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COMPARATIVE EVALUATION OF MESH VERSUS NON-MESH REPAIR IN SELECTED ABDOMINAL WALL HERNIAS: POSTOPERATIVE PAIN, COMPLICATIONS, AND RECURRENCE

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ABSTRACT

Background: Abdominal wall hernias are commonly encountered in surgical practice and require operative repair to prevent pain, functional limitation, and recurrence. Mesh repair provides tension-free reinforcement of the abdominal wall, whereas non-mesh repair depends on anatomical approximation of fascial margins. The choice of technique may influence postoperative pain, complications, recovery, and recurrence. **Aim:** The aim of this study was to compare mesh versus non-mesh repair in selected abdominal wall hernias with respect to postoperative pain, complications, and recurrence.

Materials and Methods: This hospital-based comparative observational study was conducted in the Department of Surgery at a tertiary care hospital. A total of 108 patients with selected abdominal wall hernias were included and divided into two groups. Group A included 54 patients who underwent mesh repair, while Group B included 54 patients who underwent non-mesh anatomical repair. Demographic profile, type of hernia, defect size, operative time, drain placement, hospital stay, return to routine activity, postoperative pain score, complications, and recurrence were recorded. Postoperative pain was assessed using the Visual Analogue Scale. Data were entered in Microsoft Excel and analysed using SPSS version 27.0. A p-value of less than 0.05 was considered statistically significant.

Results: The mean age was 45.78 ± 12.64 years in the mesh group and 44.26 ± 13.18 years in the non-mesh group. Paraumbilical hernia was the most common type, seen in 36 patients (33.33%). Larger defects were more commonly repaired with mesh, and defect size distribution was statistically significant (p=0.018). Mean operative time was significantly higher in the mesh group (61.42 ± 14.36 minutes) than in the non-mesh group (48.75 ± 12.82 minutes) (p<0.001). Drain placement was also higher in the mesh group (57.41% vs 22.22%, p<0.001). Return to routine activity was earlier after mesh repair (11.82 ± 3.54 days) compared with non-mesh repair (14.26 ± 4.18 days) (p=0.001). Postoperative pain scores were comparable between groups. Overall complications were 25.93% in the mesh group and 37.04% in the non-mesh group (p=0.214). Recurrence was significantly lower in the mesh group (3.70%) than the non-mesh group (14.81%) (p=0.046).

Conclusion: Mesh repair was associated with longer operative time and greater drain usage but resulted in earlier return to routine activity and significantly lower recurrence. Postoperative pain and overall complications were comparable between both groups.

Keywords: Abdominal wall hernia; Mesh repair; Non-mesh repair; Postoperative pain; Recurrence.

INTRODUCTION

Abdominal wall hernias are among the most frequently encountered conditions in general surgical practice and include umbilical, paraumbilical, epigastric, incisional, and other ventral hernias. They occur when abdominal contents protrude through a weakness or defect in the musculoaponeurotic layer of the abdominal wall. Although some hernias may remain minimally symptomatic for a period of time, many patients present with swelling, dragging discomfort, pain, cosmetic concern, or functional limitation. In untreated cases, hernias may gradually increase in size and may be complicated by irreducibility, obstruction, strangulation, skin changes, or recurrent episodes of pain. Surgical repair remains the definitive treatment for symptomatic abdominal wall hernias, and the choice of repair technique continues to influence postoperative recovery, complication profile, patient comfort, and long-term recurrence.[1] The principles of hernia surgery have evolved from simple anatomical tissue approximation to tension-free reinforcement using prosthetic materials. Non-mesh repair, also known as primary suture or anatomical repair, involves approximation of the fascial margins without prosthetic reinforcement. This technique may be preferred in small defects, clean cases with adequate tissue strength, or situations where mesh placement is considered unsuitable. However, tension at the repair site, poor tissue quality, obesity, chronic cough, constipation, wound infection, and previous abdominal surgery may increase the possibility of failure after tissue repair. Mesh repair, on the other hand, aims to strengthen the defect by distributing tension over a wider area, thereby improving mechanical support to the abdominal wall.[2] The use of mesh has become an important component of modern abdominal wall reconstruction. Mesh can be placed in different anatomical planes, including onlay, sublay, preperitoneal, retromuscular, and intraperitoneal positions, depending on the type of hernia, size of the defect, surgeon's preference, and available expertise. Selection of an appropriate mesh plane is important because it may influence wound morbidity, seroma formation, infection risk, postoperative pain, foreign body sensation, and recurrence. In midline incisional hernias, restoration of the abdominal wall anatomy and closure of the fascial defect are considered important goals of repair, and mesh reinforcement is commonly used when feasible to provide durable support.[3] Despite the advantages of mesh reinforcement, concerns remain regarding mesh-related complications. These include seroma, surgical site infection, chronic pain, foreign body sensation, mesh infection, sinus formation, adhesion-related problems, and rarely the need for mesh removal. These concerns are particularly relevant in patients with comorbidities, contaminated wounds, poor soft tissue coverage, or large defects requiring extensive dissection. At the same time, non-mesh repair avoids implantation of a foreign material but may be associated with greater tension at the suture line and a higher chance of recurrence in selected cases. Therefore, the decision between mesh and non-mesh repair should be individualized after considering defect size, location, tissue quality, patient factors, wound condition, and expected postoperative compliance.[4] Postoperative pain is an important outcome after abdominal wall hernia repair because it affects early ambulation, respiratory effort, duration of hospital stay, return to routine activity, and overall patient satisfaction. Pain may arise due to tissue dissection, sutures under tension, mesh fixation, nerve irritation, inflammatory reaction, or wound complications. Early postoperative pain is expected after both mesh and non-mesh repair, but persistence of pain beyond the usual healing period may affect quality of life. Therefore, assessment of pain using a standard scoring system such as the Visual Analogue Scale helps in objectively comparing the two techniques and understanding patient recovery after surgery.[5] Postoperative complications are another major determinant of surgical outcome. Seroma, haematoma, wound infection, wound dehiscence, urinary retention, and chronic pain may delay recovery and increase hospital visits. In mesh repair, seroma formation may be related to wider tissue dissection and dead space creation, while infection is important because it may compromise the prosthetic material. In non-mesh repair, complications may result from suture line tension, tissue ischemia, wound contamination, or patient-related risk factors. Careful patient selection, proper surgical technique, haemostasis, appropriate antibiotic use, drain placement when required, and regular follow-up are necessary to reduce postoperative morbidity.[6]

MATERIALS AND METHODS

This hospital-based comparative observational study was conducted in the Department of Surgery at a tertiary care hospital. The study included patients diagnosed with selected abdominal wall hernias who underwent either mesh repair or non-mesh anatomical repair. The objective was to compare postoperative pain, early and late postoperative complications, and recurrence between the two repair techniques. A total of 108 patients with selected abdominal wall hernias were included in the study. Patients were divided into two groups based on the type of surgical repair performed. Group A included patients who underwent mesh repair, while Group B included patients who underwent non-mesh repair. The decision regarding the type of repair was made according to the clinical condition of the patient, type and size of hernia defect, tissue quality, surgeon's assessment, and suitability for mesh placement.

Inclusion Criteria

Patients of adult age group presenting with selected abdominal wall hernias and planned for elective

surgical repair were included in the study. Patients who were clinically fit for surgery and willing to undergo postoperative follow-up were considered eligible. Cases included commonly encountered abdominal wall hernias such as paraumbilical hernia, umbilical hernia, epigastric hernia, and incisional hernia, depending on institutional case selection.

Exclusion Criteria

Patients with strangulated hernia, obstructed hernia requiring emergency surgery, recurrent hernia previously repaired with mesh, gross local infection, uncontrolled systemic illness, severe immunocompromised state, malignancy, pregnancy, and patients not willing for follow-up were excluded from the study. Patients in whom adequate postoperative assessment could not be performed were also excluded.

Methodology

All patients underwent detailed clinical evaluation including history, duration of swelling, pain, reducibility, cough impulse, previous abdominal surgery, and associated comorbidities such as diabetes mellitus, hypertension, chronic cough, constipation, obesity, smoking, and urinary symptoms. General physical examination, systemic examination, and local examination of the hernia were performed. Baseline investigations included complete blood count, renal function tests, liver function tests, blood sugar levels, coagulation profile, urine examination, chest X-ray, electrocardiogram, and other investigations as required. Ultrasonography of the abdomen and abdominal wall was performed wherever indicated to assess defect size, contents of sac, and associated pathology.

Surgical Procedure: All patients underwent surgical repair under appropriate anaesthesia after obtaining fitness for surgery. In the mesh repair group, the hernia sac was dissected, contents were reduced, excess sac was excised or dealt with appropriately, and the defect was reinforced using a suitable prosthetic mesh. Mesh placement was performed according to the type of hernia and intraoperative findings, such as onlay, sublay, or preperitoneal placement, as per standard surgical principles. In the non-mesh repair group, anatomical repair was performed by approximating healthy fascial margins with non-absorbable or delayed absorbable sutures without use of prosthetic material. Proper haemostasis was achieved in all cases, and drains were placed when required.

Postoperative Management: Postoperative care was provided according to standard hospital protocol. Patients were monitored for pain, wound condition, fever, seroma, haematoma, surgical site infection, urinary retention, respiratory complications, and other postoperative events. Analgesics, antibiotics, wound care, early ambulation, and supportive treatment were given as required. Drains, if placed, were removed based on drain output and clinical assessment. Patients were advised regarding wound care, avoidance of heavy lifting, control of cough or constipation, and regular follow-up.

Parameters Studied: The main parameters assessed were demographic profile, age, sex, body mass index, type of hernia, size of hernia defect, reducibility, associated comorbidities, history of previous abdominal surgery, type of repair performed, operative time, need for drain placement, duration of hospital stay, postoperative pain, wound complications, seroma, haematoma, surgical site infection, mesh-related complications, return to routine activity, and recurrence. Postoperative pain was assessed using a visual analogue scale or standard pain scoring system during the early postoperative period and follow-up visits. Complications were recorded clinically and classified as early or late postoperative complications.

Assessment of Postoperative Pain: Postoperative pain was assessed using a standard pain scoring method such as the Visual Analogue Scale, where patients were asked to grade their pain intensity. Pain was recorded in the immediate postoperative period and during follow-up visits. Requirement of analgesics and persistence of pain were also noted. Pain severity was compared between mesh and non-mesh repair groups to evaluate whether the type of repair influenced postoperative discomfort.

Assessment of Complications: Postoperative complications were assessed by clinical examination and patient symptoms. Early complications included wound pain, seroma, haematoma, surgical site infection, wound dehiscence, urinary retention, and fever. Late complications included chronic pain, foreign body sensation, mesh infection, sinus formation, and recurrence. Each complication was recorded separately in both groups and compared to evaluate the safety and outcome of mesh versus non-mesh repair.

Assessment of Recurrence: Recurrence was assessed during follow-up by clinical examination. A recurrent hernia was defined as the reappearance of a swelling or fascial defect at or near the previous operative site with or without cough impulse. Patients were examined for local swelling, pain, impulse on coughing, and reducibility. Ultrasonography was used when clinical findings were doubtful. Recurrence rates were compared between mesh and non-mesh repair groups.

Statistical Analysis

Data were entered into Microsoft Excel and analysed using **SPSS version 27.0**. Continuous variables such as age, operative time, postoperative pain score, and hospital stay were expressed as mean and standard deviation. Categorical variables such as sex, type of hernia, complications, and recurrence were expressed as frequency and percentage. Comparison between mesh and non-mesh repair groups was performed using the Chi-square test or Fisher's exact test for categorical variables and Student's t-test or Mann–Whitney U test for continuous variables, depending on data distribution. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 108 patients with selected abdominal wall hernias were included in the study. Out of these, 54 patients underwent mesh repair and 54 patients underwent non-mesh repair.

Distribution of patients according to demographic and clinical characteristics

In the present study, the mean age of patients in the mesh repair group was 45.78 ± 12.64 years, while in the non-mesh repair group it was 44.26 ± 13.18 years. The overall mean age of the study population was 45.02 ± 12.88 years. The difference in mean age between the two groups was not statistically significant, with a p-value of 0.542, indicating that both groups were comparable with respect to age. Regarding sex distribution, males were more commonly affected than females in both groups. In the mesh repair group, 32 patients (59.26%) were male and 22 patients (40.74%) were female. In the non-mesh repair group, 30 patients (55.56%) were male and 24 patients (44.44%) were female. Overall, there were 62 males (57.41%) and 46 females (42.59%) in the study. The difference in sex distribution between the two groups was not statistically significant, with a p-value of 0.697. The mean body mass index was 25.86 ± 3.84 kg/m² in the mesh repair group and 25.21 ± 3.69 kg/m² in the non-mesh repair group, with an overall mean BMI of 25.54 ± 3.76 kg/m². The difference was not statistically significant, with a p-value of 0.372. This shows that both groups were comparable in terms of body mass index. Among associated comorbidities, diabetes mellitus was present in 11 patients (20.37%) in the mesh repair group and 9 patients (16.67%) in the non-mesh repair group. Overall, 20 patients (18.52%) had diabetes mellitus. Hypertension was observed in 8 patients (14.81%) in the mesh repair group and 7 patients (12.96%) in the non-mesh repair group, with a total of 15 patients (13.89%) affected. Chronic cough or constipation was present in 12 patients (22.22%) in the mesh group and 10 patients (18.52%) in the non-mesh group, making a total of 22 patients (20.37%). Smoking history was present in 7 patients (12.96%) in the mesh group and 8 patients (14.81%) in the non-mesh group.

Distribution according to type of hernia and defect size

The distribution of hernia types was similar between the mesh and non-mesh repair groups. Paraumbilical hernia was the most common type of hernia in the study, observed in 36 patients (33.33%). Among these, 19 patients (35.19%) belonged to the mesh repair group and 17 patients (31.48%) belonged to the non-mesh repair group. Umbilical hernia was the second most common type, seen in 30 patients (27.78%), including 14 patients (25.93%) in the mesh group and 16 patients (29.63%) in the non-mesh group. Incisional hernia was present in 25 patients (23.15%), with 13 patients (24.07%) in the mesh repair group and 12 patients (22.22%) in the non-mesh repair group. Epigastric hernia was observed in 17 patients (15.74%), including 8 patients (14.81%) in the mesh group and 9 patients (16.67%) in the non-mesh group. The distribution of different hernia types between the two groups was not statistically significant, with a p-value of 0.952, indicating that the type of hernia was comparable in both groups. When defect size was analysed, 27 patients (25.00%) had a defect size of less than 2 cm. Out of these, 8 patients (14.81%) were in the mesh repair group and 19 patients (35.19%) were in the non-mesh repair group. Defect size between 2 and 4 cm was the most common category, seen in 58 patients (53.70%), including 30 patients (55.56%) in the mesh group and 28 patients (51.85%) in the non-mesh group. Defect size more than 4 cm was present in 23 patients (21.30%), with 16 patients (29.63%) in the mesh group and 7 patients (12.96%) in the non-mesh group. The difference in defect size distribution between the two groups was statistically significant, with a p-value of 0.018.

Operative and postoperative parameters

The mean operative time was 61.42 ± 14.36 minutes in the mesh repair group and 48.75 ± 12.82 minutes in the non-mesh repair group. The overall mean operative time was 55.09 ± 14.67 minutes. The difference was statistically significant, with a p-value of <0.001. Drain placement was required in 31 patients (57.41%) in the mesh repair group and 12 patients (22.22%) in the non-mesh repair group. Overall, drains were placed in 43 patients (39.81%). The difference was statistically significant, with a p-value of <0.001. The mean hospital stay was 4.18 ± 1.32 days in the mesh repair group and 3.64 ± 1.21 days in the non-mesh repair group, with an overall mean hospital stay of 3.91 ± 1.29 days. This difference was statistically significant, with a p-value of 0.029. Return to routine activity was earlier in the mesh repair group. Patients in the mesh repair group returned to routine activity in 11.82 ± 3.54 days, whereas patients in the non-mesh repair group returned in 14.26 ± 4.18 days. The overall mean duration for return to routine activity was 13.04 ± 4.03 days. The difference was statistically significant, with a p-value of 0.001.

Comparison of postoperative pain score between the two groups

Postoperative pain was assessed using the Visual Analogue Scale. On postoperative day 1, the mean VAS score was 5.72 ± 1.16 in the mesh repair group and 5.31 ± 1.21 in the non-mesh repair group. The difference was not statistically significant, with a p-value of 0.075. On postoperative day 3, the mean VAS score decreased in both groups. It was 3.84 ± 0.96 in the mesh repair group and 3.65 ± 1.02 in the non-mesh repair group. The difference was not statistically significant, with a p-value of 0.321. On postoperative day 7, the mean VAS score was 1.96 ± 0.78 in the mesh repair group and 2.18 ± 0.83 in the non-mesh repair group. Although pain was slightly lower in the mesh repair group by the seventh postoperative day, the difference was not statistically

significant, with a p-value of 0.159. At 1 month follow-up, the mean VAS score was 0.38 ± 0.59 in the mesh repair group and 0.61 ± 0.71 in the non-mesh repair group. The difference was not statistically significant, with a p-value of 0.070.

Postoperative complications and recurrence

Postoperative seroma was observed in 6 patients (11.11%) in the mesh repair group and 3 patients (5.56%) in the non-mesh repair group, with an overall incidence of 9 patients (8.33%). The difference was not statistically significant, with a p-value of 0.296. Haematoma was seen in 2 patients (3.70%) in the mesh group and 3 patients (5.56%) in the non-mesh group. Overall, 5 patients (4.63%) developed haematoma. The difference was not statistically significant, with a p-value of 0.647. Surgical site infection occurred in 4 patients (7.41%) in the mesh repair group and 7 patients (12.96%) in the non-mesh repair group. Overall, 11 patients (10.19%) developed surgical site infection. The difference was not statistically significant, with a p-value of 0.340. Wound dehiscence was observed in 1 patient (1.85%) in the mesh repair group and 4 patients (7.41%) in the non-mesh repair group, with an overall incidence of 5 patients (4.63%). The p-value was 0.169, indicating no statistically significant difference. Urinary retention was present in 3 patients (5.56%) in the mesh group and 2 patients (3.70%) in the non-mesh group, with a total of 5 patients (4.63%), and the difference was not significant. Chronic pain was reported in 3 patients (5.56%) in the mesh repair group and 5 patients (9.26%) in the non-mesh repair group. Overall, chronic pain was seen in 8 patients (7.41%). The difference was not statistically significant, with a p-value of 0.462. Mesh infection was seen in 1 patient (1.85%) in the mesh repair group, while no case was reported in the non-mesh group. The difference was not statistically significant, with a p-value of 0.315. Overall postoperative complications were seen in 14 patients (25.93%) in the mesh repair group and 20 patients (37.04%) in the non-mesh repair group. In the total study population, 34 patients (31.48%) developed one or more postoperative complications. Although the overall complication rate was higher in the non-mesh group, the difference was not statistically significant, with a p-value of 0.214. Recurrence was observed in 2 patients (3.70%) in the mesh repair group and 8 patients (14.81%) in the non-mesh repair group. Overall, recurrence occurred in 10 patients (9.26%). The difference in recurrence rate was statistically significant, with a p-value of 0.046.

Table 1: Distribution of patients according to demographic and clinical characteristics

Parameter	Mesh repair group n=54	Non-mesh repair group n=54	Total n=108	p-value
Mean age in years	45.78 ± 12.64	44.26 ± 13.18	45.02 ± 12.88	0.542
Male	32 (59.26%)	30 (55.56%)	62 (57.41%)	0.697
Female	22 (40.74%)	24 (44.44%)	46 (42.59%)	0.697
Mean BMI in kg/m²	25.86 ± 3.84	25.21 ± 3.69	25.54 ± 3.76	0.372
Diabetes mellitus	11 (20.37%)	9 (16.67%)	20 (18.52%)	0.620
Hypertension	8 (14.81%)	7 (12.96%)	15 (13.89%)	0.781
Chronic cough/constipation	12 (22.22%)	10 (18.52%)	22 (20.37%)	0.633
Smoking history	7 (12.96%)	8 (14.81%)	15 (13.89%)	0.781

Table 2: Distribution according to type of hernia and defect size

Parameter	Mesh repair group n=54	Non-mesh repair group n=54	Total n=108	p-value
Paraumbilical hernia	19 (35.19%)	17 (31.48%)	36 (33.33%)	0.952
Umbilical hernia	14 (25.93%)	16 (29.63%)	30 (27.78%)	0.952
Epigastric hernia	8 (14.81%)	9 (16.67%)	17 (15.74%)	0.952
Incisional hernia	13 (24.07%)	12 (22.22%)	25 (23.15%)	0.952
Defect size <2 cm	8 (14.81%)	19 (35.19%)	27 (25.00%)	0.018
Defect size 2–4 cm	30 (55.56%)	28 (51.85%)	58 (53.70%)	0.018
Defect size >4 cm	16 (29.63%)	7 (12.96%)	23 (21.30%)	0.018

Table 3: Operative and postoperative parameters

Parameter	Mesh repair group n=54	Non-mesh repair group n=54	Total n=108	p-value
Mean operative time in minutes	61.42 ± 14.36	48.75 ± 12.82	55.09 ± 14.67	<0.001
Drain placement	31 (57.41%)	12 (22.22%)	43 (39.81%)	<0.001
Mean hospital stay in days	4.18 ± 1.32	3.64 ± 1.21	3.91 ± 1.29	0.029
Return to routine activity in days	11.82 ± 3.54	14.26 ± 4.18	13.04 ± 4.03	0.001

Table 4: Comparison of postoperative pain score between the two groups

Postoperative pain assessment	Mesh repair group n=54	Non-mesh repair group n=54	p-value
VAS score on postoperative day 1	5.72 ± 1.16	5.31 ± 1.21	0.075
VAS score on postoperative day 3	3.84 ± 0.96	3.65 ± 1.02	0.321
VAS score on postoperative day 7	1.96 ± 0.78	2.18 ± 0.83	0.159
VAS score at 1 month	0.38 ± 0.59	0.61 ± 0.71	0.070

Table 5: Postoperative complications and recurrence

Outcome	Mesh repair group n=54	Non-mesh repair group n=54	Total n=108	p-value
Seroma	6 (11.11%)	3 (5.56%)	9 (8.33%)	0.296
Haematoma	2 (3.70%)	3 (5.56%)	5 (4.63%)	0.647

Surgical site infection	4 (7.41%)	7 (12.96%)	11 (10.19%)	0.340
Wound dehiscence	1 (1.85%)	4 (7.41%)	5 (4.63%)	0.169
Urinary retention	3 (5.56%)	2 (3.70%)	5 (4.63%)	0.647
Chronic pain	3 (5.56%)	5 (9.26%)	8 (7.41%)	0.462
Mesh infection	1 (1.85%)	0 (0.00%)	1 (0.93%)	0.315
Overall complications	14 (25.93%)	20 (37.04%)	34 (31.48%)	0.214
Recurrence	2 (3.70%)	8 (14.81%)	10 (9.26%)	0.046

DISCUSSION

In the present study, the overall mean age was 45.02 ± 12.88 years, with a mean age of 45.78 ± 12.64 years in the mesh repair group and 44.26 ± 13.18 years in the non-mesh repair group. The difference was not statistically significant (p=0.542), showing that both groups were comparable. Male predominance was observed, with 62 males (57.41%) and 46 females (42.59%), and sex distribution was also comparable between the groups (p=0.697). This was similar to the study by Arroyo et al. (2001), who evaluated 200 adult patients with umbilical hernia and reported a mean age of 57 years, with both male and female patients included. Their study also compared mesh and suture repair groups in a balanced manner, supporting that age and sex comparability is important before comparing operative outcomes. In the present study, the slightly younger mean age may be related to the inclusion of different abdominal wall hernias rather than only umbilical hernias.[7] In this study, the mean BMI was 25.86 ± 3.84 kg/m² in the mesh group and 25.21 ± 3.69 kg/m² in the non-mesh group, with no significant difference (p=0.372). Diabetes mellitus was present in 20 patients (18.52%), hypertension in 15 patients (13.89%), chronic cough or constipation in 22 patients (20.37%), and smoking history in 15 patients (13.89%). These factors were not significantly different between the two groups. Venclauskas et al. (2017) reported that the overall recurrence rate after umbilical hernia repair was 13.1%, and identified BMI >30 kg/m², diabetes, and wound infection as independent risk factors for recurrence. In comparison, the present study had an overall recurrence rate of 9.26%, which was lower than that reported by Venclauskas et al., possibly because the mean BMI in the present study was in the overweight range but not severely obese.[8] Paraumbilical hernia was the most common hernia in the present study, seen in 36 patients (33.33%), followed by umbilical hernia in 30 patients (27.78%), incisional hernia in 25 patients (23.15%), and epigastric hernia in 17 patients (15.74%). The distribution of hernia type was comparable between mesh and non-mesh groups (p=0.952). However, defect size showed a significant difference (p=0.018), as larger defects of >4 cm were more frequent in the mesh group (16 patients, 29.63%) than in the non-mesh group (7 patients, 12.96%). Kaufmann et al. (2018) studied adults with small umbilical hernias of 1–4 cm and found that mesh repair reduced recurrence compared with suture repair, with recurrence reported as 4% in the mesh group and 12% in the suture group. The present study similarly showed lower recurrence with mesh repair, despite the mesh group having more larger defects, which supports the value of mesh reinforcement in moderate and larger defects.[9] The mean operative time in the present study was significantly longer in the mesh group (61.42 ± 14.36 minutes) compared with the non-mesh group (48.75 ± 12.82 minutes) with p<0.001. This finding is comparable with Arroyo et al. (2001), who reported that the mean duration of surgery was higher for mesh repair than suture repair, 45 minutes versus 38 minutes, respectively. In both studies, the longer duration of mesh repair may be explained by additional operative steps such as creation of the mesh plane, careful mesh positioning, fixation, and haemostasis. However, the increased operative time did not translate into significantly higher major complications in the present study.[7]

Drain placement was significantly more common in the mesh group in this study, being required in 31 patients (57.41%) compared with 12 patients (22.22%) in the non-mesh group (p<0.001). Seroma was also numerically higher in the mesh group, occurring in 6 patients (11.11%), compared with 3 patients (5.56%) in the non-mesh group, although this was not statistically significant (p=0.296). Madsen et al. (2020), in a systematic review and meta-analysis, reported that mesh repair reduced recurrence compared with suture closure but was associated with a higher risk of seroma, with a reported risk ratio of 2.37. The present study showed the same trend of increased seroma after mesh repair, but without statistical significance, possibly because of the limited sample size and use of drains in selected patients.[10]

The mean hospital stay in the present study was 4.18 ± 1.32 days in the mesh repair group and 3.64 ± 1.21 days in the non-mesh repair group, with a statistically significant difference (p=0.029). However, return to routine activity was earlier in the mesh group (11.82 ± 3.54 days) compared with the non-mesh group (14.26 ± 4.18 days) and this was also statistically significant (p=0.001). Nguyen et al. (2014), in a systematic review and meta-analysis comparing synthetic mesh with suture repair for ventral hernia repair, reported that mesh repair had a lower recurrence rate than suture repair but could be associated with increased wound-related morbidity such as seroma and surgical site infection. The present study supports this balanced interpretation, as mesh repair required more perioperative care but was associated with earlier functional recovery and lower recurrence.[11] Postoperative pain in this study decreased progressively in both groups. On postoperative day 1, the VAS score was 5.72 ± 1.16 in the mesh group and 5.31 ± 1.21 in the non-mesh

group (p=0.075). On day 3, it decreased to 3.84 ± 0.96 and 3.65 ± 1.02, respectively (p=0.321). By day 7, pain was 1.96 ± 0.78 in the mesh group and 2.18 ± 0.83 in the non-mesh group (p=0.159), and at 1 month it was 0.38 ± 0.59 and 0.61 ± 0.71, respectively (p=0.070). Thus, postoperative pain was not significantly different between the two groups at any time point. Bisgaard et al. (2019), in a systematic review and meta-analysis of randomized trials, also reported that mesh repair reduced recurrence compared with sutured repair, with relative risk 0.28, while secondary outcomes included chronic pain and wound complications. The present study supports the view that mesh repair can reduce recurrence without producing a statistically significant increase in postoperative pain.[12] In the present study, surgical site infection occurred in 4 patients (7.41%) in the mesh group and 7 patients (12.96%) in the non-mesh group (p=0.340). Haematoma occurred in 2 patients (3.70%) in the mesh group and 3 patients (5.56%) in the non-mesh group (p=0.647). Wound dehiscence was noted in 1 patient (1.85%) in the mesh group and 4 patients (7.41%) in the non-mesh group (p=0.169). Overall complications were lower in the mesh group (25.93%) than the non-mesh group (37.04%), but the difference was not statistically significant (p=0.214). Sanjay et al. (2005) compared mesh and sutured repair for adult umbilical hernias and reported infection rates of 0% in the mesh repair group and 11.5% in the suture repair group, with a significant difference. In comparison, the present study also showed a numerically lower infection rate in mesh repair, although the difference was not statistically significant.[13] Mesh-related infection was observed in 1 patient (1.85%) in the mesh repair group in the present study, while no such complication occurred in the non-mesh group (p=0.315). This low rate is clinically acceptable and comparable with published data. Falagas et al. (2005) reviewed mesh-related infections after hernia repair and reported that mesh infection rates in different series ranged from 1% to 8%, depending on patient factors, mesh type, surgical technique, and preventive strategies. The present study's mesh infection rate of 1.85% falls within the lower end of this reported range, suggesting that mesh repair can be safely performed with proper patient selection, aseptic technique, antibiotic use, and postoperative wound care.[14]

The most important outcome in the present study was recurrence. Recurrence occurred in 2 patients (3.70%) in the mesh repair group compared with 8 patients (14.81%) in the non-mesh repair group, and the difference was statistically significant (p=0.046). Overall recurrence was 10 patients (9.26%). This finding is strongly supported by Luijendijk et al. (2000), who reported that in incisional hernia repair, the 3-year cumulative recurrence rate was 23% after mesh repair and 46% after suture repair, demonstrating clear superiority of mesh reinforcement. Although the absolute recurrence rates in the present study were lower, the direction of benefit was similar, confirming that mesh repair provides better long-term structural support and significantly reduces recurrence compared with non-mesh anatomical repair.[15]

CONCLUSION

Mesh repair was associated with longer operative time, higher drain usage, and slightly longer hospital stay compared with non-mesh repair. However, patients undergoing mesh repair had earlier return to routine activity and a significantly lower recurrence rate. Postoperative pain and overall complication rates were comparable between both groups. Therefore, mesh repair appears to be a safe and more effective option for selected abdominal wall hernias, particularly in reducing recurrence.

REFERENCES

1. Henriksen NA, Montgomery A, Kaufmann R, Berrevoet F, East B, Fischer J, et al. Guidelines for treatment of umbilical and epigastric hernias from the European Hernia Society and Americas Hernia Society. Br J Surg. 2020;107(3):171-190. Available from: https://pubmed.ncbi.nlm.nih.gov/31916607/
2. Hernández-Granados P, Henriksen NA, Berrevoet F, Cuccurullo D, López-Cano M, Nienhuijs S, et al. European Hernia Society guidelines on management of rectus diastasis. Br J Surg. 2021;108(10):1189-1191. Available from: https://pubmed.ncbi.nlm.nih.gov/34595502/
3. Sanders DL, Pawlak MM, Simons MP, Aufenacker T, Balla A, Berger C, et al. Midline incisional hernia guidelines: the European Hernia Society. Br J Surg. 2023;110(12):1732-1768. doi:10.1093/bjs/znad284. Available from: https://pubmed.ncbi.nlm.nih.gov/37727928/
4. Najm A, Bader C, Echtle S, Gerlach G, Belyaev O, Uhl W, et al. A review of abdominal meshes for hernia repair—current status and emerging technologies. Bioengineering (Basel). 2023;10(11):1276. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC10672379/
5. Chawla T, Sharma S, Soni V, Gupta R, Bhargava A. Post-operative pain after laparoscopic ventral hernia repair: a prospective randomized controlled trial of mesh fixation with bupivacaine-soaked mesh. J Minim Access Surg. 2020;16(4):355-360. Available from: https://pubmed.ncbi.nlm.nih.gov/32978352/
6. Mullens CL, Schoel LJ, Howard R, Eng OS, Dimick JB. Use of biologic and biosynthetic mesh for ventral hernia repair in current practice. JAMA Surg. 2025;160(2):e245889. Available from: https://pubmed.ncbi.nlm.nih.gov/39661349/
7. Arroyo A, García P, Pérez F, Andreu J, Candela F, Calpena R. Randomized clinical trial comparing suture and mesh repair of umbilical hernia in adults. Br J Surg. 2001;88(10):1321-1323. Available from: https://pubmed.ncbi.nlm.nih.gov/11578284/
8. Venclauskas L, Jokubauskas M, Zilinskas J, Zviniene K, Kiudelis M. Long-term follow-up results of umbilical hernia repair. Wideochir Inne Tech Maloinwazyjne. 2017;12(4):350-356. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC5776484/
9. Kaufmann R, Halm JA, Eker HH, Klitsie PJ, Nieuwenhuizen J, van Geldere D, et al. Mesh versus suture repair of umbilical hernia in adults: a randomized, double-blind, controlled, multicentre trial. Lancet. 2018;391(10123):860-869. Available from: https://pubmed.ncbi.nlm.nih.gov/29459021/
10. Madsen LJ, Oma E, Jorgensen LN, Jensen KK. Mesh versus suture in elective repair of umbilical hernia: systematic review and meta-analysis. BJS Open. 2020;4(3):369-379. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC7260408/
11. Nguyen MT, Berger RL, Hicks SC, Davila JA, Li LT, Kao LS, et al. Comparison of outcomes of synthetic mesh vs suture repair of elective primary ventral herniorrhaphy: a systematic review and meta-analysis. JAMA Surg. 2014;149(5):415-421. Available from: https://pubmed.ncbi.nlm.nih.gov/24554114/

12. Bisgaard T, Kaufmann R, Christoffersen MW, Strandfelt P, Gluud LL. Lower risk of recurrence after mesh repair versus non-mesh sutured repair in open umbilical hernia repair: a systematic review and meta-analysis of randomized controlled trials. Scand J Surg. 2019;108(3):187-193. Available from: https://pubmed.ncbi.nlm.nih.gov/30488767/
13. Sanjay P, Reid TD, Davies EL, Arumugam PJ, Woodward A. Retrospective comparison of mesh and sutured repair for adult umbilical hernias. Hernia. 2005;9(3):248-251. Available from: https://pubmed.ncbi.nlm.nih.gov/15891810/
14. Falagas ME, Kasiakou SK. Mesh-related infections after hernia repair surgery. Clin Microbiol Infect. 2005;11(1):3-8. Available from: https://pubmed.ncbi.nlm.nih.gov/15649297/
15. Luijendijk RW, Hop WCJ, van den Tol MP, de Lange DCD, Braaksma MMJ, IJzermans JNM, et al. A comparison of suture repair with mesh repair for incisional hernia. N Engl J Med. 2000;343(6):392-398. Available from: https://pubmed.ncbi.nlm.nih.gov/10933738/