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## Light vs heavy weight mesh in Lichtenstein's open inguinal hernia repair: A prospective study

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### Abstract

**Introduction:** Hernia repair has been an ever evolving field of surgery. Newer modalities of treatment are being developed, with mesh repair becoming the cornerstone of management of hernia. As mesh related complications have increased in the last decade, there has been an evolution in the type of meshes being used. The aim of our study was to compare light weight mesh and heavy weight mesh in Lichtenstein tension free open inguinal repair.

**Methodology:** A prospective study of 100 patients undergoing open inguinal mesh repair in Victoria Hospital, Bangalore, was conducted from August 2016 to March 2018. 50 patients received heavy weight mesh (HWM) and the rest 50, light weight mesh (LWM), after randomization. They were evaluated on post-operative day 7 for examination of wound, post-operative pain and with USG for seroma formation. Patients were reviewed again after 1<sup>st</sup> and 6<sup>th</sup> month for chronic pain and recurrence.

**Results:** Out of the 100 patients, 52 required 2 days of hospital stay out of which 61.5% were with HWM. At 1 week, all the patients had seroma formation (USG) but clinically significant seroma formation seen in 25 patients. Of this, 10 patients belong to LWM and 15 patients to HWM group. At 6 months, 13 patients had chronic pain and 10 belonged to HWM group. No recurrences reported.

**Conclusions:** LMW and HMW for inguinal hernia repair had similar outcomes with a non-significant trend favouring LWM in terms of decreased seroma formation and lesser incidence of chronic pain at the end of 6 months. However, these results would be required to be validated in larger studies.

**Keywords:** Inguinal hernia; Lichtenstein mesh repair; mesh

### Introduction

Hernia repairs are the one of the most common operations performed by general surgeons and more often the first surgery performed by a surgical resident. 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 laparoscopic techniques, still, the results aren't near perfect. Even though it's a frequently performed procedure, no surgeon would ever firmly state that he can always get the best results with no post-operative complications.

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 <sup>[1]</sup>. 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" <sup>[2]</sup>. These heavy weight (HW) meshes (95 gms/m<sup>2</sup>) result not only in intense inflammation, mesh shrinkage and loss of abdominal wall compliance <sup>[2]</sup> but also are known to be the cause of chronic post-operative pain, which can severely debilitate the quality of life <sup>[3]</sup>.

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 (25gms/m<sup>2</sup>) 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 <sup>[2]</sup>.

There have been few studies that have compared the two and have shown that light weight meshes might be slightly better in terms of post-operative pain and discomfort, but the recurrence rates were the same <sup>[4]</sup>.

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This study aims to compare the light and heavy weight meshes in terms of post-operative outcomes in Lichtenstein’s open inguinal hernia repairs in our setup.

**Materials and methods**

This was a prospective clinical study consisting of 100 patients who underwent open inguinal Lichtenstein tension free hernia repair in the Victoria Hospital, Bangalore, associated with Bangalore Medical College and Research Institute from August 2016 to March 2018. Patients admitted with unilateral or bilateral inguinal hernia aged above 18 years with uncomplicated, reducible and non-obstructive hernia were included in the study. After taking the required consent, patients were divided randomly into two groups of 50 patients each. One group (group 1) received the light weight mesh and the other, group 2 received heavy weight mesh.

Lichtenstein’s tension free mesh hernia repair was done for all patients under spinal anesthesia. Operative procedure and post-operative management was the same in both the groups, except for the mesh. Patients were discharged and reviewed back on 7<sup>th</sup> post-operative day. Wound was examined for the evidence of infection and seroma. Pain at operated site was determined by using Visual analogue scale. Using ultrasound, the wound was scanned to look for seroma formation, along with placement of mesh, migration of the mesh and recurrence. Seroma was quantified by measuring the length, width and depth of the fluid

collected around the mesh. If seroma collection was more than 10 ml on ultrasonography, it was aspirated and patient was given additional doses of oral antibiotics. Patient was reviewed again after one and six months after surgery to look for chronic pain and recurrence.

**Materials**

Light weight mesh – Vipro II Mesh (Ethicon, Mumbai, India)  
 Composite mesh (Polypropylene + Polygalactin 910)  
 Heavy weight mesh – Prolene Mesh (Ethicon, Mumbai, India) (Polypropylene)

**Results**

The data collected were tabulated after filling the standard proformas. 100 patients were included in this study, which were divided into two groups of 50 patients each. All 100 patients included in this study were males. Majority of the patients were above 50 years of age (56%). The incidence of hernia increased with age in our study.

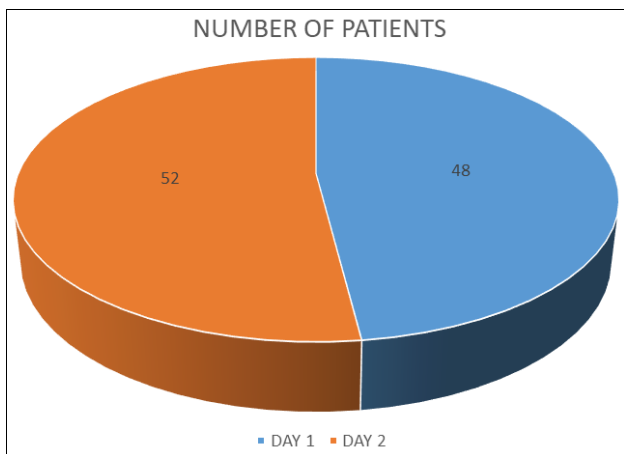
**Table 1:** Age distribution of patients

Age in years	Number	%
18-30	14	14.0
31-50	30	30.0
>50	56	56.0
Total	100	100.0

**Table 2:** Association of Age and type of hernia

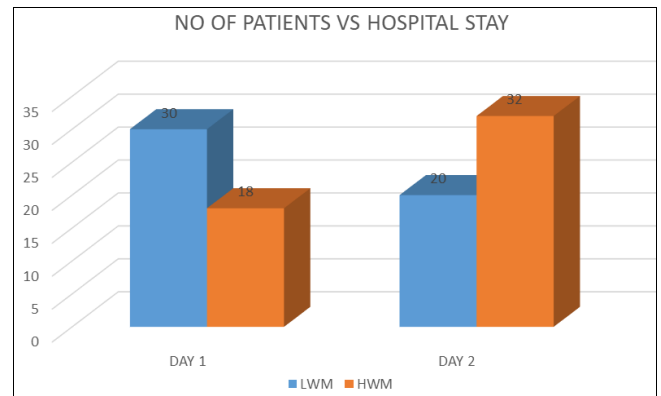
Age in years	Number of patients	Type of hernia		
		Direct	Indirect	Combined
18-30	14	1 (7.2%)	13(92.8%)	0
31-50	30	5 (16.6%)	23(76.6%)	2(6.6%)
>50	56	30(41.1%)	26(58.9%)	0
Total	100	36 (36.0%)	62(62.0%)	2(2.0%)

In our study, there was an increase in the incidence of direct hernia with an increase in age, however indirect hernia was still most common type of inguinal hernia noted overall. The indirect to direct hernia ratio observed in our study was 1.7:1. Out of the 100 patients taken in the study, 48% were discharged by the 1<sup>st</sup> post-operative day whereas the remaining were discharged by the next day.



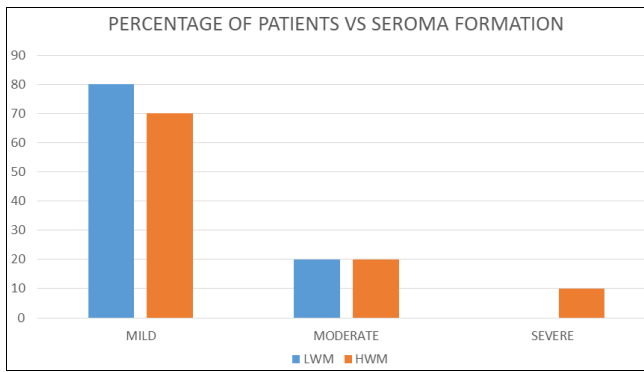
**Fig 1:** Hospital stay in days

52 patients stayed in the hospital for 2 days post-operatively, in which 61.5% (32) of the patients received a heavy weight mesh. 60% (30) of the patients that received the light weight mesh were discharged by the 1st day.



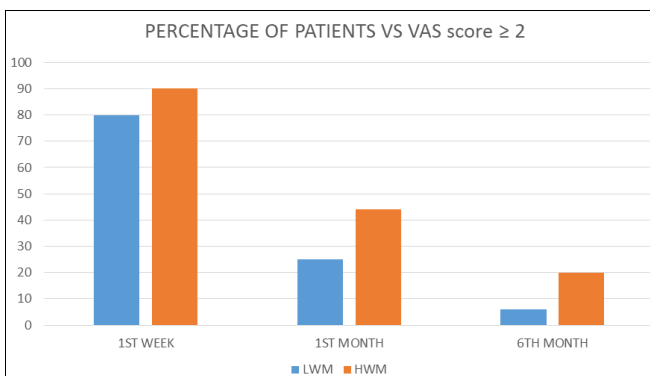
**Fig 2:** Distribution of hospital stay.

On the 7<sup>th</sup> post-operative day, patients were reviewed and the wound was assessed. The amount of seroma formation was quantified using ultrasound and in patients with more than 10 ml of seroma, aspiration was performed. In light weight mesh group, mild seroma was seen in 40 patients (80%) and moderate seroma was seen in 10 patients (20%). In heavy weight mesh group, mild seroma was seen in 35 patients (70%), moderate seroma in 10 patients (20%) and severe seroma seen in 5 patients (10%). Hence, clinically significant seroma (> 10 ml) formation was seen only in 10 patients (20%) in the light weight mesh group and in 15 patients (30%) of the heavy weight mesh group. However, the corresponding “p” value was not statistically significant.



**Fig 3:** Distribution of Seroma formation.

When the patients reviewed with us at 1<sup>st</sup> week, 1<sup>st</sup> month and at 6<sup>th</sup> month, we evaluated their pain using the visual analogue scale. Certain amount of pain was excusable and we collected data when patients gave a VAS score of above 2. VAS score at 1 week post-operatively showed that in light weight mesh group, 40 patients (80%) and 45 patients (90%) in heavy weight mesh group had VAS score  $\geq 2$ . The corresponding “p” value (0.259) was not statistically significant. After 1 month, only 12 patients (25 %) and 22 patients (44%) in the light weight and heavy weight mesh group respectively had VAS score  $\geq 2$  but the corresponding “p” value (0.221) was not statistically significant. Finally, at the 6<sup>th</sup> month post-operative review, 3 patients (6 %) and 10 patients (20%) in the light weight and heavy weight mesh group respectively had VAS score  $\geq 2$  however the corresponding “p” value (0.249) was not statistically significant.



**Fig 4:** Distribution of Visual Analogue Scale

The patients were also monitored for the incidence of recurrences. No recurrences occurred in our 6 months follow-up of the patients.

### Discussion

In our study, we included 100 patients, who were divided into two groups of 50 each and group 1 received light weight mesh and group 2 received heavy weight mesh. All cases reported in this studies were males. The incidence of hernia is much lower in females when compared to males [5]. The patients ranged from 18 to 80 years (Mean - 45 years, Median – 48.4 years). Indirect hernias were far more common than direct hernias. The incidence of hernias increased with age, which was observed in other studies as well [5].

Day care surgeries are very popular for hernia surgeries these days. However, our patients preferred staying in the hospital for at least one day before discharge. 52 % of patients stayed in the hospital for 2 days post-operatively, in which 61.5% of the patients received a heavy weight mesh. Among the 48 patients

that were discharged on day 1, 60% were from the light weight mesh group. However as the p value wasn't significant, it can't be said that the type of mesh has an influence on the hospital stay post-operatively. There are other factors that can influence hospital stay that aren't surgery related, but this aspect can be further studied.

Seroma formation and wound infection are considered as the immediate markers for the impact of the mesh on the inguinal hernia repair in immediate post-operative period [6]. The use of USG to evaluate seroma formation, helped us conclude that all cases had seroma formation of some quantity. A previously done similar study that only clinically evaluated seroma formation in their patients showed that only 30% of the patients developed seroma [7]. Clinically significant seroma formation was seen in 10 patients (20%) in the light weight mesh group and in 15 patients (30%) of the heavy weight mesh group. All these patients underwent USG guided aspiration of seroma with an extra course of antibiotics. Though the corresponding p value (0.173) was not significant, a trend in favour of lesser seroma formation in the light weight mesh group was noted, hence supporting the hypothesis that a mesh with larger surface area causes more foreign body reaction and inflammation<sup>2</sup>. Surface area depends on the pore size and number of fibers used and light weight mesh has larger pore size and lesser surface area, so the foreign body reaction is believed to be significantly reduced. In our study, we also closely monitored the development of chronic post-operative pain. This helped to compare the impact the two different meshes had on the quality of life. Post-operative pain was evaluated using a Visual Analogue Scale (VAS) system during the regular follow up at 1 week, 1 month, and 6 months. There was a non-significant trend showing lesser post-operative pain in patients in the light weight mesh group. This similar finding was extrapolated in other studies as well. This supports the foreign body reaction hypothesis.

Light weight meshes have few added advantages, but it comes at an increased cost for the mesh. Also, a longer study with a larger sample size can better evaluate the impact of the type of mesh on the hernia surgeries performed.

### Conclusion

In this study, the outcomes in the light weight mesh group and heavy weight mesh groups with respect to early and late complications, were very similar. The use of light weight mesh had a more favourable trend for reduced seroma formation and post-operative pain. This study has evidence supporting the hypothesis that reducing the amount of polypropylene in the mesh for inguinal hernia repair reduces the complication rates, but comes with the disadvantage of being expensive and not affordable by all, especially in an Indian government set-up. Light weight meshes can be a better option in Lichtenstein hernia repairs, provided they are made more affordable and also their efficacy is proven in larger studies with a longer follow-up period.

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