients were assigned to the tension-free mesh repair group (Group A), while 42 patients underwent hernioplasty with the Bassini procedure (Group B); the outcomes in both groups were then compared. Two patients in Group A and four patients in Group B had wound infections; however, no statistically significant difference was identified between the groups. In Group B, hospitalization time was significantly longer. The mean follow-up period was nine years. One patient in Group A and two patients in Group B experienced relapse. This study reported that the use of polypropylene mesh in strangulated hernias can be considered safe.

In the current study, only one patient exhibited relapse. In this case, the mesh was removed after the patient developed a wound-infection in the postoperative period, and the relapse occurred approximately one year later. There were no statistically significant differences between the groups with respect to hematoma, seroma, or relapse.

In a retrospective study previously performed by Dahlstrand et al.²⁴ on 8208 patients in Sweden between 1992 and 2006, it was reported that femoral hernias were significantly more common among women than men. The study revealed that being female and having femoral hernias increased the risks of incarceration, bowel resection, complications, and mortality. In the same study, it was also reported that older age had a noticeable impact on bowel resection and mortality rates. A number of studies have reported that performing bowel resection increases the complication rates in incarcerated inguinal hernias, while the type of mesh used is not directly associated with postoperative complications¹⁶.

Certain authors claim that even when bowel resection is performed, the use of polypropylene mesh for implantation does not increase the risk of wound infection in strangulated hernia repair²³⁻²⁴. The current study similarly reported no statistically significant differences in terms of hematoma, seroma and relapse occurrence between patients who received mesh repair in addition to bowel resection, and patients who only had mesh repair. There were also no statistically significant differences between Group 3 and Group 4 with respect to the mean follow-up period.

5. Conclusion

The current study revealed that the use of polypropylene mesh in incarcerated inguinal hernia repair has no negative effect on wound infection or complications. Considering the fact that traditional tissue repair techniques can increase the risk of relapse, the current study results revealed that polypropylene mesh can be used safely in urgent groin hernia repair, even in cases where bowel resection is required.

6. Limitations of the Study

Limitations of our study include the fact that the surgeries were performed by the same surgeon; the fact that the study was retrospective, and the lack of standardization between the groups. As this study is a clinical trial, there was only a weak correlation in parameters such as gender and age, while performing comparisons between different groups was inevitably necessary.

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