



LIGHT WEIGHT VERSUS MEDIUM WEIGHT MESH IN LAPAROSCOPIC INGUINAL HERNIA MESH REPAIR

Dr Summaya Shikalgar

3rd Year General Surgery Resident, SSH, Pune

Dr Sanjay Kolte

HOD of General Surgery Department, SSH, Pune

Dr S.P. Singh

Consultant General Surgeon, SSH, Pune

ABSTRACT

Hernia is repaired by laparoscopic or open approach. Laparoscopic inguinal hernia repairs performed are trans-abdominal preperitoneal repair (TAPP) and totally extra-peritoneal repair (TEP). This study aimed to update the previous reviews and to compare Light Weight versus Medium Weight Mesh in LIHR. Previous studies have shown benefits of LWM compared to MWM in terms of decreased pain, discomfort, and early return to normal activity. **Method:** 50 patients operated for Laparoscopic Inguinal Hernia Mesh Repair were evaluated from Inpatient department of Sahyadri Speciality Hospital, Deccan, Pune between January 2020 to May 2021. 30 patients were operated using Anatomical 3D Light weight Mesh and 20 were operated using Paritene Flat Sheet Medium Weight Mesh; allocation done by simple randomization. It is a prospective, observational study. Aim was to evaluate the post-operative outcome and return to normal activities in LWM versus MWM in LIHR. **Result:** Mean duration of hospital stay, mean duration of days taken to resume daily activities, intensity of pain by VAS and NRS, foreign body sensation, incidence of seroma formation and influence on male sexual life and fertility did not differ between patients of both groups. No significant difference in post-operative pain and foreign body sensation between use of LWM and MWM.

KEYWORDS : LWM- Light weight mesh. MWM- Medium weight mesh. HWM- Heavy weight mesh. PP-

Polypropylene. LIHR- Laparoscopic Inguinal Hernia Mesh Repair. VAS- Visual analog scale. NRS- Numeric rating scale.

INTRODUCTION

Surgical mesh is implanted to strengthen tissue repair and minimize rate of recurrence. It has features like material, strength, elasticity, density, and pore size which affects the weight of mesh and its biocompatibility to abdominal wall in terms of flexibility and discomfort⁵. Standard polypropylene mesh is most frequently used as it is cheap, available, non-absorbable and strong enough to avoid recurrence. The LWM is more expensive than standard polypropylene MWM. Mesh development is an ongoing process, reflecting changes in polymer structure, biocompatibility, operative handling, and cost. Partially absorbable meshes have two components; polypropylene non-absorbable part does not lose its strength and the other half is absorbed within 12 weeks. Eventually less foreign material is left in situ, while the remaining mesh provides sufficient mechanical barrier against recurrence. The debut of the first mesh indicated for hernia repair was in 1958 with the introduction of polyethylene mesh by Usher et al¹. The use of synthetic meshes was a milestone in hernia repair and led to the development of many other mesh products of various polymer types, densities, and elasticity to bridge the defect or to reinforce the abdominal wall. Mesh has decreased the incidence of hernia recurrence compared with sutured repair, there remain concerns about mesh-induced problems such as groin pain and infertility. Polypropylene is associated with strong foreign-body reaction with potentially harmful side-effects including chronic inflammation, chronic pain and impact on physical functioning². Patients in whom LWM with less foreign material was used in the Lichtenstein groin hernia repair had less pain at 6–12 months^{3,4}. By reducing the amount of PP and increasing the pore size less foreign body reaction is produced⁶.

LWM therefore provides adequate strength for hernia repair with less associated side effects⁷. First generation synthetic meshes contain high concentration of foreign materials which causes excessive inflammatory response and is the cause of chronic pain. LWM induces less inflammation compared to HWM which led to increased use of LWM to reduce the incidence of chronic pain, however it has been suggested that LWM have an increased rate of recurrence compared with HWM. Mesh with density >90g/m² is described as heavy, 60-78gm/m² is described as medium and 38-50g/m² is classified

as lightweight. The pore size was overlapping 1.24–3.0 mm for LWM and < 1–2.0 mm for HWM. Monofilament mesh with pore size of >2.5 mm is ideal, but some authors recommend pore sizes between 3 to 6 mm.

MATERIAL AND METHODS

This is a prospective, evidence-based study of patients who underwent LIHR above 18 years of age, evaluated at Sahyadri Specialty Hospital, Deccan, Pune, Maharashtra between Jan 2020 and May 2021 (16 months). Diagnosis was made primarily based on clinical examination followed by USG in selected cases. The staffs conducting post-operative assessments and patients were both unaware of the treatment allocation.

Sample size –

The mean return to normal activity in LWM group is (n=30) 11.07 ± 2.22 and HWM group is (n=30) 12.20 ± 1.88. The combined SD is 2.12 and Error for mean return to Normal Activity is 1.2. We have calculated the sample size by using following formula,

$$N = \frac{(Z\alpha)^2 * Sd^2}{d^2}$$

Where, N = sample size

Z α = Standard normal variate for $\alpha=0.05$ (95%CI) = 1.96

Assumed SD = 2.12

d = 1.2 = error of difference of means

N = Minimum required sample size

For sample size calculation, we considered the data of a single hospital of previous year. By using the above formula, minimum required sample size was calculated to be 49. For ease of calculation, we considered sample size of 50 which was divided with respect to Mesh Weight.

Exclusion criteria

- Patients not willing for laparoscopic or open inguinal hernia repair
- Peritonitis
- Scarred abdomen

- Very huge defect requiring abdominoplasty or bowel resection
- Strangulated and obstructed hernias
- Ascitis and Portal hypertension
- Morbidly obese patient (BMI > 29)
- Paediatric patients

DISCUSSION

Distribution of mean BMI was significantly higher in Group 1 [LWM] compared to Group 2 [MWM]. Secondary outcomes were foreign body sensation, influence on sexual life and male fertility (pain with ejaculation, testicular pain, etc.). In our study of 50 cases, 30 cases belong to LWM group and 20 cases belong to MWM group. In LWM group, 6 cases had age between 18- 40 years, 9 cases had age between 40-60 years, and 15 cases had age more than 60 years. In MWM group, 7 cases had age between 18-40 years, 7 cases had age between 40-60 years and 6 cases had age more than 60 years. The minimum – maximum age range in Group 1 and Group 2 was 21 – 84 years and 18 – 67 years respectively. In our study, the minimum – maximum BMI range in Group 1 and Group 2 was 21.77 – 29.40 kg/m² and 22.20 – 26.92 kg/m² respectively. Distribution of mean BMI is significantly higher in Group-1 [LWM] compared to Group-2 [MWM]. In our study, the minimum – maximum duration of hospital stay in both groups was 2 – 3 days. The minimum – maximum duration of time taken to resume day to day work in Group 1 was 6 – 10 days and Group 2 was 6 – 15 days which did not differ between two study groups. In Group 1, 14 patients had right side involved and 16 had left side involved. In Group 2, 10 patients had right side involved and 10 had left side involved. Distribution of side involved (laterality) did not differ between two study groups. Distribution of type of hernia did not differ between two study groups. Group 1 included 18 direct and 12 indirect hernias. Group 2 included 10 direct and 10 indirect hernias. In our study mean pain score (VAS) at post-op day 1, day 5, 1 month and 3 months did not differ significantly between two study groups. Similar study performed by Dan Hu, Bin Huang and Lili Gao reported that the intensity of chronic pain at 3 months measured by 10-point VAS, there was no significant advantage of LWM over HWM⁹. Bringman, Wollert, Osterberg observed that patients who had LWM had less pain on examination, less pain on rising from lying to sitting, fewer groin problems and felt the mesh less often than patients with MWM. Severe chronic pain has significant effects on return to work and quality of life. Experimental studies have shown that addition of polyglactin filaments to LWM reduces the inflammatory reaction and fibrous tissue formation. This study supports the hypothesis that reducing the amount of mesh left in situ after inguinal hernia repair reduces long-term pain. The cause for groin pain after inguinal hernia repair are nerve damage, mesh related fibrosis and shrinkage, mesh fixation with sutures^{12,13}. In our study, no significant difference between post-operative pain in between both groups was observed. Distribution of foreign body sensation at post-operative day-1, 5, 30 and 90 among the cases studied did not differ significantly between two study groups. Similar study conducted by Dan Hu, Bin Huang, and Lili Gao observed no significant difference in foreign body sensation between LWM and HWM groups at 3 months.

It is demonstrated in few studies that foreign body sensation is diminished by using LW mesh. Fibrosis depends on the intensity of inflammatory response which is related to pore size and amount of foreign material. Li et-al showed higher incidence of chronic groin pain after 6months follow-up with use of HWM compared to LWM and no significant difference at 1year follow-up. Data was analysed on intention-to-treat basis. At later stages different origin of pain, foreign-body reaction and chronic inflammation plays key role. In the present study standard mesh group patients had more pain on examination and rising from lying to a sitting position. There was no recurrent hernia noted in cases of both groups.

Similar study conducted by Dan Hu, Bin Huang, and Lili Gao observed higher recurrence rate in LWM group compared to HWM group⁹. The intrinsic weakness of LWM and the decreased formation of fibrosis may play a role in increased hernia recurrence. Based on the law of Laplace and maximum intra-abdominal pressure, Klinge et al calculated that mesh with tensile strength of 16 Ncm is sufficiently strong in repair of abdominal wall hernias. It represents physiological strength of the human abdominal wall and is lower than most meshes. The increased risk of hernia recurrence associated with LWM warrants further research but would be related to the size of the suture bites taken on the mesh rather than inherent defect in the material. In a similar RCT performed by Burgmans et al significantly higher recurrence rate and increased rate of chronic pain was reported in LWM group compared to HWM group with 2-year follow-up¹⁰. The IEHS's (International Endo Hernia Society) recommendation is that meshes with large pores are more beneficial to use than meshes with more foreign material¹¹. In our study Group 1 had 4 cases and Group 2 had 3 cases of seroma formation. No influence on sexual life and male fertility was observed at 3 months follow-up.

Limitations

1. Patient specific information such as smoking, obesity, medications or status of physical activity was absent, which may have an impact on outcome.
2. The surgeon's technical skills in performing Laparoscopic Inguinal Hernia Mesh Repair could affect the outcome and could not be evaluated in this study.
3. Specific anaesthesia, prophylactic antibiotics, infiltration of local anaesthetics and postoperative analgesics were not stated in the protocol.

CONCLUSION

1. Mean duration of hospital stay and mean days taken to resume daily activities did not differ in both groups.
2. The incidence of seroma formation, influence on male sexual life and fertility did not differ in between patients of both groups.
3. Age and BMI variations between the patients of two groups did not cause significant difference in the outcome of study and line of management.
4. Side of inguinal hernia (laterality) and type of hernia did not affect the study objectives.
5. There was no significant difference in postoperative pain measured by VAS and NRS; and foreign body sensation between use of LWM and MWM.
6. Based on our observations, no significant difference in rate of recurrence at 3 months between use of LWM and MWM.

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