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ORIGINAL ARTICLE

Comparison of post operative pain in self gripping mesh (PROGRIP) repair versus fixation of mesh in Lichtenstein repair for inguinal hernia.

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ABSTRACT… Objective: To compare post-operative pain outcomes between self-gripping mesh repair and prolene sutured mesh fixation in Lichtenstein repair for inguinal hernia at a tertiary care hospital in Karachi. **Study Design:** Randomized Controlled Experiment. **Setting:** Surgical Unit 3, Jinnah Postgraduate Medical Centre (JPMC), Karachi, Pakistan. **Period:** April 2023 to September 2023. **Methods:** A full six months of research were dedicated to the topic. Methodology: A total of 100 male patients aged 18 to 60 years undergoing elective inguinal hernia repair were randomly allocated into two groups: Group 1 received self-gripping mesh repair, and Group 2 received prolene sutured mesh repair. Pain scores were assessed post-operatively at 8 hours, 24 hours, and on the 5th day using the Visual Analogue Scale (VAS). Demographic and clinical data were analyzed using SPSS version 20, and comparison of pain scores between the groups was performed using the independent t-test with significance set at $P < 0.05$. **Results:** Total 100 patients admitted for inguinal hernia repair were included. The mean age was 31.840+3.606 years. The mean post-operative pain score (at 8 hours, 24 hours & at 5th day) in group 1 was 4.640+0.631, 2.640+0.622 & 1.540+0.542 respectively while in group 2 it was 6.640+1.045, 5.580+0.730 & 3.780+0.932 respectively. **Conclusion:** In conclusion the mean post-operative pain in self gripping mesh repair was significantly low as compared to prolene sutured mesh repair. So self-gripping mesh repair method is superior over prolene sutured mesh repair method.

Key words: Inguinal Hernia, Prolene Sutured Mesh, Post-operative Pain, Self-gripping Mesh, Self-gripping Mesh.

INTRODUCTION

A hernia is an abnormal hole in the wall of the cavity that allows a herniated or partially herniated piece of tissue to protrude. One of the most common surgical challenges is abdominal wall hernias.[1,2] With a lifetime risk of 27% for men and 3% for women, inguinal hernias account for 75% of all abdominal barrier hernias.[3,4]

Of all hernias, 80-83% are inguinal hernias, which affect 3-8% of the population.[5] There are three types of inguinal hernias: indirect (50%), direct (25%), and femoral (5%). Inguinal hernias affect 86% of males, but femoral hernias affect 84% of women.[6] For both sexes, the most common kind of inguinal hernia is indirect. As people get older, they are more likely to suffer strangulation and require hospitalization.[7]

A direct hernia of the inguinal canal can develop from a weakness in the transversalis fascia on the back wall of the canal, or an indirect hernia could emerge from a passage through the deep inguinal ring. There are two main categories of recognized hernia causes: congenital and acquired deformities. A variety of surgical methods are available for the treatment of inguinal hernias, including the following: Bassini repair, Darning, Shouldice's repair, Lichtenstein repair, and laparoscopic hernia repair.[8,9]

Many criteria determine the inguinal hernia repair method, but the most important ones are the surgeon's experience, their understanding of the available literature, and their own personal choice.[10]

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When it comes to open inguinal hernia repair, Lichtenstein tension-free mesh repair is among the most well-known, popular, and easy-to-learn methods currently available.[11] Hernioplasty procedures, such as tensionless open mesh reconstruction[12], were introduced by Lichtenstein in 1986. These procedures can be performed under general, spinal, or local anaesthesia.[13]

Prior to the introduction of synthetic mesh that needed to be sutured to cure inguinal hernias, the conventional method had not altered much in the past decade. A monofilament polypropylene mesh has been the go-to biomaterial for a long time, but it triggers inflammation and leads to fibrosis.[14]

Data on this subject is rare both locally and internationally, which is why the study is justified. Thus, the purpose of this study is to collect data from our resource-poor nation so that we can employ the most effective techniques for reducing post-operative pain. In the long run, this will alleviate the financial strain on patients and decrease the number of beds needed.

METHODS

A tertiary care institution in Karachi will be used to compare the mean post-operative pain of Lichtenstein repair with self-gripping mesh and prolene sutured mesh repair. A randomized controlled trial is the research design that was used from April 2023 to September 2023 after the approval from the Ethical Committee (Letter No: F.3-91/2023, Dated: 20-02-2023 in the name of Dr. Rakesh Kumar) and CPSP. Performed at Jinnah Post Graduate Medical College's Surgical Unit 4 at Karachi's Department of General Surgery. The sample size is determined by comparing the both groups' mean (S.D) post-operative pain scores, which are 4.40 ± 2.48 and 1.53 ± 0.97, respectively.[15]

Total 100 patients, 50 in each, a span of six months. We used non-probability sequential sampling for our sample. Here are the criteria that were used to pick the sample: Inguinal hernia patients were male and ranged in age from 18 to 60. Hernias that are blocked or strangulated, those that reoccur in the inguinal region, and those for which informed written consent is unavailable are not eligible.

We included patients in our study if they met the inclusion criteria. After patients were assessed for anaesthesia fitness, ethical clearance, informed consent, and admission, they had surgery at Jinnah Postgraduate Medical Centre Karachi's outpatient surgery department. Inguinal hernia repair is the procedure that will be performed on one hundred patients. They were randomly assigned to one of two groups, with 50 cases in each. Patients in Group 2 had sutured mesh repairs, whereas those in Group 1 had self-gripping mesh repairs. A consultant with at least 5 years of experience following fellowship led the surgical team, and their qualifications were determined by the research. On the 8th, 24th, and 5th day following surgery, each patient had their pain score evaluated. Predesigned performas were used to record demographic information.

The statistics package for social services 20 included a database. At 8, 24, and 5 hours after surgery, the mean and standard deviation of the postoperative pain score, body mass index (BMI), age, and outcome (i.e., the pain score) were computed. For each demographic, we determined the frequency and percentage. The mean levels of pain experienced by both groups following surgery were compared using a student t-test. Utilizing a student t-test, we were able to adjust for impact modifiers by stratifying participants according to age, gender, body mass index (BMI), and socioeconomic level. A significance level was considered to be $P < 0.05$.

Follow Up

following 8 hours, 24 hours, and 5 days following surgery, patients who participated in this research were monitored for post-operative discomfort.

Visual Analogue Score

0= No pain.
1-4 = mild pain.
5-7 = moderate pain.
8-10 = severe pain

RESULTS

For this study, a sample size of 100 patients hospitalized for inguinal hernia repair was used. Group 1 patients had their inguinal hernias repaired using self-gripping mesh, whereas group 2 patients had their hernias repaired using prolene sutured mesh. Patients were randomly assigned to either group.

The demographic characteristics were well-balanced between the two groups. The majority of patients were aged 18-30 years, with a slightly higher mean age in G-2 (33.08 ± 3.98 years) than G-1 (30.60 ± 2.69 years). Most patients had a height between 1.3-1.65 meters, with comparable mean heights (G-1: 1.573 ± 0.211 m; G-2: 1.583 ± 0.267 m). The majority weighed 43-74 kg, with a minimal difference in mean weight (G-1: 54.67 ± 11.34 kg; G-2: 55.57 ± 15.30 kg). BMI was predominantly in the 17-24 kg/m^2 range, with nearly identical mean values (G-1: 21.59 ± 3.28; G-2: 21.55 ± 3.72). Socio-economic status distribution was also similar, with no significant difference (P = 0.409). These results confirm that both groups had comparable baseline characteristic.

At all post-operative time points (8 hours, 24 hours, and 5th day), patients in the self-gripping mesh repair group (G-1) reported significantly lower pain scores compared to the prolene sutured mesh repair group (G-2). At 8 hours, the mean pain score was 4.64 ± 0.63 for G-1 and 6.64 ± 1.05 for G-2 (P = 0.001). At 24 hours, G-1's mean pain score was 2.64 ± 0.62, while G-2 had a higher score of 5.58 ± 0.73 (P = 0.001). By the 5th day, G-1 reported a mean score of 1.54 ± 0.54, significantly lower than G-2's 3.78 ± 0.93 (P = 0.001). These differences were highly statistically significant, indicating that self-gripping mesh repair results in better pain management compared to prolene sutured mesh repair.

The Table-III summarizes the significant differences in post-operative pain scores between Group 1 (self-gripping mesh repair) and Group 2 (prolene sutured mesh repair) at both 24 hours and the 5th day, with all comparisons showing statistically significant results (P = 0.001). The stratification of post-operative pain scores based on age, BMI, and socio-economic status revealed no significant differences between the two groups (G-1 and G-2) across these categories. For age, the pain scores at 8 hours, 24 hours, and 5th day showed similar trends in both age groups (18-30 years and 31-60 years), with no statistically significant differences (P > 0.05). Similarly, for BMI (17-24 and 24.1-30 kg/m^2), and socio-economic status (below 10,000, 10,000-25,000, and above 25,000), the pain scores at all time points were comparable between the two groups, with no significant findings (P > 0.05). This indicates that age, BMI, and socio-economic status did not significantly affect the post-operative pain experience between the two mesh repair groups.

DISCUSSION

Inguinal hernia surgery aims to minimize the patient's risk of morbidity, impairment, and acute and chronic discomfort while providing a repair that does not reoccur. More than a century after hernia surgery first began, this result is still up in the air. With the use of meshes, surgeons were able to reduce the recurrence rate to less than 5%. To the contrary, persistent neuralgic pain has recently been recognised as a major adverse clinical consequence that might occur after inguinal hernia surgery. Chronic pain, which is defined as ongoing discomfort or pain that lasts more than three months, has an unclear aetiology.[15]

Inguinal hernia mesh repair no longer requires sutures thanks to a novel self-gripping mesh.[11] The absorbable micro-hooks that cover the surface of this mesh allow for tissue fixation, and the qualities of parietene light are combined with them. The Lichtenstein repair group that used polypropylene mesh had an average post-operative pain score of 4.40 ± 2.48 on day 7 and 1.33 ± 1.58 on day 4 weeks, compared to the ProGrip mesh group that used 1.53 ± 0.97 and 0.60 ± 1.10 on day 7 and 4 weeks, respectively.[16]

Variables	Groups	G-1 (Self-Gripping Mesh Repair)	G-2 (Prolene Sutured Mesh Repair)	Overall	P-Value
Age Distribution	**Age Groups**				
	18-30 years	29 (29%)	25 (25%)	54 (54%)	-
	31-60 years	21 (21%)	25 (25%)	46 (46%)	-
	Total	50 (50%)	50 (50%)	100 (100%)	-
	Mean ± SD	30.600 ± 2.695	33.080 ± 3.983	31.840 ± 3.606	-
Height Distribution	**Height (meters) groups**				
	1.3-1.65	30 (30%)	33 (33%)	63 (63%)	-
	1.66-2.0	20 (20%)	17 (17%)	37 (37%)	-
	Total	50 (50%)	50 (50%)	100 (100%)	-
	Mean ± SD	1.573 ± 0.211	1.583 ± 0.267	1.578 ± 0.211	-
Weight Distribution	**Weight groups (kg)**				
	43-74	47 (47%)	44 (44%)	91 (91%)	-
	75-105	3 (3%)	6 (6%)	9 (9%)	-
	Total	50 (50%)	50 (50%)	100 (100%)	-
	Mean ± SD	54.674 ± 11.343	55.570 ± 15.297	55.122 ± 13.406	-
BMI Distribution	**BMI groups (kg/m²)**				
	17-24	34 (34%)	35 (35%)	69 (69%)	-
	24.1-30	16 (16%)	15 (15%)	31 (31%)	-
	Total	50 (50%)	50 (50%)	100 (100%)	-
	Mean ± SD	21.586 ± 3.277	21.550 ± 3.720	21.568 ± 3.488	-
Socio-economic Status Distribution	**Socio-economic status**				
	<10,000	12 (12%)	11 (11%)	23 (23%)	0.409
	10,000-25,000	22 (22%)	22 (22%)	44 (44%)	
	>25,000	16 (16%)	17 (17%)	33 (33%)	
	Total	50 (50%)	50 (50%)	100 (100%)	

Table-I. Comparison of age, height, weight, BMI, and socio-economic status distribution between group 1 (self-gripping mesh repair) and group 2 (prolene sutured mesh repair).

Comparison of mean post-operative pain score (at 8 hours) between two groups:(n=100)				
Groups	**G-1**	**G-2**	**Over All Mean Pain Score**	**t-test P-value**
Mean post-operative pain score (at 8 hours)	4.640+0.631	6.640+1.045	5.640+1.322	-11.068 0.001

Table-II. (Comparison of mean post-operative pain score (at 8 hours) between two groups: (N=100)

Time Point	Groups	Mean Pain Score ± SD	Overall Mean Pain Score ± SD	t-test	P-Value
24 Hours	G-1	2.640 ± 0.622	4.110 ± 1.632	-20.827	0.001
	G-2	5.580 ± 0.730			
5th Day	G-1	1.540 ± 0.542	2.646 ± 1.357	-14.670	0.001
	G-2	3.780 ± 0.932			

Table-III. Comparison of mean post-operative pain score (at 24 hours) between two groups: (N=100)

While using sutured lightweight mesh resulted in higher early postoperative pain scores (mean visual analogue pain score relative to baseline +8·6 and +13·3 at discharge, respectively; P = 0.033), self-gripping mesh resulted in lower scores (mean surgical pain scale relative to baseline +4.2 and +9.7 on day 7, respectively; P = 0.027).[17]

Although certain documented issues are associated with meshes, they have considerably reduced the risk of recurrence. Mesh has the potential to raise infection risks due to its status as a foreign body. Having said that, inguinal hernia procedures do not often provide a significant risk of surgical site infection. Chronically resistant infections almost seldom cause rejection or the need to remove mesh. The substance, elasticity, density, and pore size of a hernia mesh are some of its distinguishing characteristics. The most common type of mesh is standard polypropylene mesh. It is non-absorbable, powerful enough to prevent recurrence, inexpensive, and available at most institutions. However, there is controversy around conventional polypropylene mesh because to several real issues with its usage, such as prolonged postoperative discomfort and foreign body sensation. Polyester mesh may be an option, but it would never catch on. Over time, particularly in diseased regions, polyester meshes can deteriorate.[18]

Inguinal hernia mesh repair no longer requires sutures thanks to a novel self-gripping mesh. This mesh has absorbable micro-hooks for tissue attachment onto its surface, which enhances its characteristics, and parietene light.[19] In our study the mean post-operative pain score (At 8 hours, At 24 hours, At 5th day) in group 1 was 4.640+0.631, 2.640+0.622 & 1.540+0.542 respectively while in group 2 it was 6.640+1.045, 5.580+0.730 & 3.780+0.932 respectively with overall mean post-operative pain score (At 8 hours, At 24 hours, At 5th day) of 5.640+1.322, 4.110+1.632, 2.646+1.357 as compare to Yilmaz et al25 study the mean post-operative pain score at day 7 and at 4 weeks in Lichtenstein repair with polypropylene mesh (L group) was 4.40 ± 2.48 and 1.33 ± 1.58 respectively while with ProGrip mesh (P group) was 1.53 ± 0.97 and 0.60 ± 1.10 respectively.[20] Mean visual analogue pain scores relative to baseline were +1·3 and +8·6 at discharge and +4·2 and +9·7 on day 7, respectively, with self-gripping mesh compared to sutured lightweight mesh in terms of early postoperative pain scores.[21]

The study found that self-gripping mesh repair (G-1) resulted in significantly lower post-operative pain scores compared to prolene sutured mesh repair (G-2) across all time points (8 hours, 24 hours, and the 5th day). However, age, BMI, and socio-economic status did not significantly influence pain scores between the two groups. Despite its limitations, the findings suggest that self-gripping mesh repair may be a preferable option for reducing post-operative pain in hernia surgeries. Further multi-center studies with larger sample sizes and extended follow-up periods are recommended to confirm these results.

This study has several limitations. The small sample size (n=100) restricts the generalizability of the findings to larger populations. Being a single-center study further limits the external validity of the results. Additionally, the short follow-up period, focusing only on post-operative pain up to the 5th day, overlooks long-term outcomes such as chronic pain or recurrence rates. Furthermore, other potential factors influencing

pain perception, such as psychological status, co-morbidities, or variations in surgical technique, were not considered, which might impact the results.

CONCLUSION

Finally, compared to prolene sutured mesh repair, self-gripping mesh repair had much lower mean post-operative discomfort. Therefore, compared to prolene sutured mesh repair, self-gripping mesh repair is the way to go.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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1	**Rakesh Kumar:** Data collection, analysis, paper writing.
2	**Priya Bai:** Discussion writing, review manuscript.
3	**Rabel Qureshi:** Data collection, paper writing.
4	**Adil Dawaich:** Literature review, data entry.
5	**Usama Shabbir:** Review manuscript.
6	**Bashir Ahmad Noor:** Data analysis, literature review.