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Original Research Article

A Study on Laparoscopic Mesh Repair of Paraumblical Hernia

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Abstract

Aim & Objectives: The main objective was to study the safety and complications of laparoscopic PUH repair, to assess the pain in postoperative period, to highlight the early return to normal activity and to evaluate for the recurrence of the hernia.
Methods & Material: The period of study was from January 1st 2012 to December 31st 2016 at St. Martha's Hospital. A total of 26 patients between 22-70 years of age who were diagnosed to have para-umbilical hernia was taken into study.
Results: All the 26 patients underwent laparoscopic mesh repair without conversion. Dual mesh (PTFE) was the commonly used mesh with a mean operating time of 128 minutes. There was no intra operative complication. Seroma was found to be the most common post operative complication (15.4%). In the prospective study, 8 patients were evaluated for post operative pain and found that 62.5% had no pain on second postoperative day. The mean postoperative hospital stay was 2.4 days and the mean time taken for return to normal activity was 7 days. There was only one recurrence (3.8%) seen at the follow up period of 48 months. All the patients were cosmetically satisfied.
Conclusion: The following conclusions were made during the course of study: Paraumbilical hernia is more common between the 3rd and 5th decade of life. 1) Women are affected more frequently than men. 2) Laparoscopic paraumbilical hernia mesh repair is an effective and safe procedure with minimal postoperative complications. 3) Seroma being the most common postoperative complication. 4) Patients have a shorter postoperative hospital stay. 5) Postoperatively, pain is minimal and patients return to their normal activity earlier. 6) The recurrence rate is low (3.8%) and cosmetically better as no umbilectomy or drainage is done.
Keywords: Paraumblical Hernia (PUH), Polypropylene mesh.

1. Introduction

The word 'hernia' is derived from a latin term, meaning 'a rupture' [1]. A ventral hernia is defined by a protrusion through the anterior abdominal wall fascia.[2] Paraumbilical hernia is a protrusion through the linea alba just above or sometime just below the umbilicus. It constitutes around 10% of all primary abdominal wall hernias.[3,4]

Women are affected more frequently than men and it is common between age 35 to 50.[5] Increasing obesity, flabbiness of the abdominal muscles and repeated pregnancy are important risk factors. The clinical presentation of these patients is usually a swelling around the umbilicus. The other symptoms include pain and discomfort which gets worse on straining or by heavy exercise. The treatment of symptomatic paraumbilical hernia is mainly surgical. Open and laparoscopic procedures are available. For defects more than 2 cm mesh repair is usually necessary.[6,7] Open hernia repair was the standard procedure until recently. Increased incidence of recurrence and potentially increased risk of infection due to the incision in and around the umbilical crease are the problems involved in umbilical hernia repair.[6,8] From the past decade and a half laparoscopic hernia repair has became more accepted. Laparoscopic repair of ventral hernia was first described in 1993.[9] Since then, the use of laparoscopic repair of paraumbilical hernia has been increasing.

This study is aimed at highlighting the early recovery of the patients, after laparoscopic hernia repair

which is possible due to minimal postoperative pain and morbidity. This surgery has excellent cosmesis and gives better patient satisfaction. The postoperative complications are minimal.

2. Methodology

2.1 Source of the data

A retrospective and prospective study of 26 patients with paraumbilical hernia was undertaken to study. Patients clinically diagnosed as having paraumbilical hernia and those willing for the laparoscopic hernia repair were included in the study. The period of study was from January 1st 2012 to December 31st 2016 at St. Martha's Hospital.

2.2 Inclusion criteria

1) Patients diagnosed as having paraumbilical hernia.
2) Patients with symptomatic paraumbilical hernia who choose laparoscopic over open hernia repair.

2.3 Exclusion criteria

1) Patients with obstructed or strangulated hernia.
2) Patients not fit for general anesthesia.
3) Patients who preferred open repair.
4) Pregnancy with paraumbilical hernia.

The patients were selected as per inclusion and exclusion criteria. An informed consent was taken. The relevant investigations were done to achieve the correct diagnosis.

In the prospective study, the patients were explained about the Visual Analogue Score (VAS) the day before surgery and were instructed to show how they felt in the postoperative period with respect to pain, on the scale and accordingly the percentage of pain was considered.

Any operative complications were noted carefully and recorded in the operative notes and follow up was done with regard to complications. In cases managed conservatively, the manner of management and complications were noted. The cause of death was noted in cases of death.

3. Results

The following results were obtained during the course of study:

Figure 1: A 36 year old female with paraumbilical hernia

Figure 2: A 34 year old male with paraumbilical hernia

Figure 3: Adhesiolysis

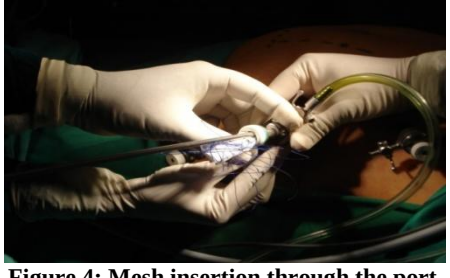

Figure 4: Mesh insertion through the port

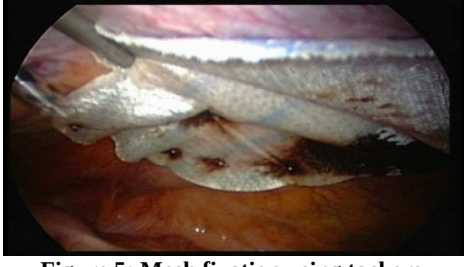

Figure 5: Mesh fixation using tackers

Figure 6: Post mesh fixation

Figure 7: One week post op laparoscopic mesh repair

Table 1: Age distribution of patients studied

Age in years	Number of patients	%
21-30	3	11.5
31-40	12	46.2
41-50	8	30.8
51-60	1	3.8
61-70	2	7.7
Total	26	100.0

Mean ± SD: 40.58±11.31

Majority of the patients were in the age group of 30-50 years (77%). Only 3 patients were above 50 years. Youngest patient in this group is 22 years old and eldest patient being 70 years.

Table 2: Gender distribution of patients studied

Gender	Number of patients	%
Male	10	38.5
Female	16	61.5
Total	26	100.0

Most of the patients were females (61.5%).

Table 3: Defect size

Defect size	Number of patients (n=26)	%
< 2 cm	7	26.92
2 – 3 cm	18	69.23
> 3 cm	1	3.8
Total	26	100.0

Mean ± SD: 2.03±0.66

Of the 26 patients, 18 patients (69.23%) had a defect size between 2 and 3 cm. Mean defect size was 2.03cm^2 (range 1- 4 cm).

Table 4: Mesh type

Mesh type	Number of patients (n=26)	%
Dual	14	53.8
Paritex	2	7.7
Proceed	2	7.7
Prolene	8	30.8

The mesh used commonly was Dual mesh (PTFE) in 14 patients (53.8%).

Table 5: Mesh Size

Mesh Size	Number of patients (n=26)	%
7.6x15	1	3.8
10x15cm	7	26.9
12x12cm	5	19.23
12x15cm	2	7.69
15x15cm	9	34.6
15x20	2	7.69

The mesh size commonly used was 15x15cm in 9 patients (34.6%). The smallest mesh used was 7.6x15cm and largest was 15x20cm. The mean mesh size was 186 cm^2 (range 114-300).

Table 6: Mesh Fixation

Fixation	Number of patients (n=26)	%
Sutures	11	42.3
Tackers	1	3.8
Sutures+tackers	14	53.8

The commonly used method for fixation of the mesh was sutures and tackers in 14 patients (53.8%).

Table 7: Mesh Placement

Placement	Number of patients (n=26)	%
Intraperitoneal	23	88.5
Extraperitoneal	3	11.5

Of the 26 patients, 23 had intraperitoneal repairs and 3 underwent extraperitoneal repairs.

Table 8: Duration of surgery

Duration of surgery (minutes)	Number of patients (n=26)	%
91-120	16	61.5
121-180	8	30.8
>180	2	7.7
Total	26	100.0

The duration of surgery was between 90 and 120 minutes in 16 patients (61.5%). The mean operating time was 128 minutes ranging from 90 minutes to 250 minutes. One patient which took a longer time of 250 minutes also underwent appendectomy and cholecystectomy.

Table 9: Intra-op and Post-op Complications

Complications	Number of patients (n=26)	%
Intra-op		
Nil	26	100.0
Present	0	0.0
Post-op		
Nil	22	84.6
Present(Seroma)	4	15.4

Of the 26 patients, 4 patients (15.4%) developed seroma in the postoperative period.

Table 10: Postoperative hospital stay in days

Post-op Hospital stay (days)	Number of patients (n=26)	%
1-2 days	18	69.2
3-4 days	8	30.8

Mean ± SD: 2.42±0.81

The mean length of hospital stay was 5 days and postoperatively, the mean hospital stay was 2.4 days (range 1-4 days).

Table 11: Follow up: minimum 3 months to 48 months

Follow up	Number of patients (n=26)	%
Recurrence	1	3.8
No follow up events	25	96.2

During a mean follow up period of 12 months (range 3- 48 months) there was a single recurrence, giving the recurrence rate of 3.8%.

Table 12: Post-op pain score (n=8)

Post-op pain	Post-op pain			
	No pain	Mild	Moderate	Severe
6 hour	0	3(37.5%)	4(50.0%)	1(12.5%)
Day 1	0	5(62.5%)	3(37.5%)	0
Day 2	3(37.5%)	5(62.5%)	0	0
1st Visit	6(75.0%)	2(25.0%)	0	0

In the prospective study, 8 patients were evaluated for postoperative pain depending on visual analogue score. Pain had significantly reduced on the 2nd postoperative day (62.5% patients had no pain) which had further reduced during the first week of follow up. Only 2 patients had minimal pain at 1st week of follow up (25%).

Table 13: Correlation of study variables with Post-op complication

Study variables	Post-op Complications		p value
	Absent (n=22)	Present (n=4)	
Age in years			
<40	12(54.5%)	3(75%)	0.614
>40	10(45.5%)	1(25%)	
Gender			
Male	8(36.4%)	2(50%)	0.625
Female	14(63.6%)	2(50%)	
Duration of Surgery (Min)			
91-120	13(59.1%)	3(75%)	0.225
121-180	8(36.4%)	0(0%)	
>180	1(4.5%)	1(25%)	
Mesh type			
Dual	10(45.5%)	4(100%)	0.440
Paritex	2(9.1%)	0(0%)	
Proceed	2(9.1%)	0(0%)	
Prolene	8(36.4%)	0(0%)	
Placement			
Intraperitoneal	19(86.4%)	4(100%)	1.000
Extraperitoneal	3(13.6%)	0(0%)	
Size of defect			
< 2 cm	7(31.8%)	0	0.403
2 – 3 cm	14(63.6%)	4(100.0%)	
> 3 cm	1(4.5%)	0	

2x2, 2x3, 2x4 Fisher Exact test

4. Discussion

In this clinical study, 26 patients with paraumbilical hernia were treated with Laparoscopic mesh repair from January 1st 2012 to December 31st 2016.

Table 14: Mean age distribution of the patients studied:

Comparative studies	Mean age (years)	Female (%)
Current study	40.5 (range 22-70)	68.5
Wright *et al*[13]	46±2.2 (range 25-79)	27
Ujiki *et al*[14]	50 (range 22-84)	51
Kannan *et al*[15]	54 (range 35-78)	80

The majority of the patients were in the age group of 30-50 years (77%) with a mean age of 40.5 years (range 20-70). Of the 26 patients, 16 (68.5%) were female and 10 male (38.5%).

In this series, hypertension, diabetes mellitus, asthma and hypothyroidism were the most common co-existing medical conditions.

All the repairs were accomplished laparoscopically without conversion. Of the 26 patients, 23 had intraperitoneal repairs and 3 underwent extraperitoneal repairs.

Table 15: Mesh used

Comparative studies	Mesh used
Current study	e-PTFE(14), Parietex(2), Proceed(2), polypropylene(8)
Wright *et al*[13]	e-PTFE
Beldi *et al*[16]	Composite (parietene)
Kannan *et al*[15]	e-PTFE
Chowbey *et al*[11]	Polypropylene

In this series, the mesh used commonly was Dual mesh (PTFE) in 14 patients (53.8%).

Table 16: Defect size

Comparative studies	Mean defect size (cms)
Current study	2.03 (range 1-4)
Ninh *et al*[12]	1.2±0.4 (range 1-2)
Chowbey *et al*[11]	Range 1.5 – 12

Mean defect size was 2.03cm^2 (range 1- 4) which is similar to other studies.[11,12]

Table 17: Mesh Size

Comparative studies	Mean mesh size (cms^2)
Current study	186
Wright *et al*[13]	113±16
Kannan *et al*[15]	206

The mean mesh size used was 186 cm^2 (range 114-300). Most commonly mesh size used was 15x15cm in 9 patients (34.6%).

Table 18: Operating time

Comparative studies	Mean operating time (minutes)
Current study	128 (range 90-250)
Wright *et al*[13]	113±7
Ujiki *et al*[14]	128 (range 37-255)
Beldi *et al*[16]	155 (range 50-360)
Kannan *et al*[15]	117 (range 55-260)
Chowbey *et al*[11]	90

The mean operating time was 128 minutes (range 90-250 minutes) which is similar compared to other studies.[13,14] The mean operating time has reduced from 180 minutes in the initial 2 years to 90 minutes in the last 2 years. One case which took a longer time (250 minutes) also underwent appendectomy and cholecystectomy.

Table 19: Complications

Comparative studies	Post operative complications				
	Rate (%)	Seroma	Hematoma	Wound infection/ cellulitis	Others
Current study	15.4	15.4	-	-	-
Wright *et al*[13]	13	3	-	1	-
Ujiki *et al*[14]	22	13	1	4	4
Kannan *et al*[15]	10	4	1	-	-
Chowbey *et al*[11]	2.4	-	-	5	-

In terms of safety, the mortality rate was 0% and the overall complication rate was 15.4%. This rate is comparable to complication rates of 10% to 23% published in various studies.[13-15] There were no intraoperative complications. 4 patients had seromas which resolved without treatment within 4 weeks.

In all these 4 patients with seroma, Dual mesh (PTFE) was used and placed intraperitoneally. The size of the defect in these cases was in between 2-3 cm.

In the prospective study, 8 patients were evaluated for postoperative pain depending on visual analogue score. Pain had significantly reduced on the 2nd postoperative day

(62.5% patients had no pain) which had further reduced during the first week of follow up. Only 2 patients had minimal pain at 1st week of follow up (25%).

Table 20: Hospital stay in days

Comparative studies	Mean hospital stay in days	Mean post-operative stay
Current study	5 (range 3-8)	2 (range 1-4)
Beldi *et al*[16]	6 (range 3-32)	NA
Kannan *et al*[15]	NA	4 (range 1-10)
Chowbey *et al*[11]	NA	1.8
Franklin *et al*[10]	6.5	NA

The mean length of hospital stay was 5 days (range 4-8 days) and postoperatively, the mean hospital stay was 2.4 days. This is comparable with other studies with the range 1-6 days.[11,15,16] The prolonged hospital stay for few patients was because of associated medical co morbidities which required stabilization. The mean time taken for return to normal activity was 7 days (range 4-21 days).

Table 21: Follow up and recurrence

Comparative studies	Mean period of follow up (months)	Recurrence rate (%)
Current study	12 (range 3-48)	3.8
Wright *et al*[13]	23	0.0
Ujiki *et al*[14]	3 (range 0-26)	6
Kannan *et al*[15]	14.9 (range 3-45)	5
Chowbey *et al*[11]	34.8	1

During a mean follow up period of 12 months (range 3- 48 months) there was a single recurrence, giving the recurrence rate of 3.8%. Byron *et al*[13] series showed no recurrences in 23 months of follow up whereas Kannan *et al*[15] series showed a recurrence rate of 5% during a mean follow-up period of 14.9 months.

The single recurrence present was seen at the follow up period of 48 months. This patient had a defect of 2.5 cm for which an intraperitoneal proceed mesh 15x15 cm was used and anchored using sutures. There was no intra operative or post operative complication in this patient.

5. Conclusion

The conclusion based on following study was:

1) Para umbilical hernia is more common between the 3rd and 5th decade of life.
2) Women are affected more frequently than men.
3) Laparoscopic paraumbilical hernia mesh repair is an effective and safe procedure with minimal postoperative complications.
4) Seroma being the most common postoperative complication.
5) Patients have a shorter postoperative hospital stay.
6) Postoperatively, pain is minimal and patients return to their normal activity earlier.
7) The recurrence rate is low (3.8%) and
8) Cosmetically better as no umbilectomy or drainage is done.

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