

Comparison of Prolene Mesh and Prolene-Vicryl Composite Mesh in Lichtenstein's Inguinal Hernioplasty

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ABSTRACT

Background: Inguinal hernias are the most common among abdominal wall hernias accounting for about 75% with a life time risk of 27% in men and 3% in women. Groin hernia repair is a commonly performed general surgery procedure in both adults and children, with inguinal hernias constituting more than 95% of all groin hernia repairs. Lichtenstein's mesh repair is now standard in most countries and widely accepted as superior to primary suture repair. Prolene meshes have been used for hernia repair as prosthesis conventionally. Light weight meshes can be completely absorbable when it is used for temporary reinforcement or partially absorbable (in combination with prolene). Various studies have compared prolene with prolene-polyglecaperone or vicryl mesh. Which amongst the light weight meshes is better is still a question of debate due to paucity of literature. This study was done to compare prolene and prolene-vicryl composite mesh in terms of post operative outcome in Lichtenstein's hernioplasty. **Methods:** This was a prospective study which included 60 patients who underwent Lichtenstein's hernioplasty. Efficacy of prolene mesh and prolene-vicryl composite mesh was compared by comparing the post operative outcome in terms of immediate postoperative pain, chronic pain, infection, seroma formation and recurrence of hernia. **Results:** Except for chronic pain after 3 months of surgery, nothing significantly differed between the two meshes. **Conclusion:** Though this study finds not much of difference between the meshes, further studies are required to identify the best mesh to be used for open hernioplasty.

Keywords: Inguinal hernia, prolene mesh, composite prolene-vicryl mesh, pain, infection, recurrence.

INTRODUCTION

A hernia occurs when an organ pushes through an opening in the muscle or tissue that holds it in place. It protrudes through the anatomical structures that normally contains it and is most common in the abdomen.^[1] Inguinal hernias are the most common among abdominal wall hernias accounting for about 75% with a life time risk of 27% in men and 3% in women.^[1] An indirect hernia is lateral to the inferior epigastric vessels and is oblique. The direct hernia is medial to inferior epigastric vessels and is due to weakening of abdominal wall muscles.^[2] Inguinal hernia is indirect in 55 % of cases, direct in 30 % and of the pantaloon (mixed) type in 15%.^[3] Groin hernias are 20 times more common in men than women. The ratio of direct-to-indirect inguinal hernias in men is about 1:3. Almost no case of direct

hernia is seen in females.^[4] Groin hernia repair is a commonly performed general surgery procedure in both adults and children, with inguinal hernias constituting more than 95% of all groin hernia repairs.^[5] Common principles for hernia repair include reduction of the hernia contents into the abdominal cavity with removal of any non viable tissue and bowel repair if necessary, excision and closure of peritoneal sac if present or replacing it deep to the muscles, re-approximation of the walls of the neck of the hernia if possible, permanent reinforcement of the abdominal wall defect with sutures or mesh.^[2]

In late 19th century, Bassini's repair was introduced involving suturing of internal oblique, transverse abdominis, fascia transversalis to inguinal ligament which had low recurrence rates. In present era the indication for Bassini's repair is the condition where mesh is contraindicated like infection.^[6] In Shouldice modification of Bassini's repair, the transversalis fascia is opened by a central incision from the deep inguinal ring to the pubic tubercle and then closed to create a double-thick two layered posterior wall (double breasting).^[2] McVays repair had similar

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recurrence rates which involved suturing of triple layer to Cooper's ligament.^[7]

In 1986, Lichtenstein described the tension free repair with mesh which has become the most popular open technique and has been shown to have simplicity of repair, decreased post operative pain and decreased recurrence rates when compared to tissue based repair.^[7] Lichtenstein repair combined with Bassini repair was comparatively better than only Lichtenstein repair in all direct inguinal hernias because of low recurrence rate (0%) and low postoperative complications.^[6]

Mesh repair is now standard in most countries and widely accepted as superior to primary suture repair.^[8] Lichtenstein's repair is the most commonly performed open hernia repair surgery in resource rich countries.^[2] Polypropylene has been extensively used in a wide variety of surgical procedures and is relatively inexpensive. The inflammatory reaction may predispose to adhesion formation and result in contraction of the mesh and surrounding tissues by 30% to 50%. This vigorous inflammatory reaction is thought to contribute to postoperative pain and loss of elasticity. While the inflammatory response generated by polypropylene contributes to its durability, it also increases adhesion formation when the mesh is used adjacent to the bowel. As a result, polypropylene is rarely used alone in the peritoneal cavity.^[9] Permanent synthetic meshes are susceptible to infection, limiting their use in contaminated fields. A recent meta-analysis showed that the overall infection rate was 5%. Risk factors for infection included smoking, American Society of Anesthesiologists score > 3, and emergency operation.^[10]

Meshes with thinner strands and larger spaces between them, 'light weight, large pore meshes', are preferred because they have better tissue integration, less shrinkage, more flexibility and improved comfort. The terms light, medium and heavy are not precisely defined, but meshes < 40g/sq.m are generally referred to as light and >80g/sq.m as heavy.^[2] Light weight meshes with reduced polypropylene content and larger pore size demonstrated reduced inflammation and improved integration in surrounding tissues. Low mass, decreased content of foreign body and large pores are characteristic of light weight meshes. They are also associated with decreased complaints of pain, paresthesia and improved abdominal wall compliance while providing adequate strength.^[7]

The new biosynthetic meshes exhibit better tissue integration, new collagen deposition, and sustained neovascularization compared with polypropylene meshes. Biodegradable polymers also can provide a temporary scaffold for deposition of proteins and cells, which are necessary for tissue ingrowth, neovascularization, and host integration. Therefore, theoretically, a lightweight mesh might be better for reducing pain due to less fibrosis. Lightweight mesh

was characterized by a reduction in the polypropylene volume, a large pore size, a higher concentration of mature collagen, and less fibrosis.^[11,12]

Light weight meshes can be completely absorbable when it is used for temporary reinforcement or partially absorbable (in combination with prolene). Various studies have compared prolene with prolene-poliglecaprone or vicryl mesh. Which amongst the light weight meshes is better is still a question of debate due to paucity of literature. This study is done to compare prolene and prolene-vicryl composite mesh in terms of post operative outcome in inguinal hernia repair.

Aims & Objectives

To compare the post-operative outcome of prolene and prolene-vicryl composite mesh in the repair of inguinal hernias by Lichtenstein's technique in view of

1. Post operative pain
2. Chronic pain
3. Infection
4. Seroma formation
5. Recurrence of hernia

MATERIALS AND METHODS

This was a prospective study which included 60 patients who underwent inguinal hernia repair in the department of surgery, Government Medical College and Rajindra hospital, Patiala, who were randomized into two groups using computer generated table of randomization.

1. Group A - 30 patients on whom prolene mesh was used
2. Group B - 30 patients on whom prolene-vicryl composite mesh was used.

The patients were explained about the study in detail and consent for participation in the study was taken. Efficacy of prolene mesh and prolenevicryl composite mesh was compared by comparing the post operative outcome in terms of postoperative pain assessed on POD#1 and POD#2 using visual analogue scale, chronic pain which was defined by pain after 3 months of surgery, infection as assessed by discharge at wound site, seroma formation in follow up period, recurrence occurring 6 months after surgery. Patients were catheterized in the immediate postoperative period to avoid bias with the pain due to urinary retention.

Inclusion Criteria

1. Patients undergoing inguinal hernia repair between the age group 18-65 both males and females.
2. Patients willing to participate in the study.

Exclusion Criteria

1. Patients who are diabetic.
2. Patients with chronic obstructive pulmonary disease.

- Patients who are immunocompromised (HIV/HBsAg/HCV positive)
- Patients not willing to participate in the study.

The collected data was analysed by calculating the mean of each variable and chi square test for comparing the values and getting the significance by p value in case of discrete variables. For continuous variables, Mann Whitney's test was used. P value less than 0.05 is taken as significant.

RESULTS

Table 1: Pain

	Groups	Mean	S.D	P value	Significance
Pain On POD 1	Group A	2.63	0.61	0.322	NS
	Group B	2.47	0.51		
Pain On POD 2	Group A	1.73	0.78	0.475	NS
	Group B	1.60	0.77		

Pain on POD1 in group A on VAS scale was 2.63 as compared to 2.47 in group B. The result was not statistically significant.

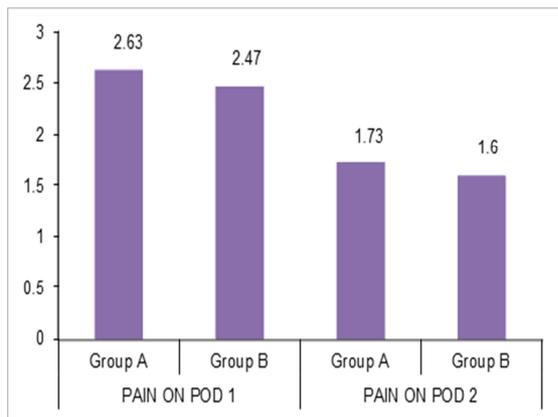


Figure 1: Pain on VAS scale on POD 1 & 2

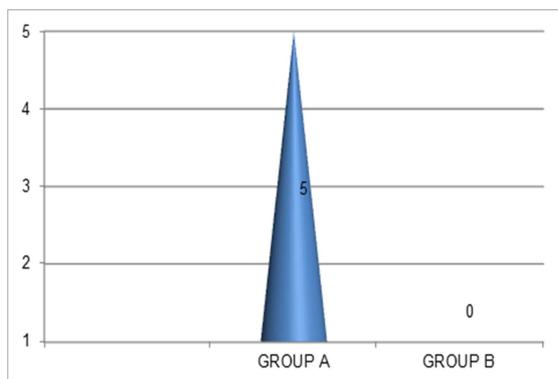


Figure 2: Chronic pain

Table 2: Wound Discharge

Wound Discharge	Group A		Group B	
	Number	Percentage	Number	Percentage
Yes	5	16.7	2	6.7
No	25	83.3	28	93.3
Total	30	100.0	30	100.0

Yes	5	16.7	2	6.7
No	25	83.3	28	93.3
Total	30	100.0	30	100.0
Chi Square	1.456			
P value	0.228			
Significance	NS			

5 patients in group A had wound discharge while only 2 patients in group B had wound discharge.

Table 3: Seroma

Seroma	Group A		Group B	
	Number	Percentage	Number	Percentage
Yes	2	6.7	2	6.7
No	28	93.3	28	93.3
Total	30	100.0	30	100.0
Chi Square	-			
P value	-			
Significance	-			

In both the groups 2 patients had seroma formation postoperatively.

Table 4: Chronic Pain

Chronic Pain	Group A		Group B	
	Number	Percentage	Number	Percentage
Yes	5	16.7	0	0.0
No	25	83.3	30	100.0
Total	30	100.0	30	100.0
Chi Square	5.455			
P value	0.020			
Significance	S			

Chronic pain was seen only in patients of group A. No patient had chronic pain on follow up where prolene-vicryl mesh was used. This result is statistically significant.

Table 5: Recurrence

Recurrence	Group A		Group B	
	Number	Percentage	Number	Percentage
Yes	0	0.0	0	0.0
No	30	100.0	30	100.0
Total	30	100.0	30	100.0

Recurrence was not found in both the groups.

DISCUSSION

Lichtenstein's hernioplasty is the most commonly practiced procedure for inguinal hernia repair in most developed countries. This prospective study was undertaken to compare the various post operative outcomes following Lichtenstein's hernioplasty using prolene mesh which is unabsorbable and prolenevicryl composite mesh which is partially absorbable. Though there are various studies explaining the pros and cons of partially absorbable meshes, it is still a topic of controversy as to which is the best mesh for

hernioplasty because of variable post operative outcomes.

Vasu et al studied the post operative complications following Lichtenstein's repair and estimated the post operative pain on VAS scale on POD 1 & 2 to be 3.24 and 1.58 respectively.^[13] In our study, in the group where prolene mesh was used, pain on VAS on POD 1 & 2 were 2.63 & 1.73. Both pain on POD 1 & 2 between both the groups did not differ significantly.

In our study, when post operative follow up of patients was done, minimal wound discharge either serous or purulent was taken into account as wound discharge. It was seen that 5 patients in prolene group and 2 patients in prolene-vicryl group had wound discharge. This was not significant statistically between the groups. Also none of the patients had purulent discharge or required any intervention. Also on follow up, the patients did not have any sinus formation. This finding goes along with other similar studies. Usoro N et al also found one patient out of the 14 in the study group had serous discharge from a skin suture on 5th day post-op, which resolved completely in 24 hours on removal of all skin sutures and antibiotic administration.^[14]

When the initial experience with a new macroporous partially absorbable mesh was assessed by Handojo K et al, seroma formation was found in 4.8% of patients in the study population.^[15] In the current study, there were 2 patients in each group with post operative seroma formation thus signifying no difference between the meshes used. In the total of 30 patients in the prolene-vicryl mesh group, 2 patients had seroma, accounting to 6.6%.

In a study by Nikkolo C et al, there were significantly more patients with pain at rest in the HW mesh group than in the LW mesh group at 6 months follow-up (6.3 vs. 0%, $P = 0.038$). The feeling of a foreign body at the operation site was experienced by 32.8% of the patients in the HW group and by 20.9% of the patients in the LW group after 6 post-operative months ($P = 0.123$).^[16] In the present study, 5 patients in the group A had chronic pain while none of the patients in group B had. This result was statistically significant with a p value of 0.02.

A meta-analysis of randomized trials which studied a total of 2027 patients of 10 RCTs were included. Compared with polypropylene Mesh, prolene-vicryl mesh had no significant difference in recurrence.^[17]

In our study, none of the patients had recurrence in the 6 month follow up period. This could be biased as the patients may have recurrence later after the study period.

CONCLUSION

1. There was no significant difference between the patients in the two groups in the pain experienced on Post operative day 1 & 2.
2. There was wound discharge which was serous in 16.7% patients in group A and 6.7% in group B which did not require any intervention and self limiting without any sinus formation or mesh infection on follow up.
3. Both groups had 2 patients with seroma formation.
4. Chronic pain on 3 months follow up was significantly low in group B as compared to group A.
5. There was no recurrence of hernia in both the groups in the 6 month follow up period.

Conclusion

The study concludes that prolene mesh and prolene-vicryl mesh in open hernia repair do not differ much in the post operative complications except that prolene-vicryl mesh gives less chronic pain as compared to prolene mesh. However, further studies are needed to establish the difference in post operative outcome between different types of meshes in Lichtenstein's hernioplasty.

REFERENCES

1. Rahul BG, Ravindranath GG. Incidence of inguinal hernia and its type in a study in a semiurban area in Andhra Pradesh, India. *International Surgery Journal*. 2016 Nov ;3(4) : 1946-49.
2. Williams NS, O'Connell R, McCaskie AW. *Bailey and Love's Short practice of Surgery*. 27th edition. Pages 1026-1034.
3. Sakorafas GH, Halikias L, Nissotakis C, Kotsifopoulos N, Stavrou A, Antonopoulos C, Kassaras GA. Open tension free repair of inguinal hernias; the Lichtenstein technique. *BMC Surg*. 2001; 1: 3.
4. Sulaiman J, Sugirtharaj JS, Senthurpandian S, Anandan H. A Study of Incidence of Different Types of Groin Hernias in Adults. *10.17354/ijss/2018/18*.
5. Burcharth J, Pedersen M, Bisgaard T, Pedersen C, Rosenberg J. Nationwide Prevalence of Groin Hernia Repair. *January 14, 2013*. <https://doi.org/10.1371/journal.0054367>.
6. Patil SM, Gurujala A, Kumar A, Kumar KS, Mithun G. Lichtenstein Mesh Repair (LMR) v/s Modified Bassini's Repair (MBR) + Lichtenstein Mesh Repair of Direct Inguinal Hernias in Rural Population – A Comparative Study. *J Clin Diagn Res*. 2016 Feb; 10(2): PC12–PC15.
7. Mukthinath G, Shankar K, Bhaskaran A. A comparative study of postoperative complications of lightweight mesh and conventional prolene mesh in Lichtenstein hernia repair. *Int J Res Med Sci*. 2016 Jun;4(6):2130-2134
8. Brown CN, Finch JG. Which mesh for hernia repair? *Ann R Coll Surg Engl*. 2010 May; 92(4): 272–278.
9. FitzGerald JF, Kumar AS. Biologic versus Synthetic Mesh Reinforcement: What are the Pros and Cons? *Clin Colon Rectal Surg*. 2014 Dec; 27(4): 140–148.
10. Mavros MN, Athanasiou S, Alexiou VG, Mitsikostas PK, Peppas G, Falagas ME. Risk factors for mesh-related infections after hernia repair surgery: a meta-analysis of cohort studies. *World J Surg*. 2011;35(11):2389–2398.
11. Li J, Ji Z, Cheng T. Lightweight versus heavyweight in inguinal hernia repair: a meta-analysis. *Hernia*. 2012 Oct;16(5):529-39. Epub 2012 Jun 12.
12. Sajid MS, Leaver C, Baig MK, Sains P. Systematic review and meta-analysis of the use of lightweight versus heavyweight

- mesh in open inguinal hernia repair.31 October 2011
<https://doi.org/10.1002/bjs.7718>
13. Vasu S,Sagar K.A clinical study of post operative complications of Lichtenstein's hernioplasty for inguinal hernia. *IntSurg J.* 2019 Jan;6(1):13-16.
 14. Usoro N, Agbor C, Emelike K, Bamidele A. Early Outcome Of Inguinal Hernia Repair Using Ultrapro® Mesh In University Of Calabar Teaching Hospital, Nigeria. *ISPUB.com / IJTWM/6/2/11171*
 15. Handojo K, Meylemans D, Devroe K, Vermeiren K, Aelvoet C, Tollens T. Initial Experience with a New Macroporous Partially Absorbable Mesh: Introducing Ultrapro® Advanced™. *SurgTechnol Int.* 2016 Apr;28:125-30.
 16. Nikkolo C, Lepner U, Murruste M, Vaasna T, Seepter H, Tikk T. Randomised clinical trial comparing lightweight mesh with heavyweight mesh for inguinal hernioplasty. *Hernia.* 2010 Jun;14(3):253-8
 17. Gao M, Han J, Tian J, Yang K. Vypro II mesh for inguinal hernia repair: a meta analysis of randomized controlled trials. *Ann Surg.* 2010 May;251(5):838-42.

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