

A comparative study of mesh fixation with non-absorbable versus delayed-absorbable monofilament suture in Lichtenstein tension-free hernioplasty in a medical college



Subhadip Sarkar

Assistant Professor, Department of Surgery, ESIC-PGIMSR, Kolkata, West Bengal, India

Submission: 05-03-2022

Revision: 26-05-2022

Publication: 01-07-2022

ABSTRACT

Background: Mesh placement and subsequent fixation are an important aspect of hernia surgery. Different methods are available in modern days for fixing the mesh in inguinal hernioplasty surgery in both open and laparoscopic approach. However, sutures are still preferred by most of the surgeons because of its easy availability and cost-effectiveness. Conventionally, non-absorbable sutures are used to fix mesh. **Aims and Objectives:** The objective of our present study is to compare the post-surgical outcomes of mesh fixation with monofilament non-absorbable sutures versus monofilament delayed absorbable sutures. **Materials and Methods:** This prospective and randomized study was conducted at the Department of Surgery, ESIC-PGIMSR, Joka during the period of January 2017 – March 2019. Total 160 patients having unilateral uncomplicated inguinal hernia were included in this study; operated by the same surgical team. The patients were divided into two groups, each of 80 patients. In Group I, mesh fixation was done with delayed absorbable sutures whereas, in Group II, mesh was fixed with non-absorbable sutures. The data were analyzed with appropriate statistical tests such as Chi-square test and $P < 0.05$ that were considered as statistically significant. **Results:** The development of post-operative pain was more common in Group II. The difference was statistically significant at 6 months post-operative time ($P = 0.042$). When we compared the post-operative paraesthesia in both surgical groups, more number of patients developed it in Group II but no significant statistical difference was observed (P -value came as 0.784, 0.221, and 0.385 after analyzing 3 months, 6 months, and 1 year data, respectively). Regarding other complications such as hematoma, wound infection, seroma formation, and scrotal/cord edema, no statistically significant differences were observed in either group (P -values were 0.339, 0.149, 0.313, and 0.117, respectively). No patient developed chronic discharging sinus post-operatively in either group. No recurrence was noted in any patients included in this study, after 1 year of follow-up. **Conclusion:** Using delayed-absorbable suture material with air knotting technique for mesh fixation in Lichtenstein tension-free open inguinal hernioplasty causes less chance of post-operative inguinal pain and paraesthesia. Hence, it is a good alternative choice for surgeons; in terms of safety and efficacy.

Key words: Hernioplasty; Mesh; Sutures

INTRODUCTION

Inguinal hernia may be defined as a protrusion of a part or whole of viscous into the inguinal canal either through the deep inguinal ring or through the Hesselbach's triangle. It is

one of the most common complaints with which patients attend surgical outpatient department in our country.¹ Approximately 20 million hernia repairs are performed yearly around the world.^{2,3} Two different approaches for inguinal hernia surgery are there; open and laparoscopic

Access this article online

Website:

<http://nepjol.info/index.php/AJMS>

DOI: 10.3126/ajms.v13i7.43650

E-ISSN: 2091-0576

P-ISSN: 2467-9100

Copyright (c) 2022 Asian Journal of Medical Sciences



This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

Address for Correspondence:

Dr. Subhadip Sarkar, Assistant Professor, Department of Surgery, ESIC-PGIMSR, Kolkata - 700 104, West Bengal, India.

Mobile: +91-9874823031/8240953987. **E-mail:** dr.subhadip87@gmail.com

repair. The most commonly performed open procedure is the Lichtenstein tension-free hernioplasty. Now a day, it is the gold standard open surgical technique worldwide, supported by the available guidelines.^{4,6}

Open inguinal hernioplasty is relatively easier to perform, less expensive, and can be done even under local an esthesia also.⁷ On the other hand, laparoscopic approach needs higher technical expertise, longer learning curve, and high cost. However, in both open and laparoscopic approach, the type of mesh used and the method of its fixation are still a matter of debate.^{8,9}

In modern day hernia surgery, the main idea behind mesh fixation is to obtain a perfect balance between a secure fixation to avoid recurrence and nerve entrapment as the main cause of chronic pain and discomfort.¹⁰ In modern era, we have many options for mesh fixation such as simple non-absorbable sutures, delayed absorbable sutures, glues, and tacks.¹¹ Both sutures and tissue adhesives are found to be equally safe in terms of recurrence and wound infection but glues are associated with less chronic pain in open technique.¹² However, sutures still have the advantage of cost-effectiveness and availability.⁸

There had only been two similar studies from Western India, done by Kharadi and Shah¹³ from Gujarat and Meena et al.,¹⁴ from Rajasthan, but no such study was conducted in Eastern India. Therefore, our intention for this study was to find out the post-operative outcomes in a medical college in Eastern India.

Aims and objectives

The objective of our present study is to compare the post-operative outcomes of mesh fixation with non-absorbable versus delayed absorbable monofilament suture material, with the ultimate aim of improving the quality of life of patients.

MATERIALS AND METHODS

This prospective and randomized study was conducted in ESIC-PGIMSR, Joka, Kolkata from January 2017 to March 2019. Lichtenstein tension-free hernioplasty was performed by the same surgical team in 160 patients who were included in this study. Certain inclusion and exclusion criteria were set beforehand.

Inclusion criteria

The following criteria were included in the study:

1. Age > 20 years
2. Unilateral inguinal hernia
3. Primary hernia repair
4. Elective surgery performed.

Exclusion criteria

The following criteria were excluded from the study:

1. Age <20 years and > 70 years
2. Obstructed and strangulated hernias, operated in emergency
3. Recurrent hernia
4. Bilateral inguinal hernia.

The patients were informed about the details, risks, and benefits of the technique and consents were obtained. The study was approved by the Institutional Ethical Committee (ESIC/47/IEC/JOKA dated December 23, 2016). All patients were randomly allocated into two groups. Randomization was done by toss a coin method. Group I included 80 patients in whom mesh fixation was done by delayed absorbable monofilament suture, Polyglecaprone (2-0); whereas, Group II consisted of the rest 80 patients in whom mesh was fixed with Polypropylene (2-0) which is a non-absorbable monofilament suture. The sample size was calculated using appropriate statistical tests based on our study design.

Pre operatively, all patients were given single dose of injection Ceftriaxone (1 g), prior to incision. All surgeries were performed under spinal an esthesia, using injection Bupivacaine (0.5%).

During surgery, after dealing with the sac whether direct or indirect and its contents, hernioplasty was achieved by polypropylene mesh. It is fixed to the posterior wall of the inguinal canal by six stitches; one at the periosteum of the pubic tubercle, three stitches to the inguinal ligament with approximately 1.5 cm distance, and another two stitches to the conjoint tendon with the same distance apart.⁷ In both group, the suturing technique involved air knotting of the stitch over the mesh surface and not to the mesh edges.¹⁵

Standard post-operative care was given to all patients including antibiotics, analgesics, and wound care, as per institutional protocol. All patients in both groups were observed in the ward until their discharge and then follow-up was done after 14 days, 3 months, 6 months, and 1 year after surgery. Both groups were compared on the basis of age, type, location and side of hernia, post-operative complications such as wound infection, seroma, hematoma, chronic discharging sinus, paresthesia, chronic inguinal pain, and recurrence.

RESULTS

The results were analyzed with SPSS for windows version 26 and the differences between groups were compared with Chi-square test using confidence interval

to be 95% and $P < 0.05$ as statistically significant. In our present study, 160 patients were included in the study. The data were meticulously collected and analyzed.

Age distribution

Here, we can see that maximum number of patients belong to age group (41–50) in both groups (Table 1).

Distribution of patients according to the hernia side (right/left)

From Table 2, it is obvious that right-sided hernia patients were the majority in numbers in both groups.

Distribution of patients according to the hernia type

Indirect hernia patients were more in number in comparison to the direct hernia patients in both groups (Table 3).

Combined demographic data were presented in a single table (Table 4).

Post-surgical complications in both groups

No statistically significant difference was observed between the two groups; in terms of the common post-operative complications such as seroma and hematoma formation, scrotal or cord edema, wound infection, chronic discharging sinus, and hernia recurrence (Table 5).

Post-operative inguinal pain in both groups

If we consider appearance of post-operative inguinal pain in both groups, it showed statistical significance ($P < 0.05$) after 6 months of post-operative period. However, after 1 year, no statistically significant difference was observed. (Table 6).

Table 1: Age distribution of patients in both Group I and Group II

Age group (years)	Group I (n=80) (%)	Group II (n=80) (%)	Total (%)
(21–30)	8 (10)	10 (12.5)	18 (11.25)
(31–40)	18 (22.5)	16 (20)	34 (21.25)
(41–50)	28 (35)	30 (37.5)	58 (36.25)
(51–60)	14 (17.5)	15 (18.75)	29 (18.125)
(61–70)	12 (15)	09 (11.25)	21 (13.125)

Table 2: Number and percentage of patients in each group based on hernia side

Groups	Right (%)	Left (%)	Total (%)
I	44 (55)	36 (45)	80 (100)
II	49 (61.25)	31 (38.75)	80 (100)

Table 3: Number and percentage of patients in each group based on hernia side

Groups	Direct (%)	Indirect (%)	Total (%)
I	34 (42.5)	46 (57.5)	80 (100)
II	31 (38.75)	49 (61.25)	80 (100)

Post-operative paraesthesia in both groups

There was more number of patients in Group I, in comparison to Group II, who developed paraesthesia after inguinal hernioplasty. However, considering the P-value, no statistical significance was found (Table 7).

DISCUSSION

In open hernioplasty, there are lots of debate regarding ideal mesh fixation technique. Many options are available such as sutures, tacks, staples, glues, and fibrin sealants.⁷ However, the choice of method mostly depends on the availability and surgeons' preference. In open technique, both sutures and tissue adhesives have been proven equally safe in terms of recurrence and wound infection.⁸ In this study, we have compared the post-operative outcomes of mesh fixation with non-absorbable versus delayed absorbable suture material in Lichtenstein tension-free hernioplasty.

Table 4: Demographic data and baseline characteristics of each group

Variables	All patients (%)	Group I (%)	Group II (%)
Number of patients	160	80	80
Age (years)	Mean=46.3	Mean=44.2	Mean=48.5
Right-sided hernia	93 (58.125)	44 (47.31)	49 (52.69)
Left-sided hernia	67 (41.875)	36 (53.73)	31 (46.27)
Direct hernia	65 (40.625)	34 (52.3)	31 (47.7)
Indirect hernia	95 (59.375)	46 (48.42)	49 (51.58)

Table 5: Number and percentage of complications in both groups with P-value (Chi-square test)

Complications	Group I	Group II	P-value
Seroma	6	8	0.313
Hematoma	2	1	0.339
Scrotal/cord edema	4	5	0.117
Wound infection	4	3	0.149
Chronic discharging sinus	0	0	--
Recurrence	0	0	--

Table 6: Post-operative inguinal pain in both groups with P-value (Chi-square test applied)

Time period	Group I	Group II	P-value
After 3 months	13	17	0.656
After 6 months	7	16	0.042
After 1 year	5	11	0.113

Table 7: Post-surgical paraesthesia in both groups with P-value (Chi-square test)

Time period	Group I	Group II	P-value
After 3 months	10	14	0.784
After 6 months	7	12	0.221
After 1 year	5	8	0.385

In our study, maximum numbers of patients were of (41 –50) years age. Right- sided and indirect inguinal hernia patients were majority in numbers in both groups. Chronic post-hernioplasty groin pain is defined as persistent post-operative pain that fails to resolve even 3 months after surgery.¹⁶ After Lichtenstein technique, chronic inguinal pain and discomfort can occur up to 30% of patients. The cause of this pain is mostly compression and entrapment of inguinal nerves by sutures used for fixing the mesh. This can be avoided by identifying the inguinal nerves during surgery or using glues instead of sutures to secure the mesh.¹¹ In our study, we have found that more number of patients had inguinal pain post operatively, after 3 months, 6 months, and even after 1 year in that group where mesh fixation was done by non-absorbable sutures. Moreover, statistically significant difference between two groups was observed regarding inguinal pain status 6 months post operatively. These findings are similar to the studies done by Kharadi and Shah and Bharatam.^{13,17} A study done by Meena et al., also showed $P = 0.013$ which was statistically significant.

Table 8 shows that our study results are at par with most other international school studies. Regarding the development of post-operative pare sthesia, in our study, more patients in Group II developed it but no statistical significance was observed between the groups. The most common reason behind the development of pare sthesia is again nerve entrapment by suture or mesh. In our study, we found no recurrence in both groups, after follow- up for 1 year, which indicates that delayed absorbable suture is good alternative to non-absorbable sutures for mesh fixation in open hernioplasty, in terms of recurrence. Regarding other post-operative complications such as seroma, h ematoma, scrotal/cord edema, wound infection, and development of chronic discharging sinus, no statistically significant differences were observed between two groups.

Table 8: Various studies showing chronic inguinal pain and the statistical significance. Groups I and II consist of patients who underwent mesh fixation by delayed absorbable and non-absorbable sutures, respectively

Studies	Chronic inguinal pain		P-value
	Group I	Group II	
Igor et al., ¹⁸	26	29	0.071
Kharadi and Shah ¹³	2	4	0.40
Shanoo et al., ¹⁹	2	8	0.043
Meena et al., ¹⁴	5	15	0.02
Paajanen ²⁰	21	15	0.3
Present study	7	16	0.042

Limitations of the study

Our study had certain limitations such as small sample size and follow-up period of 1 year which is a short period for detecting hernia recurrence. Hence, late recurrences could not be analyzed. Therefore, large, multicentric, and long follow- up studies are needed to confirm the results of our study.

CONCLUSION

In Lichtenstein tension-free open inguinal hernioplasty, mesh fixation with delayed absorbable suture material is simple, safe, and effective alternative. In comparison to the traditional method of mesh fixation by non-absorbable suture with air knotting, there is fewer incidences of chronic groin pain and pare sthesia. No recurrence was observed in either group. Moreover, other post-surgical complications are also found to be statistically insignificant ($P > 0.05$). Therefore, fixing mesh with delayed absorbable monofilament suture is a safe and effective choice for surgeons.

ACKNOWLEDGMENT

We would like to thank all those patients who participated in the study.

REFERENCES

- Li J, Ji Z and Li Y. The Comparison of self-gripping mesh and sutured mesh in open inguinal hernia repair: The results of meta-analysis. *Ann Surg.* 2014;259(6):1080-1085. <https://doi.org/10.1097/SLA.0000000000000408>
- Miller HJ. Inguinal hernia: Mastering the anatomy. *Surg Clin North Am.* 2018;98(3):607-621. <https://doi.org/10.1016/j.suc.2018.02.005>
- Rutkow IM. Demographic and socioeconomic aspects of hernia repair in the United States in 2003. *Surg Clin North Am.* 2003;83(5):1045-1051. [https://doi.org/10.1016/S0039-6109\(03\)00132-4](https://doi.org/10.1016/S0039-6109(03)00132-4)
- Beddy P, Ridgway PF, Geoghegan T, Pierce C, Govender P, Keane FB, et al. Inguinal hernia repair protects testicular function: A prospective study of open and laparoscopic herniorrhaphy. *J Am Col Surg.* 2006;203(1):17-23. <https://doi.org/10.1016/j.jamcollsurg.2006.04.013>
- Lichtenstein IL and Shore JM. Simplified repair of femoral and recurrent inguinal hernias by a "plug" technique. *Am J Surg.* 1974;128(3):439-444. [https://doi.org/10.1016/0002-9610\(74\)90189-5](https://doi.org/10.1016/0002-9610(74)90189-5)
- Simons MP, de Lange D, Beets GL, van Geldere D, Heij HA, Go PM, et al. The "Inguinal Hernia" guidelines of the association of surgeons of the Netherlands. *Ned Tijdschr Geneeskd.* 2003;147(43):2111-2117.
- Awad SS and Fagan SP. Current approaches to inguinal hernia repair. *Am J Surg.* 2004;188(6):9-16. <https://doi.org/10.1016/j.amjsurg.2004.09.007>

8. Hoyuela C, Juvany M, Carvajal F, Veres A, Troyano D, Trias M, et al. Randomized clinical trial of mesh fixation with glue or sutures for Lichtenstein hernia repair. *Br J Surg*. 2017;104(6):688-694. <https://doi.org/10.1002/bjs.10488>
9. Guttadauro A, Maternini M, Frassani S, De Simone M, Chiarelli M, Macchini D, et al. "All-in-one mesh" hernioplasty: A new procedure for primary inguinal hernia open repair. *As J Surg*. 2018;41(5):473-479.
10. Nienhujs SW, Rosman C, Strobbe LJ, Wolff A and Bleichrodt RP. An overview of the features influencing pain after inguinal hernia repair. *Int J Surg*. 2008;6(4):351-356. <https://doi.org/10.1016/j.ijsu.2008.02.005>
11. Fridman A. Mesh Fixation Devices and Techniques: A Review of the Literature. *Bariatric Times*. Available from: <http://bariatrictimes.com/mesh-fixation-devices-and-techniques-a-review-of-the-literature> [Last accessed on 2016 Mar 02].
12. Testini M, Lissidini G and Poli E. A single surgeon randomized trial comparing sutures, n-butyl-2-cyanoacrylate and human fibrin glue for mesh fixation during primary inguinal hernia repair. *Can J Surg*. 2010;53(3):155-160.
13. Kharadi A and Shah V. Comparative study of mesh fixation with non-absorbable v/s delayed absorbable suture in open inguinal hernia. *Int Surg J*. 2016;3(3):1180-1183. <http://dx.doi.org/10.18203/2349-2902.isj20162703>
14. Meena LN, Bansal S, Verma P and Rai R. A comparative study of post-operative chronic pain after tension free inguinal hernia repair using absorbable versus non-absorbable sutures for mesh fixation. *Int Surg J*. 2018;5(4):1378-1381. <http://dx.doi.org/10.18203/2349-2902.isj20181114>
15. Kalan M and Chowdhry S. Reducing the pain of open groin hernia repair. *Hernia*. 2004;8(4):381-383. <https://doi.org/10.1007/s10029-004-0248-z>
16. Alfieri S, Rotondi F, Di Giorgio A, Fumagalli U, Salzano A, Di Miceli D, et al. Influence of preservation versus division of ilioinguinal, iliohypogastric and genital nerves during open mesh herniorrhaphy: Prospective multicentric study of chronic pain. *Ann Surg*. 2006;243(4):553-558. <https://doi.org/10.1097/01.sla.0000208435.40970.00>
17. Bharatam KK. Prospective analysis of post-operative outcomes-immediate/delayed in patients undergoing Lichtenstein's open inguinal hernioplasty using vypro versus prolene mesh. *Int J Bioass*. 2015;4(11):4451-4453.
18. Igor J, Wisner I, Karasic E, Nesterenko V, Poleksht N, Lawy R, et al. Reduced pain after tension free inguinal hernia repair using absorbable sutures: A single blind randomized clinical trial. *J Am Coll Surg*. 2014;218(1):102-107. <https://doi.org/10.1016/j.jamcollsurg.2013.09.010>
19. Shanoo A, Sanjeev C, Zeeshan A, Ashish M, Amit G, Jeevan K, et al. Comparative study between monofilament absorbable versus non-absorbable sutures for mesh fixation in Lichtenstein's hernia repair. *Antiseptic*. 2017;114:27-31.
20. Paajanen H. Do absorbable mesh sutures cause less chronic pain than non-absorbable sutures after Lichtenstein inguinal hernioplasty? *Hernia*. 2002;6(1):26-28. <https://doi.org/10.1007/s10029-002-0048-2>

Authors Contribution:

SS– Concept and design of the study, preparation of manuscript, review of literature, statistical analysis, interpretation of results, and final revision of the manuscript

Work attributed to:

ESIC-PGIMSRS, Joka, Kolkata - 700 104, West Bengal, India

Orcid ID:

Dr . Subhadip Sarkar - <https://orcid.org/0000-0001-6979-5700>

Source of Support: Nil, **Conflict of Interest:** None declared.