

# A Prospective Comparative Clinical Study on Repair of Paraumbilical Hernias with Mayo's and Mesh Techniques and their Postoperative Complications

P M Mohamed Shameem<sup>1</sup>, P P Lakshmanan<sup>2</sup>

<sup>1</sup>Associate Professor, Department of General Surgery, Malabar Medical College, Modakkallur, Atholi, Kozhikode, Kerala, India, <sup>2</sup>Professor, Department of Surgery, Malabar Medical College, Modakkallur, Kozhikode, Kerala, India

## Abstract

**Background:** "Paraumbilical hernia" occurs through Linea Alba either above or below umbilicus. The current trend is to use a mesh for the repair irrespective of the size. The conventional suture method of Mayo's is also being practiced in various centers. An attempt is made in this study to compare both the methods especially in relation to their post-operative complications in the long-term follow-up.

**Aim of the Study:** The aim of the study to study and compare Mayo's method and use of mesh technique in the surgical management of repair of paraumbilical hernias in relation to their post-operative complications.

**Materials and Methods:** A cross-sectional prospective clinical study was conducted in the Department of General Surgery of Malabar Medical College Hospital, Modakkallur. Atholi, Kozhikode, Kerala, wherein 58 patients undergoing surgery for paraumbilical hernia were included in the study. The patients were assigned to these groups using random numbers from www.randomizer.org. The patients belonging to Group A were subjected to Mayo's operation and Group B were subjected to Mesh technique. All the patients were asked thorough history taking followed by investigations of surgical profile before undertaking the surgery. All the patients were followed up from day 1 postoperatively for 2 years.

**Observations and Results:** A total of 58 patients with paraumbilical hernia were divided into 2 equal groups comprising of 29 each. The mean age in Group A was  $43.65 \pm 4.10$  years and in Group B was  $44.60 \pm 3.20$  years. There were 18 females and 11 males in Group A and 17 females and 12 males in Group B. The patients belonging to the age group of 33–62 years were 21/29 (72.41%) in group A and 23/29 (79.31%) in Group B. There was no statistical significance in the incidence among the two groups as  $P = 0.153$  ( $P$  taken significantly at  $<0.05$ ). The male to female ratio in Group A was 1:1.63 and 1:1.41 in Group B. Pain was complained in the post-operative period in 19/29 (65.51%) patients in Group A and 16/29 (55.17%) patients in Group B. Hematoma was observed in 5/29 (17.24%) patients in Group A and 7/29 (24.13%) patients in Group B. Seroma was observed in 4/29 (13.79%) patients in Group A and 3/29 (10.34%) patients in Group B.

**Conclusions:** In a follow-up of 2 months to years, among the procedures used classical Mayo's repair had 4/29 recurrences and 1/29 were noted in patients underwent mesh repair. Even though Mayo's repair for paraumbilical has been the procedure of choice in many centers, but the tension-free mesh repair has an advantage of having no recurrences and can be used in the presence of bigger defect and weaker abdominal muscle tone, thus showing a superior and favorable procedure than Mayo's repair.

**Key words:** Hernia mesh, Hernia, Laparoscopic hernia repair, Mayo's operation, Paraumbilical hernia, Umbilical hernia

## INTRODUCTION

Hernia is defined as a bulging of the part of the normal contents of the abdominal cavity through a weakness in the

abdominal wall.<sup>[1]</sup> Paraumbilical hernia is a type of ventral hernia occurring through Linea Alba either superior or inferior to the umbilicus. Ventral hernias constitute one of the common hernias of adulthood especially in women in the ratio of 3:1.2.<sup>[2]</sup> The development of paraumbilical hernia is a multifactorial and complex process, typically supraumbilical in location.<sup>[3]</sup> In 90% of the patients, paraumbilical hernias occur as acquired defects as a direct result of increased abdominal pressure, especially in multiparous women, obese individuals, elderly people, patients with emphysema, and asthma-related diseases.<sup>[4]</sup> Paraumbilical hernias are a common surgical problem

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**Corresponding Author:** Dr. P P Lakshmanan, Department of Surgery, Malabar Medical College, Modakkallur, Kozhikode, Kerala, India.

consisting of 10% of all primary hernias.<sup>[5-7]</sup> The sac of the hernia may contain preperitoneal fat, omentum, or small intestine mostly, but sometimes a combination of these structures also may herniate.<sup>[8]</sup> The most common symptom making the patient to visit the surgeon is pain in the swelling.<sup>[9]</sup> As the incidence of complications such as incarceration and strangulation is more common with ventral hernias and elective surgery remains the choice of treatment.<sup>[10]</sup> In Mayo's repair, attempts at widening the hernia defect in transverse direction cut more aponeurotic fibers and favors recurrence at lateral extremities of the repair. Recurrence often occurs much earlier than expected and has been reported to occur in the first few post-operative months (Mair, 1945).<sup>[11]</sup> It was believed that the wide area of contact between upper and lower fascial sheets would promote strong adhesion between them and ensure a good repair. The use of mesh to repair the hernia defect, either open or laparoscopic, is widely used now a day.<sup>[12,13]</sup> The recurrence rates have come down drastically with the use of a tension-free mesh technique when compared to Mayo's tissue repair.<sup>[14,15]</sup> In this context, the present study was conducted to study and compare Mayo's method and use of Mesh technique in the surgical management of repair of paraumbilical hernias in relation to their post-operative complications.

#### Type of the Study

This was a cross-sectional prospective comparative study.

#### Period of the Study

The study was from January 2016 to December 2018.

#### Institute of the Study

This study was conducted at Malabar Medical College Hospital, Modakkallur. Atholi, Kozhikode, Kerala.

## MATERIALS AND METHODS

A cross-sectional prospective clinical study was conducted in the Department of General Surgery of Malabar Medical College Hospital, Modakkallur. Atholi, Kozhikode, Kerala, wherein 58 patients undergoing surgery for paraumbilical hernia were included. An Institutional Ethical Committee Clearance was obtained before the commencement of this study. An ethical committee cleared consent form was used for the study.

#### Inclusion Criteria

(1). Patients aged above 12 years and below 72 years were included in this study. (2). Patients with paraumbilical hernia alone were included in this study. (3). Patients presenting with *de novo* paraumbilical hernia or with its complications were also included in this study. (4). Patients with paraumbilical hernia with complaints of pain were

included in this study. (5). Patients who had hernia of small and medium size; 3–8 cm diameter were included in this study. (6). Patients of both sex groups were included in this study.

#### Exclusion Criteria

(1). Patients aged below 12 years and above 72 years were excluded from the study. (2). Patients uncontrolled hypertension, diabetes mellitus, and other allergic asthma were excluded from the study. (3). Patients with debilitating diseases or immunodeficiency diseases were excluded from the study. (4). Patients having large and recurrent, cirrhosis of liver, ascites, and carcinoma were excluded from the study. A total of 57 patients were divided into two groups. Group A consisted of 29 patients and Group B consisted of 28 patients. The patients were assigned to these groups using random numbers from [www.randomizer.org](http://www.randomizer.org). Patients belonging to Group A were subjected to Mayo's operation and Group B were subjected to mesh technique. All the patients were asked thorough history taking followed by investigations of surgical profile before undertaking the surgery. The traditional Mayo repair consisted of a vertical overlap with adjacent aponeurotic structures. The incision in the aponeurosis was extended longitudinally on either side of the hernia defect. The hernia sac was encircled and excised from the edges of the fascia. The sac was transected from the base of the umbilicus. All the patients were followed up from day 1 postoperatively for 2 years. An observation was made in relation to the post-operative symptoms and complications such as pain, fever, wound infection, hospital stay, analgesic requirements, quality of life, and recurrence. All the data were analyzed using standard statistical methods.

## OBSERVATIONS AND RESULTS

Among the 58 patients in this study with paraumbilical hernia were divided into two equal groups comprising of 29 each. The mean age in Group A was  $43.65 \pm 4.10$  years and the mean age in Group B was  $44.60 \pm 3.20$  years. There were 18 females and 11 males in Group A and 17 females and 12 males in Group B. Overall there were 35/58 (60.34%) females when compared to 23/58 (39.65%) males.  $P = 0.041$  ( $P$  taken significantly at  $<0.05$ ). Patients belonging to the age group of 33–62 years were 21/29 (72.41%) in Group A and 23/29 (79.31%) in Group B. There was no statistical significance in the incidence among the two groups as  $P = 0.153$  ( $P$  taken significantly at  $<0.05$ ). The male to female ratio in Group A was 1:1.63 and 1:1.41 in Group B [Table 1].

The most common symptom of clinical presentation in both the groups was swelling (Group A – 18/29

[62.06%] and Group B – 16/29 [55.17%]) followed by pain (Group A – 14/29 [48.27%] and Group B 16/29 [55.17%]). The most common complication was irreducibility (Group A – 4/29 [13.79%] and Group B 3/29 [10.34%]) followed by intestinal obstruction and ulceration (Group A – 2/29 [6.89%] and Group B 3/29 [10.34%]) [Table 2].

During the surgery, the size of the defect in Linea Alba was measured and tabulated in Table 3. There were 17/29 (58.62%) patients with 2–4 cm defect in Linea Alba in Group A and 14/29 (48.27%) in Group B. The defect was 5–7 cm in 11/29 (37.93%) patients in Group A and 14/29 (48.27%) in Group B [Table 3].

The complaints during the post-operative period and complications in both the groups were tabulated in Table 4. Pain was complained in the post-operative period in 19/29 (65.51%) patients in Group A and 16/29 (55.17%) patients in Group B. Hematoma was observed in 5/29 (17.24%) patients in Group A and 7/29 (24.13%) patients in Group B. Seroma was observed in 4/29 (13.79%) patients in Group A and 3/29 (10.34%) patients in Group B. Wound infection was observed in 2/29 (06.89%) of Group A and Group B patients. The period of return to normal activity was 10–21 days

(mean 14.73 days) in Group A and 10–18 days (mean 12.16 days). All the patients were followed up for 2 years. There were 4/29 (13.79%) cases of recurrence in Group A and 1/29 (03.44%) recurrence in Group B [Table 4].

## DISCUSSION

In the present study, 58 patients were included with paraumbilical hernia that underwent two types of common procedures. The study was a cross-sectional and prospective one. Paraumbilical hernia is common in the 4<sup>th</sup>–5<sup>th</sup>.<sup>[16]</sup> In this study, the mean age of occurrence in Group A was 43.65 ± 4.10 years and the mean age in Group B was 44.60 ± 3.20 years. In a similar study conducted by Daudpoto, Shahid Mirani, and others, it was observed that the majority of patients were above the age of 40 years<sup>[17]</sup> and in a report by Berger *et al.*<sup>[18]</sup> the mean age was 42.7 with standard deviation.<sup>[12]</sup> Paraumbilical hernia is reported commonly in women than men.<sup>[19]</sup> In the present study, the incidence of paraumbilical hernia was more common females than males with a male to female ratio of 1:1.41. Overall, there were 35/58 (60.34%) females when compared to 23/58 (39.65%) males. The *P* = 0.041 (*P* taken significantly at <0.05). The explanation given is that fat tissue deposition varies according to gender contributing hernia in a major way.<sup>[20]</sup> The most common symptom of clinical presentation in both the groups was swelling (Group A – 18/29 [62.06%] and Group B – 16/29 [55.17%]) followed by pain (Group A – 14/29 [48.27%] and Group B – 16/29 [55.17%]). The most common complication was irreducibility (Group A – 4/29 [13.79%]

**Table 1: The demographic data of the study group (n=58)**

Observations	Group A–29	Group B–29	P-value
Age			
12–22	02	01	0.148
23–32	03	02	
33–42	06	07	
43–52	11	12	
53–62	04	04	
63–72	03	03	
Gender			0.132
Male	18	17	
Female	11	12	
Incidence 33–72 years group	72.41%	79.31%	0.153
Male to female ratio	1:1.63	1:1.41	0.110

**Table 2: The incidence of symptoms and complications in the study groups (n=8)**

Complaints	Group A–29%	Group B–29%
Swelling	18 (62.06)	16 (55.17)
Pain	14 (48.27)	16 (55.17)
Abdominal distension	03 (10.34)	02 (06.89)
Constipation	03 (10.34)	04 (13.79)
Vomiting	01 (03.44)	02 (06.89)
Complications		
Ulceration	02 (06.89)	03 (10.34)
Irreducibility	04 (13.79)	02 (06.89)
Intestinal obstruction	02 (06.89)	03 (10.34)
Strangulation	01 (03.44)	02 (06.89)

**Table 3: The size of the defect in Linea Alba per operatively (n=58)**

Size	Group A–29 (%)	Group B–29 (%)
2–4 cm	17 (58.62)	14 (48.27)
5–7 cm	11 (37.93)	14 (48.27)
>7 cm	01 (03.44)	01 (03.44)

**Table 4: The incidence of postoperative complaints and complications in the study group (n=58)**

Post-operative complaints and complications	Group A–29 (%)	Group B–29 (%)
Pain	19 (65.51)	16 (55.17)
Use of analgesic doses in 1 week		
3–6	09 (31.03)	11 (37.93)
7–10	13 (44.82)	15 (51.72)
>10	07 (24.13)	03 (10.34)
Hematoma	05 (17.24)	07 (24.13)
Seroma	04 (13.79)	03 (10.34)
Wound infection	02 (06.89)	02 (06.89)
Mesh extrusion	--	02 (06.89)
Recurrences	04 (13.79)	01 (03.44)

and Group B – 3/29 [10.34%]) followed by intestinal obstruction and ulceration (Group A – 2/29 [6.89%] and Group B – 3/29 [10.34%]). In a similar study by Courtney *et al.*<sup>[9]</sup> it was observed that the most common symptom was swelling complained by their patients in 67.18% followed by pain in 49.30%. There were 17/29 (58.62%) patients with 2–4 cm defect in Linea Alba in Group A and 14/29 (48.27%) in Group B. The defect was 5–7 cm in 11/29 (37.93%) patients in Group A and 14/29 (48.27%) in Group B. In a study by Abdul Qayoom *et al.*<sup>[17]</sup> who classified the size of the hernia defects to 2–4 cm; were found in (63–78%) of the cases and 4–6 cm; and were found in (21–36%) patients. Wassenberg *et al.*<sup>[21]</sup> typed the hernia defects to small size (1–2 cm); were found in (62.5%) and medium defects (2–4 cm); and were found in (37.5%) patients. In the present study, pain was complained in the post-operative period in 19/29 (65.51%) patients in Group A and 16/29 (55.17%) patients in Group B. Hematoma was observed in 5/29 (17.24%) patients in Group A and 7/29 (24.13%) patients in Group B.

Seroma was observed in 4/29 (13.79%) patients in Group A and 3/29 (10.34%) patients in Group B. Wound infection was observed in 2/29 (6.89%) of Group A and Group B patients. The period of return to normal activity was 10–21 days (mean 14.73 days) in Group A and 10–18 days (mean 12.16 days). All the patients were followed up for 2 years. There were 4/29 (13.79%) cases of recurrence in Group A and 1/29 (03.44%) recurrence in Group B. The occurrence of seroma may be explained by the fact that only techniques require subcutaneous dissection to place the meshes, which lead to devitalization of the tissue. The incidence of seroma in the study by Abdul Qayoom *et al.*<sup>[17]</sup> was nearly similar to our study (13.79%). However, the incidence of seroma was <5% in a study by Bessa *et al.*<sup>[22]</sup> chronic pain was not found in this study subjects. A review of literature shows that the recurrence rate was lower after mesh repair than that after Mayo's operation (1% vs. 11%) in a 64-month mean post-operative follow-up by Arroyo *et al.*<sup>[4]</sup> In a retrospective clinical series of 100 patients, the recurrence rates for the suture and mesh repair groups were 11.5% and 0%, respectively ( $P = 0.007$ ).<sup>[23]</sup> There are certain limitations to this study such as the study design which is weak regarding question of better surgery that has to be addressed. Secondly, the sample size is small.

## CONCLUSIONS

The study reflects the clinical aspects, surgical techniques, and the related post-operative complications of the commonly used surgical procedures for paraumbilical hernia. These are most common in elderly females, with

swelling followed by pain being the chief presentation, irreducibility is the common complication. In a follow-up of 2 months to years, among the procedures used classical Mayo's repair had 4/29 recurrences and 1/29 were noted in patients underwent mesh repair. Even though Mayo's repair for paraumbilical has been the procedure of choice in many centers, but the tension-free mesh repair has an advantage of having no recurrences and can be used in the presence of bigger defect and weaker abdominal muscle tone, thus showing a superior and favorable procedure than Mayo's repair.

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