

Fixation Versus No Fixation of Prolene Mesh in Lichtenstein Mesh Hernioplasty for Inguinal Hernia: A Short-term Follow-up Study

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ABSTRACT

Introduction: Lichtenstein tension free repair is the most commonly used anterior technique in which mesh is used for inguinal hernia.

Aim: To compare fixation vs no fixation of prolene mesh in Lichtenstein mesh hernioplasty for inguinal hernia.

Materials and Methods: This prospective interventional study was conducted in the Department of General Surgery at Mahatma Gandhi Medical College and Hospital, Jaipur, Rajasthan, India, between December 2019 and May 2021. Patient of either sex aged 18-70 years who had reducible inguinal hernia were divided into two groups (group A: no mesh fixation and group B: mesh fixation by Lichtenstein mesh hernioplasty). Operative procedure time, postoperative pain (using visual analogue pain scale), postoperative haematoma/seroma, wound infection and rate of early recurrence were assessed. Operative procedure time and postoperative pain in both group was compared in

both group using student's unpaired t-test with unequal variance while postoperative haematoma, postoperative recurrence and mesh migration were compared in both group using Fischer's-exact test.

Results: A total of 89 patients were enrolled (group A has 48 patients and group B has 41 patient). Operative procedure time was less in group A in comparison to group B which was statistically significant (p -value=0.00221). Postoperative mean pain score was lower in group A at 12 (5.85 vs 6.97), and 24 hours (5.79 vs 7.19), and at day 2 (5.12 vs 6.61), day 4 (4.33 vs 5.1), day 7 (3.67 vs 4.56) and at 1 month (3.1 vs 3.58). Postoperative haematoma/seroma was found less in group A but was not significant. Recurrence and mesh migration were seen in one patient in group A.

Conclusion: No prolene mesh fixation technique in Lichtenstein mesh hernioplasty had decreased postoperative pain with an added benefit of lesser in operative time.

Keywords: Hasselbach's triangle, Inferior epigastric vessel, Medical management, Operative time, Pain, Postoperative haematoma

INTRODUCTION

Hernia is defined as protrusion of a viscera or a part of viscera through the wall that contains it. Inguinal hernia is protrusion of a part of whole abdomen viscera into inguinal canal either through the deep ring or through Hasselbach's triangle or both. Hernia through lateral to inferior epigastric vessel is termed as indirect inguinal hernia, and the hernia through the Hasselbach's triangle is called direct inguinal hernia [1].

Around 75% of all hernias are groin hernia. Of all the inguinal hernias, around two-thirds are indirect and one third direct hernias [2]. Inguinal hernias are one of the most common problems encountered by general surgeon, which accounts for approximate 10-15% of all operations [3,4]. As it is an anatomical pathology surgery is treatment of choice and there is no role for conservative medical management.

There are many methods for repairing inguinal hernia, however, none of these methods have been selected as the preferred method so far and although many years have passed since the discovery of these methods, still the surgical methods are selected based on the diagnosis (type or any associated co-morbidities) along with experience and skills of the surgeon [5]. Methods of inguinal hernia repair are commonly divided into two groups based on approach of repair: anterior repair and posterior repair. In the group of anterior approach procedures, floor repair of inguinal canal can be done with or without mesh. Lichtenstein tension free repair is the most commonly used anterior technique in which mesh is use and is preferred by surgeons with different experiences and it is more desirable compared to other techniques [6,7]. The gold standard is lowest recurrence rate for any hernia surgery that is performed. Two techniques have been described to use a mesh in open procedure

i.e., with mesh fixation (traditional Lichtenstein) and without mesh fixation. Those promoting no fixation mesh hernioplasty, are of the opinion that with decrease tension in suture line and a better levelling lead to rapid embodiment of mesh without formation of dead space which decreases the chances of nerve entrapment and hence postoperative complications are reduced, which in turn fastens postoperative recovery and postoperative hospital stay is decreased [8-12].

On the other hand, some studies claim that chances of displacement, migration and folding of mesh which could lead to recurrence are more in no fixation mesh hernioplasty than traditional Lichtenstein technique, resulting in the failure of the whole procedure [13-15]. As tension free hernioplasty are easy to perform and has lowest recurrence rate, wide spread enthusiasm has been developed for Lichtenstein tension free repair. Furthermore, no fixation mesh hernioplasty with its added simplicity, durability, quick recovery with comparable results to that of mesh fixation which is the prospect of study. No fixation of mesh can help decrease postoperative acute and long-term pain and haematoma formation and also with added benefit of decreased operative time [16]. Based on these conflicting statements the present study was conducted with an aim to compare fixation versus no fixation of prolene mesh lichtenstein mesh hernioplasty.

MATERIALS AND METHODS

This prospective interventional study was conducted in the Department of General Surgery at Mahatma Gandhi Medical College and Hospital, Jaipur, Rajasthan, India, between December 2019 and May 2021. The ethical approval was obtained from Institutional Ethical Committee (MGMCH/IEC/JPR/2020/206). The

selected patients were then informed about the procedure and written informed consent was obtained.

Sample size includes all patient who had reducible inguinal hernia presented to Mahatma Gandhi Medical College and Hospital, Jaipur Rajasthan in Department of General Surgery in given time period.

Inclusion criteria: All patient of either sex aged 18-70 years who had reducible inguinal hernia and diagnosed with help of clinical examination and medically fit to undergo surgical procedure were included in the study.

Exclusion criteria: Patients having congenital hernia and hernia in patients up to age of 18 years, recurrent hernia, incarcerated, obstructed or strangulated inguinal hernia, large direct inguinal hernia, type 3B, 3C and 4 based on Nyhus classification of hernia [17], and obese patient with Body Mass Index (BMI) >30 kg/m² and those with any co-morbidities were excluded from the study.

A detailed clinical history and detailed physical examination was done and recorded in proforma. Randomisation was done by using chit method and patients were divided into two different groups.

- Group A with no fixation of mesh
- Group B with fixation of mesh

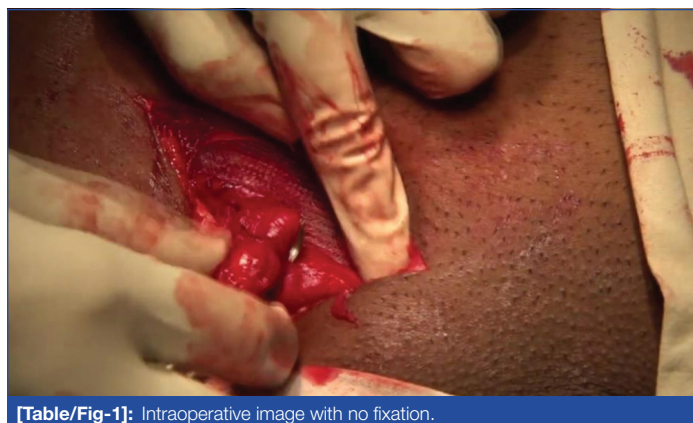
All patients were operated at a single hospital and were operated by a single surgeon. All routine blood investigation was done. Patients were given spinal anaesthesia. Patients were planned for Lichtenstein tension-free mesh hernioplasty after taking informed consent.

Procedure

After proper painting and draping in supine position, right/left inguinal crease incision was given. Camper's and Scarpa's fascia were separated until aponeurosis of the external oblique was identified and cut along the line of incision with the direction of its fibres. Ilioinguinal nerve was identified and safe guarded. Cord structure was identified and dissected free at pubic tubercle and encircled with a sling and sac was identified. In case of indirect inguinal hernia, sac was identified lateral to the inferior epigastric vessel and at the anteromedial aspect of cord. Sac was dissected free from cord, down to the level of deep inguinal ring till pre-peritoneal fat. The vas deferens and testicular vessels were identified and safe guarded. Sac was opened and content was reduced. Sac was twisted and transfixed with Vicryl 2-0 and herniotomy was done. The stump of the sac was checked for haemostasis and allowed to retract into abdomen. A 6x11 cm prolene mesh was placed.

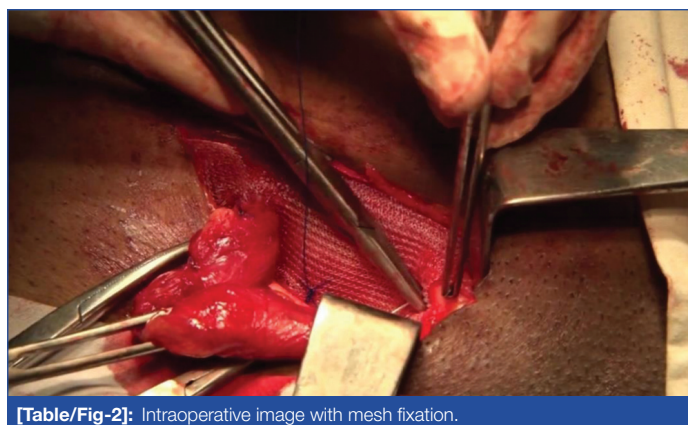
In case of direct inguinal hernia, sac was identified medial to the inferior epigastric vessel. Contents along with sac were separated from cord structures. A 6x11 cm prolene mesh was placed.

In group A, mesh was not fixed with any sutures [Table/Fig-1]; however, in group B mesh was fixed with prolene 2-0 [Table/Fig-2] at the pubic tubercle, conjoint tendon and inguinal ligament.



[Table/Fig-1]: Intraoperative image with no fixation.

Operative procedure time, postoperative pain, postoperative haematoma/seroma, wound infection and rate of early recurrence were assessed.



[Table/Fig-2]: Intraoperative image with mesh fixation.

- Pain was assessed postoperatively using visual analogue scale [18] in which patient was asked to rate their pain on a scale of 1-10 which was done after 6 hours, 12 hours, 24 hours, 2 days, 4 days, 7 days, 1 month, 2 months, 3 months, 4 months, 5 months, 6 months.
- Haematoma/seroma formation was assessed on postoperative day 1, day 2, day 4 and day 7, 1 month, 2 months, 3 months, 4 months, 5 months, 6 months.
- Postoperative wound infection was assessed on the day of discharge and on first follow-up (on day 7).
- Patients were followed for recurrence and mesh migration upto 6 months postoperatively.

STATISTICAL ANALYSIS

The entire data was entered into a Microsoft office Excel and statistical analysis was done using Statistical Package for the Social Sciences (SPSS) version 26.0. Operative procedure time in both groups was compared using Student's unpaired t-test with unequal variance. Postoperative pain was compared in both group using Students' unpaired t-test with unequal variance. Postoperative haematoma was compared in both groups using Fischer's-exact test. Postoperative recurrence and mesh migration was compared in both groups using Fischer's-exact test. The p-value <0.05 was considered to be significant.

RESULTS

A total of 89 patients were enrolled in this study, of which 48 were in group A and 41 were in group B. Out of total patients, 86 (97%) patients were male and 3 (3%) patients were female. Of the total patient 57 (64%) patients were with right inguinal hernia and 32 (36%) patients were with left inguinal hernia. Minimum age being 23 years and maximum age being 69 years with a mean age of 43.42±11.5 years. The majority of patients were distributed within the age group of 41-50 years and minimum in age group 61-70 years [Table/Fig-3].

Age group (years)	Group A (n=48)	Group B (n=41)	
		Male	Female
18-30	5 (10%)	5 (12%)	0
31-40	13 (27%)	11 (27%)	1 (2%)
41-50	18 (38%)	8 (20%)	2 (5%)
51-60	10 (21%)	7 (17%)	0
61-70	2 (4%)	7 (17%)	0

[Table/Fig-3]: Age and gender distribution in both groups.

Of the total patients, 9 (19%) patients in group A had direct inguinal hernia; while 39 (81%) had indirect inguinal hernia. Out of total 41 patients in group B, 7 (17%) patients had direct inguinal hernia and 34 (83%) had indirect inguinal hernia.

Operative procedure time: The mean operative procedure time was significantly lower in group A than group B (35.1±6.62 minutes versus 40.07±6.24; p-value=0.00221).

Postoperative pain: The Postoperative pain 12 hours after surgery, (5.85 ± 1.24 vs 6.97 ± 1.11 , p -value=0.0001), On day 7 after surgery (3.67 ± 0.86 vs 4.56 ± 1.18 , p -value=0.0001), 1 Month after surgery (3.1 ± 1 vs 3.58 ± 1.14 , p -value=0.02) [Table/Fig-4].

Timepoint	VAS at different timepoint		p-value
	Group A	Group B	
6 hours	3.48 ± 1.24	3.00 ± 1.00	0.97
12 hours	5.85 ± 1.24	6.97 ± 1.11	0.0001
24 hours	5.79 ± 1.34	7.19 ± 1.00	0.0001
Day 2	5.12 ± 0.87	6.61 ± 1.30	0.0001
Day 4	4.33 ± 0.98	5.1 ± 1.24	0.001
Day 7	3.67 ± 0.86	4.56 ± 1.18	0.0001
1 month	3.10 ± 1	3.58 ± 1.14	0.0197
2 months	2.08 ± 1.00	2.00 ± 1.39	0.3799
3 months	1.42 ± 1.00	1.12 ± 1.40	0.1281
4 months	0.83 ± 1.00	0.73 ± 1.18	0.335
5 months	0.46 ± 1	0.27 ± 0.81	0.837
6 months	0.08 ± 0.00	0.12 ± 0.64	0.4942

[Table/Fig-4]: Mean visual analogue pain score.

Students unpaired t-test was used; p -value <0.005 was considered as statistically significant

Postoperative haematoma: The postoperative haematoma/seroma formation was found in one patient in group A after 24 hours of surgery, one patient in Group A on day 2 of surgery, one patient in group A on day 4 of surgery and one patient in group B on day 4 of surgery. Three patients from group B developed haematoma/seroma on day 7 of surgery. Post day 7 until 6 months of surgery no new patient developed haematoma/seroma [Table/Fig-5].

Time interval	Group A	Group B	p-value
24 h	1	0	1
Day 2	1	0	1
Day 4	1	1	1
Day 7	0	3	0.094

[Table/Fig-5]: Postoperative haematoma/seroma.

From 1-6 month no postoperative haematoma/seroma was observed in any of the group
Fischer's-exact test was used

Incidence of recurrence: Postoperatively patients were followed for upto 6 months for incidence of recurrence of hernia specifically due to mesh migration. In group A, one patient developed recurrence of hernia which turned out to be due to mesh migration; however, none of the patients from group B reported recurrence of hernia.

Wound infection: Postoperatively patients were also followed for wound infection but none of the patients in either of the group were found to have wound infection.

DISCUSSION

Lichtenstein tension-free repair is most widely performed surgery for inguinal hernia which is mainly due to easy learning curve, reproducibility and low recurrence. To improve this further postoperative pain, haematoma/seroma formation is very important complications that need to be addressed. The mean operating time in group A was 35.1 ± 6.62 minutes while in group B was 40.07 ± 6.24 minutes. This difference of mean operating time in each group was statistically significant.

In the study done by Sahebally SM, et al., mesh fixation was associated with more pain at 24 hour postoperatively which was similar to that in the present study (p -value=0.001). In study done by Sahebally SM et al., both groups had similar recurrence and seroma formation while in our study, there is one case of recurrence in no fixation group (group A) and no recurrence in mesh fixation group (group B) and there was more seroma formation in mesh fixation

group (group B) compared to no mesh fixation group (group A) but both were statistically not significant [19].

Similarly in study done by Kalidare B et al., where fixation of mesh was compared with no mesh fixation in which difference of operative procedure time, seroma formation, recurrence was not statistically significant and postoperative pain of patients one day after the surgery was not statistically significantly different between the two groups (p -value=0.241). However, the pain score at the time of discharge in mesh fixation with a mean of 3.34 ± 2.26 was statistically significantly higher than that of group with no mesh fixation, with a mean of 3.34 ± 2.26 (p -value=0.010). In addition, the mean of pain score in group with mesh fixation was 2.76 ± 1.62 and 2.34 ± 1.37 , at 1 and 2 weeks after the surgery, respectively, which was higher than that of one with no mesh fixation, with a mean score of 1.74 ± 1.50 and while in the current study, the difference in operative procedure time and postoperative pain at 12 hour after surgery, day 1, day 2, day 4, 1 week after surgery and 1 month after surgery was statistically significant but seroma formation and recurrence were not statistically significantly different [20].

In a study done by Lionetti R et al., the mean operative time in group with no mesh fixation was 44.4 ± 6.1 minutes while in one with mesh fixation was 62.3 ± 9.2 minutes which were statistically significant [21]. Negro P et al., reported earlier in 2011 that mean pain score with suture less technique was 2.5 ± 1.7 while with Lichtenstein was 3.2 ± 1.8 which was statistically significant [22]. As per study conducted by Lionetti R et al., where authors compared no fixation of mesh with Lichtenstein hernioplasty average the postoperative Visual Analogue Scale (VAS), pain score was significantly lower in no fixation in comparison to Lichtenstein hernioplasty on 6 hours, 12 hours 24 hours and 7 days postoperatively which is consistent with the present study [21].

In study conducted by Lionetti R et al., where he compared no fixation of mesh with Lichtenstein hernioplasty, postoperative haematoma were lower in no fixation group but this difference was statistically not significant which was similar to that in the present study [21].

In another study done by Ersoz F et al., mean operative time and mean VAS pain score in no fixation group was found significantly lower than compared to group with mesh fixation. While the difference in rates of seroma formation, scrotal edema and recurrence was not found to be statistically significant [5]. No patients in our study group were found to have postoperative wound infection.

Postoperative recurrence and mesh migration were noted in both groups. In case in Inguinal hernia the success of a procedure is assessed chiefly by rate of recurrence. In a study including 1098 patients by Kark AE et al., Lichtenstein procedure was reported to have a recurrence rate of 0.1% [23]. Bellone D et al., found the same rate following their tension free repair as 0.8% in 119 patients [24]. There was one case of recurrence which was due to mesh migration noted in group A while no recurrence was noted in group B. This difference was statistically not significant as sample size was small.

In a study done by Cunningham HB et al., in which the presence or absence of hernia recurrence at the time of patient presentation with migration or erosion complication was examined. Hernia recurrence was discovered in a significant portion of cases of mesh migration (28.1%) [13].

In a meta-analysis study done by Sajid MS et al., four patients developed recurrent inguinal hernia in 691 patients having mesh fixation and three patients developed recurrent inguinal hernia in 691 patients having no mesh fixation. The difference was statistically not significant, hence the risk of developing recurrent inguinal hernia following was statistically similar in both groups [25].

With the benefit of low postoperative pain in no mesh fixation, and significant decrease in procedure time, the modification of traditional Lichtenstein mesh hernioplasty by no fixation of mesh can

be employed in regular practice with experienced hands. Further studies may be needed to evaluate long-term complication (mesh migration and recurrence) and benefits (chronic postoperative pain beyond 6 months) of no fixation technique.

Limitation(s)

Limitations of study include low sample size and short follow-up period and difference of effect of quality of life of patient operated for inguinal hernia with and without mesh fixation was not studied.

CONCLUSION(S)

No prolene mesh fixation technique in Lichtenstein mesh hernioplasty has shown to significantly decrease postoperative pain in inguinal hernia repair with an added benefit of decrease in operative time. Hence, the no fixation technique has a slight edge over traditional Lichtenstein tension free hernia repair.

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