International Journal of Medical and Pharmaceutical Research

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Available online on: https://ijmpr.in/

Original Article

A Comparative study of Lightweight vs Heavyweight Mesh in Lichtenstein Repair of Inguinal Hernia

Mrinal Talukdar[1], Subal Rajbongshi[2], Ridipta Sekhar Das[3], M.Nikhil[4]

[1]Associate Professor, Department of Surgery, Fakhruddin AliAhmed Medical College and Hospital (FAAMCH), Barpeta
[2]Assistant Professor, Department of Surgery, Fakhruddin AliAhmed Medical College and Hospital (FAAMCH), Barpeta
[3]Associate professor, Department of Surgery, Fakhruddin Ali Ahmed Medical College and Hospital (FAAMCH), Barpeta
[4]Junior Resident, Department of Surgery, Fakhruddin AliAhmed Medical College and Hospital (FAAMCH), Barpeta

Corresponding Author:

Dr. M. Nikhil
Junior Resident, Department of Surgery, Fakhruddin Ali Ahmed Medical College and Hospital (FAAMCH), Barpeta

Received: 25-11-2025
Accepted: 20-12-2025
Available online: 31-12-2025

ABSTRACT

Inguinal hernia repair is one of the most commonly performed surgical procedures worldwide1. The Lichtenstein tension-free mesh repair is considered the gold standard for open inguinal hernia surgery3. However, the ideal mesh type remains controversial, as heavyweight meshes are associated with increased foreign body reaction, pain, and stiffness4. Lightweight meshes have been introduced to improve postoperative comfort and quality of life9.This prospective observational study was conducted on 80 patients undergoing elective Lichtenstein repair for primary inguinal hernia at a tertiary care hospital. Patients were randomly allocated into two groups: Group A (Lightweight mesh, n=40) and Group B (Heavyweight mesh, n=40). Postoperative outcomes including pain (Visual Analogue Scale), foreign body sensation, abdominal wall stiffness, postoperative complications, and duration of hospital stay were assessed at 2 weeks, 1 month, and 3 months. Statistical analysis was performed using appropriate tests, and a p-value <0.05 was considered significant. The lightweight mesh group demonstrated significantly lower postoperative pain scores at all follow-up intervals ($p<0.001$). Foreign body sensation and abdominal wall stiffness were significantly more common in the heavyweight mesh group ($p<0.05$). Postoperative complications such as seroma and scrotal edema were fewer in the lightweight mesh group. The mean duration of hospital stay was shorter in patients receiving lightweight mesh. Lightweight mesh in Lichtenstein inguinal hernia repair is associated with reduced postoperative pain, less foreign body sensation, decreased abdominal wall stiffness, and shorter hospital stay compared to heavyweight mesh. Lightweight mesh should be preferred in primary inguinal hernia repair to improve postoperative patient comfort and outcomes

Keywords*: Inguinal hernia, Lichtenstein repair, lightweight mesh, heavyweight mesh, postoperative pain.*

INTRODUCTION

Inguinal hernias account for approximately 75% of all abdominal wall hernias, making them a common surgical condition worldwide2. The field of hernia surgery has been ever evolving. The focus in hernia repair has shifted from anatomical repair to using prosthesis, from open to laparoscopy. The use of a mesh in primary inguinal hernia repair is a standard treatment now and has been proven to be far more superior to a basic anatomical repair [1]. This technique was proposed and popularized by Dr. Irving Lichtenstein. Once the tension free open mesh repair was accepted worldwide, the focus has shifted to optimizing the results. Polypropylene mesh has been used most commonly for hernia repairs for last 50 years and now it is believed that they are rather strong or " over- engineered."

These heavy weight (HW) meshes featuring high density (>80 g/m²), small pores (<1 mm), and thick filaments result not only in intense inflammation, mesh shrinkage and loss of abdominal wall compliance [2] but also are known to be the cause of chronic post-operative pain, which can severely debilitate the quality of life [This called for a modification in

the previously used meshes to yield much satisfactory results, in the form of light weight meshes. The only difference between the light and heavy meshes were the amount of polypropylene present. There was a notable 30% decrease in the amount of polypropylene used in light weigh meshes with low material density (<40 g/m²), large pore size (>1 mm), and thin polypropylene filaments when compared to heavy weight meshes.Light weight meshes has reduced amount of foreign body material and hence causes reduced inflammation. By reducing the amount of foreign body material, lighter weight meshes may provide ample strength for hernia repair with less associated side effects.Despite these theoretical advantages, comparative clinical data in prospective settings remain limited, particularly from resource-constrained environments4. This study aims to compare LWM versus HWM in Lichtenstein repair for primary inguinal hernia, evaluating pain (VAS score), foreign body sensation, stiffness, complications, and hospital stay.

MATERIALS AND METHODOLOGY

This prospective observational study was conducted at the Department of General Surgery, FAAMCH, Barpeta. A total sample size of 80 patients was included, with 40 patients in Group A (lightweight mesh, LWM) and 40 patients in Group B (heavyweight mesh, HWM).

Inclusion Criteria: Patients aged 18 years or older with primary inguinal hernia undergoing elective surgery. **Exclusion Criteria**: Recurrent hernia, emergency cases, or refusal to consent.

Surgical Technique: Standard Lichtenstein tension-free mesh repair was performed using polypropylene lightweight mesh (LWM: <40 g/m², large pore size >1 mm, thin filaments) or heavyweight mesh (HWM: >80 g/m², small pore size <1 mm, thick filaments).

Patients were followed up postoperatively at 2 weeks, 1 month, and 3 months. During each follow-up visit, postoperative pain was assessed using the Visual Analogue Scale (VAS). The presence or absence of foreign body sensation and abdominal wall stiffness was documented. Postoperative complications, including seroma, hematoma, scrotal edema, and epididymo-orchitis, were recorded. In addition, the duration of hospital stay was noted in days as an outcome parameter.

Figure 1

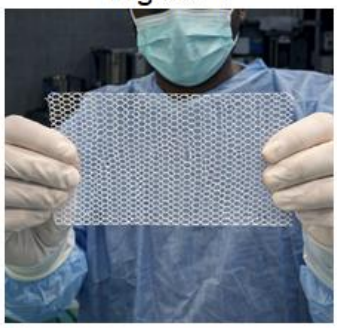


Figure 2

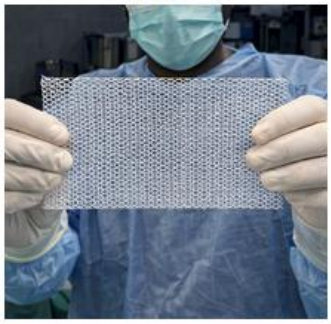
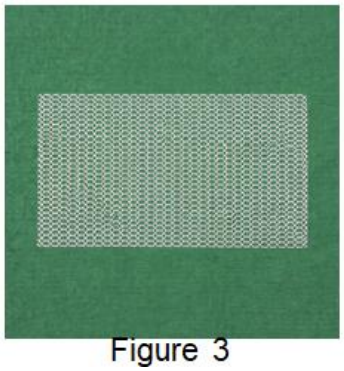


Figure 1&3 - Light-weight mesh



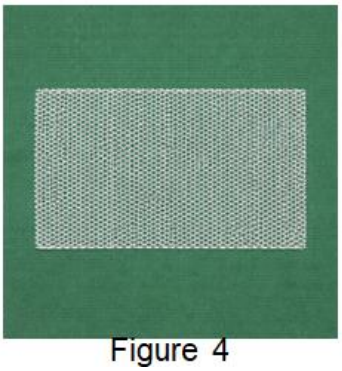


Figure 2&4 - Heavy-weight mesh

Figure 3

Figure 4

RESULTS

The present study included a total of 80 patients undergoing Lichtenstein inguinal hernia repair, with 40 patients each in the lightweight mesh (Group A) and heavyweight mesh (Group B) groups. The age distribution was comparable between the two groups. Most patients belonged to the 41–50 years age group, accounting for 22 patients (27.5%), followed by the 51–60 years age group with 20 patients (25%). The 31–40 years age group comprised 18 patients (22.5%), while 10 patients (12.5%) each were in the 18–30 years and above 60 years age groups. Each age category was equally represented in both groups, indicating effective age matching between Group A and Group B. The overall mean age of the study population was 45.6 ± 12.4 years, and the study predominantly involved male patients (95%), reflecting the known male preponderance of inguinal hernia.

Table 1 - Association of age

Age (years)	Group A	Group B	Total

18-30	5(12.5%)	5(12.5%)	10(12.5%)
31-40	9(22.5%)	9(22.5%)	18(22.5%)
41-50	11(27.5%)	11(27.5%)	22(27.5%)
51-60	10(25%)	10(25%)	20(25%)
>60	5(12.5%)	5(12.5%)	10(12.5%)

Postoperative pain, assessed using the Visual Analogue Scale (VAS), was significantly lower in the lightweight mesh (LWM) group compared to the heavyweight mesh (HWM) group at all follow-up intervals. At 2 weeks postoperatively, the mean VAS score was 2.1 in the LWM group compared to 3.4 in the HWM group. At 1 month, the mean pain score further reduced to 1.2 in the LWM group, while it remained higher at 2.5 in the HWM group. By 3 months, patients in the LWM group reported minimal pain with a mean VAS score of 0.5, whereas the HWM group continued to have higher pain scores with a mean of 1.6. The difference in pain scores between the two groups was statistically significant at all follow-up intervals, with a p-value of <0.001, indicating a consistently lower postoperative pain burden associated with the use of lightweight mesh.

Table 2 - Post-operative pain

Time interval	**LWM(Mean+-SD)**	**HWM(Mean+-SD)**	**p-value**
2weeks	2.1	3.4	<0.001
1month	1.2	2.5	<0.001
3months	0.5	1.6	<0.001

Table 3 Pain at 2 weeks post operative

VAS Score	**LWM**	**HWM**
Mild pain(VAS 1-3)	34	18
Moderate pain(VAS 4-6)	6	22
Severe pain(VAS >6)	0	0

At 2 weeks following surgery, the majority of patients in the lightweight mesh (LWM) group experienced mild pain. Mild pain (VAS 1–3) was reported by 34 patients in the LWM group compared to 18 patients in the heavyweight mesh (HWM) group. Moderate pain (VAS 4–6) was observed in only 6 patients in the LWM group, whereas it was considerably higher in the HWM group, affecting 22 patients. None of the patients in either group reported severe pain (VAS >6) at this follow-up interval, indicating an overall reduction in severe postoperative discomfort.

Table 4 Pain at 1 month post operative

VAS Score	**LWM**	**HWM**
Mild pain (VAS1-3)	28	12
Moderate pain (VAS4-6)	12	28

At 1 month post-operative follow-up, pain intensity showed a further decline in both groups; however, the LWM group continued to demonstrate better outcomes. Mild pain (VAS 1–3) was present in 28 patients in the LWM group compared to only 12 patients in the HWM group. In contrast, moderate pain (VAS 4–6) persisted in 12 patients in the LWM group, while a significantly larger proportion of patients in the HWM group, numbering 28, continued to experience moderate pain. This highlights a slower resolution of pain in patients receiving heavyweight mesh.

Table 5 Pain at 3 months post operative

Pain status	**LWM**	**HWM**
Pain present	4 (10%)	16 (40%)
Pain absent	36	24

At 3 months post-operative follow-up, persistent pain was markedly less in the lightweight mesh group. Pain was present in only 4 patients (10%) in the LWM group, whereas 16 patients (40%) in the HWM group continued to report pain. Conversely, pain was absent in 36 patients in the LWM group compared to 24 patients in the HWM group. These findings indicate a significantly lower incidence of chronic postoperative pain associated with the use of lightweight mesh.

Table 6 - Foreign body sensation

Group	**Present**	**Absent**
LWM	6(15%)	34(85%)
HWM	18(45%)	22(55%)

Foreign body sensation was observed significantly more frequently in patients who received heavyweight mesh compared to those who received lightweight mesh. In the lightweight mesh (LWM) group, only 6 patients (15%) reported

foreign body sensation, while the remaining 34 patients (85%) were asymptomatic. In contrast, 18 patients (45%) in the heavyweight mesh (HWM) group experienced foreign body sensation, with only 22 patients (55%) reporting no such complaints. The difference between the two groups was statistically significant, with a p-value of 0.03, indicating that the use of lightweight mesh is associated with a significantly lower incidence of postoperative foreign body sensation.

Table 7 - Abdominal wall stiffness

Group	Present
LWM	4(10%)
HWM	16(40%)

Abdominal wall stiffness was observed significantly more frequently in patients who received heavyweight mesh compared to those who received lightweight mesh. In the lightweight mesh (LWM) group, abdominal wall stiffness was present in only 4 patients (10%), whereas the remaining majority were free from stiffness. In contrast, 16 patients (40%) in the heavyweight mesh (HWM) group developed abdominal wall stiffness. This marked difference between the two groups indicates a significantly higher incidence of postoperative abdominal wall stiffness associated with heavyweight mesh use, suggesting that lightweight mesh offers better postoperative abdominal wall compliance.

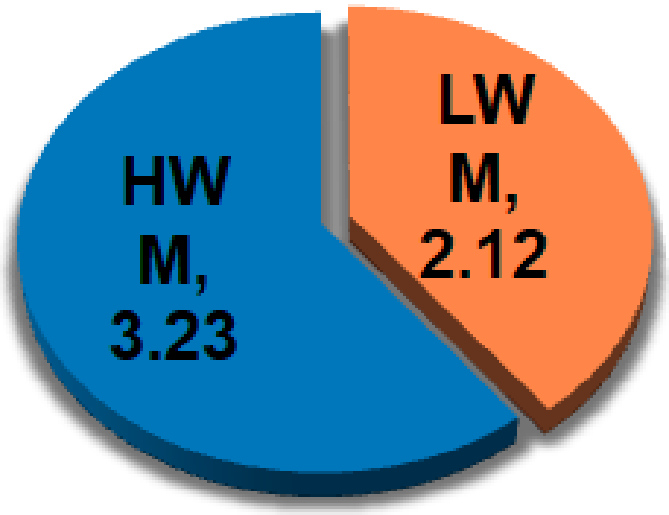
Table 8 - postoperative complications

Complication	LWM	HWM
Seroma	2(5%)	6(15%)
Haematoma	0	2(5%)
Scrotal edema	2(5%)	4(10%)
Epididymo-orchitis	0	2(5%)

Post-operative complications were observed less frequently in the lightweight mesh (LWM) group compared to the heavyweight mesh (HWM) group. Seroma formation was noted in 2 patients (5%) in the LWM group, whereas it occurred in 6 patients (15%) in the HWM group. No cases of haematoma were reported in the LWM group, while 2 patients (5%) in the HWM group developed haematoma. Scrotal edema was observed in 2 patients (5%) following lightweight mesh repair compared to 4 patients (10%) in the heavyweight mesh group. Epididymo-orchitis was not seen in any patient in the LWM group but was reported in 2 patients (5%) in the HWM group. Overall, the incidence of post-operative complications was lower in the lightweight mesh group, with seroma and scrotal edema being more common among patients receiving heavyweight mesh.

Table 9

Group	Mean stay(days)
LWM	2.1
HWM	3.2



Hospital stay in days

The duration of hospital stay was shorter in patients who underwent Lichtenstein repair with lightweight mesh compared to those who received heavyweight mesh. The mean hospital stay in the lightweight mesh (LWM) group was 2.1 days,

whereas patients in the heavyweight mesh (HWM) group had a longer mean stay of 3.2 days. This indicates faster postoperative recovery and earlier discharge among patients treated with lightweight mesh, likely reflecting reduced postoperative pain, stiffness, and complication rates in this group.

DISCUSSION

Lichtenstein tension free mesh repair now has become the gold standard technique in inguinal hernia surgery. Concepts behind the use of mesh are to reinforce the abdominal wall with the formation of scar tissue. Therefore, it was believed that the stronger the mesh resulted in more fibrosis and, the more effective wall strengthening. Various types of meshes are available now-a-days with its own advantages and disadvantages. Heavy weight mesh (HWM) is designed with thick polymer fibres (>80gm/m2), small pores (< 1 mm) gives high tensile strength but causes more inflammation and decreased elasticity.The light weight mesh (LWM) has larger pore size (>1mm), low weight per unit area(<40gm/m2), stimulates less inflammatory reaction, provides greater elasticity, less mesh shrinkage and more tissue flexibility. Lightweight mesh demonstrated superior outcomes with reduced postoperative pain, foreign body sensation, abdominal wall stiffness, complications, and hospital stay compared to heavyweight mesh in Lichtenstein inguinal hernia repair.In our study showed postoperative pain was analysed using VAS score and found to be significantly lower in LWM in comparison to HWM. This finding is consistent with prior studies, including Sajid et al.'s meta-analysis showing lower chronic pain with LWM. Chunlin Zhong et al meta-analysis showing the use of a lightweight mesh is associated with less postoperative pain and less sensation of a foreign body.M M Uzzaman et al.use of lightweight mesh in Lichtenstein inguinal hernia repair is associated with less chronic pain, and foreign body sensation compared with heavyweight mesh.

Foreign body sensation was another important outcome parameter that differed significantly between the two groups. In the present study, only 15% of patients in the lightweight mesh group reported foreign body sensation, compared to 45% in the heavyweight mesh group, a difference that was statistically significant. This finding supports the hypothesis that the bulk and rigidity of heavyweight mesh contribute to persistent awareness of the implant. Lightweight mesh, by virtue of its reduced polypropylene content and improved tissue integration, appears to be better tolerated by patients, leading to improved subjective comfort and quality of life.

Abdominal wall stiffness was also significantly more common in patients receiving heavyweight mesh. Only 10% of patients in the LWM group experienced abdominal wall stiffness, compared to 40% in the HWM group. This difference highlights the impact of mesh characteristics on abdominal wall dynamics. Heavyweight meshes provoke a stronger foreign body reaction, leading to increased fibrosis, mesh shrinkage, and loss of abdominal wall compliance. In contrast, lightweight meshes preserve abdominal wall flexibility due to their macroporous structure and reduced inflammatory response, resulting in better functional outcomes.

The duration of hospital stay was shorter in the lightweight mesh group compared to the heavyweight mesh group. Patients who underwent repair with lightweight mesh had a mean hospital stay of 2.1 days, whereas those in the heavyweight mesh group stayed for an average of 3.2 days. This reduction in hospital stay may be explained by lower postoperative pain, reduced stiffness, and faster mobilization in the LWM group. Shorter hospitalization not only reflects better recovery but also has important implications in terms of healthcare costs and resource utilization, particularly in resource-limited settings.

Overall, the findings of the present study consistently favor lightweight mesh over heavyweight mesh in terms of postoperative pain, patient comfort, abdominal wall compliance, and recovery. While both mesh types are effective in preventing recurrence, lightweight mesh appears to offer superior short-term and medium-term patient-centered outcomes without compromising surgical efficacy. These results support the growing body of evidence advocating the use of lightweight mesh in open inguinal hernia repair.

Limitations include the observational design without randomization, small sample size (n=80), short-term follow-up (3 months), and lack of long-term recurrence data; future multicenter RCTs are warranted to confirm these results.

CONCLUSION

Lightweight mesh proves superior to heavyweight mesh in Lichtenstein repair of primary inguinal hernia, offering less postoperative pain, reduced foreign body sensation and stiffness, fewer complications, and shorter hospital stay. These outcomes enhance patient satisfaction and recovery, supporting preference for LWM in elective primary repairs.

Conflict of interest: Nil

REFERENCES

1. Rutkow IM. A selective history of groin hernia surgery in the early 19th century. Surgical Clinics of North America. 1998;78(6):921–940

2. Williams NS, Bulstrode CJK, O'Connell PR. Bailey & Love's Short Practice of Surgery. 27th ed. London: CRC Press; 2018.
3. Lichtenstein IL, Shulman AG, Amid PK, Montllor MM. The tension-free hernioplasty. American Journal of Surgery. 1989;157(2):188–193.
4. 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.British Journal of Surgery. 2012;99(1):29–37.
5. Bittner R, Leibl BJ, Kraft B, Schwarz J. One-year results of a prospective randomized clinical trial comparing four meshes in laparoscopic inguinal hernia repair. Hernia. 2011;15:503–510.
6. Zhong C, Wu B, Yang Z, Deng X, Kang J, Guo B, Fan Y. A meta-analysis comparing lightweight meshes with heavyweight meshes in Lichtenstein inguinal hernia repair. Surg Innov. 2013 Feb;20(1):24-31. doi: 10.1177/1553350612463444. Epub 2012 Oct 16. PMID: 23075529.
7. Uzzaman MM, Ratnasingham K, Ashraf N. Meta-analysis of randomized controlled trials comparing lightweight and heavyweight mesh for Lichtenstein inguinal hernia repair. Hernia. 2012 Oct;16(5):505-18. doi: 10.1007/s10029-012-0901-x. Epub 2012 Feb 28. PMID: 22371213
8. Sajid MS, et al. Systematic review... lightweight vs heavyweight mesh. Br J Surg. 2012;99(12):1499-37
9. Lee SD, Son T, Lee JB, Chang YS. Comparison of partially absorbable lightweight mesh with heavyweight mesh for inguinal hernia repair. Ann Surg Treat Res. 2017;93(6):322–330.
10. Klinge U, Klosterhalfen B.Modified classification of surgical meshes for hernia repair based on material, pore size, and weight.Hernia. 2012;16(1):5–15.