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MESH REPAIR VERSUS MAYO REPAIR FOR PARAUMBILICAL HERNIA <3CM DEFECT SIZE: A COMPARATIVE STUDY

General Surgery

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ABSTRACT

Introduction: Paraumbilical hernia is a common anterior abdominal wall defect, usually occurring along the linea alba. Several techniques have been described for its repair, with recurrence being a major concern. This study was conducted to compare mesh repair with Mayo's repair in terms of efficacy, postoperative morbidity, and recurrence. **Methods:** A prospective comparative study was carried out at LN MEDICAL COLLEGE & JK HOSPITAL Bhopal between March 2024 and July 2025. Fifty adult patients with clinically diagnosed paraumbilical hernia <3cm defect size were enrolled. Pediatric cases and patients requiring emergency surgery were excluded. Twenty five patients underwent Mayo's repair, while Twenty five underwent mesh repair. The follow-up period ranged from 6 to 15 months. **Results:** Most patients presented between the fourth and sixth decades of life, with a female predominance (female-to-male ratio 3:1). The most frequent presentation was a reducible swelling with cough impulse (36%). Obesity and multiparity were the leading predisposing factors. Early postoperative complications occurred in 15% of the Mayo's group and 8% of the mesh group, without statistically significant difference. Recurrence was observed in 6% of Mayo's repairs, while no recurrence was noted in the mesh group. Postoperative complications such as seroma and wound infection were similar in both techniques. **Discussion/Conclusion:** Mesh repair offers superior long-term results compared with Mayo's technique, particularly in preventing recurrence, while maintaining comparable complication rates. Given its effectiveness and patient satisfaction, mesh repair may be regarded as the preferred method and could potentially serve as the standard approach for adult paraumbilical hernia repair.

KEYWORDS

Paraumbilical hernia, Mesh repair, Mayo's repair, Recurrence, Obesity, Multiparity.

INTRODUCTION

Paraumbilical hernia is defined as a midline defect through the linea alba, situated immediately above or below the umbilicus. It is one of the common abdominal wall hernias in adults, usually occurring in the supraumbilical region [1].

The condition is more frequently observed in women, with a female-to-male ratio of approximately 3:1 [2]. In about 90% of patients, it is an acquired defect resulting from factors that increase intra-abdominal pressure. Contributing risk factors include multiparity, obesity, advancing age, chronic pulmonary conditions such as asthma or emphysema, prostatism, abdominal distension, prolonged steroid use, chronic cough, and occupations involving heavy lifting [3,4].

Clinically, paraumbilical hernia may remain asymptomatic or present with intermittent abdominal discomfort and a ventral bulge. The omentum is the most common hernia content, although small bowel may also be involved. Complications such as incarceration and strangulation are more likely when the hernia defect is narrow [5].

Traditional surgical management was based on Mayo's repair, but this technique is associated with high recurrence rates, reported up to 30–34% [6]. The introduction of prosthetic mesh has revolutionized management, with mesh repair now regarded as the standard of care due to its lower recurrence rates compared with tissue repair [7].

Given that paraumbilical hernia continues to present as a common surgical problem, this study was designed to compare the outcomes of mesh repair with Mayo's repair and to analyze the morbidity associated with these techniques.

METHODS

Study Design And Setting: This prospective study was conducted at LN MEDICAL COLLEGE & JK HOSPITAL Bhopal between March 2024 and July 2025. A total of 50 patients diagnosed with paraumbilical hernia were included after obtaining informed written consent.

Inclusion Fifty patients were selected randomly for the study between 18 to 65yr with defect size<3cm.

Exclusion Criteria

Patients with defect size>3cm, severe cardiopulmonary disease, uncontrolled ascites, recurrent hernia, paediatric age group, or those requiring emergency surgery were excluded.

Clinical Evaluation

Detailed clinical history was obtained regarding duration and progression of hernia, associated pain or discomfort, vomiting, reducibility, chronic cough, constipation, urinary symptoms, abdominal distension, previous abdominal surgery, and obstetric history in women. On local examination, the hernia was assessed for site, size, shape, consistency, cough impulse, reducibility, condition of overlying skin, and defect size in the linea alba.

Preoperative Preparation

Patients underwent standard preoperative optimization including correction of anaemia, hypertension, diabetes, and local skin conditions with sonographic finding suggestive of defect size<3cm. All received a single prophylactic dose of third-generation cephalosporin (1 g) at induction of anesthesia. The preferred anesthesia was spinal or epidural block with light intravenous sedation.

Surgical Allocation

The Patients Were Divided Into Two Groups:

- **Group A:** 25 patients underwent Mayo's repair.
- **Group B:** 25 patients underwent polypropylene mesh repair. Allocation was random.

Operative Technique

Mayo's Repair

Patients were placed supine, and the abdominal wall was prepared with antiseptic scrub. A transverse elliptical incision was made extending at least 2 cm beyond the hernia margins. The hernia sac was carefully dissected and opened, and adhesions were released. Omentum was reduced, If bowel was involved, adhesiolysis was performed and contents were reduced into the peritoneal cavity. The sac was excised, and the defect was repaired using the Mayo overlap technique.

Mesh Repair

All steps up to sac dissection and content reduction were identical to Mayo's repair. A polypropylene mesh was placed above the peritoneum and beneath rectus muscle (retrorectal space) after closure with Vicryl 2-0. The mesh was anchored to the rectus sheath using Prolene sutures. A suction drain (No.16) was placed in all patients, and

the wound was closed with either skin staples or nylon sutures.

RESULTS

Paraumbilical hernia was observed most frequently in the 4th to 6th decade of life with female predominance. There was no significant difference in age distribution between genders. The mean age of patients undergoing mesh repair was 50±10 years, while for those undergoing Mayo's repair it was 45±12 years.

The most common presenting feature was swelling around the umbilicus, which was either painless or associated with mild discomfort. In 93.3% of patients, the swelling was reducible with a positive cough impulse. Skin changes overlying the hernia were noted in 8.3% of cases.

Among female patients, multiparity was the leading precipitating factor (87%), followed by obesity (33%). In males, smoking (61%) and chronic obstructive pulmonary disease were the predominant risk factors. These findings are consistent with international literature that describes paraumbilical hernia as more common in obese, multiparous women.

The size of the hernia defect was less than 3 cm in all patient. Diabetes mellitus was the most common comorbidity (20%), followed by hypertension (16%) and hypothyroidism (3%).

Postoperative complications included seroma formation in 13% of patients undergoing Mayo's repair and 6% of those treated with mesh repair. Wound infection occurred in 6% of Mayo's repair cases and 3% of mesh repair cases. The mean defect size in patients treated with mesh repair was 2.5± .5cm, compared to 2±1cm in those undergoing Mayo's repair.

Recurrence was observed in one patient (3%) following Mayo's repair, while no recurrences occurred after mesh repair. Although the difference in recurrence between the two groups was not statistically significant ($p = 0.207$), a trend favoring mesh repair was evident. This trend may achieve statistical significance with larger sample sizes and longer follow-up

Table 1: Demographics

Variable	Value
Mean age (Mesh repair)	40±18 years
Mean age (Mayo's repair)	45±15 years
Female (%)	65%
Male (%)	35%

Table 2: Clinical Presentation and Risk Factors

Clinical Feature / Risk Factor	Incidence (%)
Swelling around umbilicus	Most common symptom
Reducible + cough impulse	93%
Skin changes	8%
Female – Multiparity	87%
Female – Obesity	33%
Male – Smoking	61%
Male – COPD	Not quantified

Table 3: Comorbidities

Comorbidity	Incidence (%)
Diabetes mellitus	20%
Hypertension	16%
Hypothyroidism	3%

Table 4: Postoperative Complications

Complication	Incidence (%)
Seroma (Mayo's)	13.3%
Seroma (Mesh)	6.6%
Wound infection (Mayo's)	6.6%
Wound infection (Mesh)	3.3%

Table 5: Outcomes

Outcome	Value
Mean defect size (Mesh repair)	2.5± 0.5cm
Mean defect size (Mayo's repair)	2±1cm
Recurrence (Mayo's)	(3%)
Recurrence (Mesh)	0 cases
p-value for recurrence	0.207

DISCUSSION

In the present study most cases occurred between 40–60 years, with a female predominance. In the Mayo's group (n=25), 15 patients (60%) were female and 10(40%) were male, whereas in the mesh group (n=25), 17 patients (70%) were female and 8 (30%) were male. The female-to-male ratio aligns with the ratios reported in international literature. No significant difference was seen in age distribution between sexes, with the majority of cases clustered in the 4th to 6th decades. [8].

All 50 patients presented with swelling around the umbilicus. Pain was reported in 36.5% patients, while 8.3% patients also had skin excoriation. Most patients had symptoms for approximately 6 months before hospital presentation, with duration ranging from 1 month to 2.5 years. Contrary to the commonly described finding that paraumbilical hernias are often irreducible, in this study, 93.3% of cases were reducible with cough impulse. Only 4 patients presented with irreducibility. Skin changes were predominantly seen in long-standing cases (8.3%).

In females, multiparity was the leading precipitating factor, likely due to stretching and weakening of the musculoaponeurotic layer. Obesity was the second most common factor, present in (33.3%). According to Mayo's hypothesis, obesity increases vertical tension on the abdominal wall, weakens the aponeurosis, and facilitates hernia formation. Other contributory factors included diabetes, hypertension, chronic cough, and constipation (Arroyo et al. 2001).

Among males, smoking was the major predisposing factor (61.9%), followed by COPD. Smoking is known to impair collagen metabolism, which may predispose to hernia formation. Obesity and heavy manual labor were also noted. Some patients had multiple risk factors, while others had none. Comorbidities included diabetes (12 patients), hypertension (10 patients), and hypothyroidism (2 patients). These were optimized prior to surgery, minimizing their influence on postoperative outcomes (Venclauskas 2010).

Of the 50 patients, 25 underwent polypropylene mesh repair (all preperitoneal inlay technique), while 25 underwent Mayo's suture repair. Allocation was random.The difference between groups was not statistically significant.

The most frequent postoperative complication was seroma formation, seen in 13% of Mayo's repairs and 6% of mesh repairs. Wound infection occurred in 6% and 3%, respectively. Infections were superficial and responded to antibiotics, and no mesh removal was required. The complication rates were higher than those reported by Arroyo et al. (2001), but no significant difference was observed between the two repair techniques (Muysoms et al. 2013.

Recurrence was noted in one patient (3%) after Mayo's repair, whereas no recurrence was observed in the mesh group. Reported recurrence rates in the literature are around 11% for suture repair and 1% for mesh repair. Although the difference in recurrence in this study was not statistically significant ($p=0.207$), the trend favors mesh repair. Suture repairs have historically shown recurrence rates as high as 54%, whereas mesh repair demonstrates superior durability. In line with earlier studies, this series found recurrence exclusively in the suture group. [9].

Study limitations include the relatively small sample size and short follow-up period, which may underestimate long-term differences between the two techniques. [10].

CONCLUSION

Based on our findings, mesh repair provides superior outcomes for paraumbilical hernia <3 cm, with lower recurrence and comparable morbidity. Larger multicenter trials with longer follow-up are needed to confirm these results.

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