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HEAVYWEIGHT VS LIGHTWEIGHT MESH USE IN LAPAROSCOPIC VENTRAL HERNIA REPAIR: A RANDOMISED CLINICAL TRIAL

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ABSTRACT
Incisional hernias are a major problems following abdominal surgeries causing physical and emotional stress to the patient and pose a challenge to the surgeons. The choice of mesh and its long term outcome has been a subject of debate in the surgical community. We performed a ramdomised control trial during July 2015-16 incorporating 30 patients with incisional or ventral hernias who underwent laparoscopic repair with either composite (lightweight) or polypropylene (heavyweight) mesh. Outcome was evaluated on the basis of post operative pain, return to full normal activity, complications. There were no major complications though one patient in lightweight group had recurrence and one patient in heavyweight group had chronic pain. The outcome in lightweight group in reference to postoperative pain and return to daily activities was statistically significant as compared to the heavyweight group.

KEYWORDS: Incisional hernias are a major problems following ramdomised post operative in group.

INTRODUCTION
Incisional hernia is a common complication of abdominal surgeries especially when the wound is infected. It is still a challenging complication of major abdominal surgery, with a reported incidence of about 25% in laparotomic incisions.[1] The incidence of incisional hernia is up to 2-11.5% of surgical abdominal wounds.[2,3] Recurrence rate of up to 33% after first repair and 44% after second repair mostly within 3 years of the repair.[4,5]

A meta-analysis of 11 studies examining the incidence of ventral hernia formation after various types of abdominal incisions has concluded that the risk is 10.5% for midline, 7.5% for transverse, and 2.5% for paramedian incisions.[6]

Laparoscopic repair of ventral and incisional hernia with mesh is now emerging as a better option in comparison to open due to lower recurrence rates (less than 10%), lower wound morbidity, less pain, and early return to work. But the debate still continues over the ideal mesh to be used.[7,8]

The laparoscopic technique of ventral hernia repair requires placement of the prosthesis in the peritoneal cavity. Polypropylene (heavyweight) mesh was the most commonly used mesh for the repair of ventral and incisional hernias because of its properties of excellent fibrous ingrowth and cheap price but has a disadvantage of foreign body sensation/reaction, erosion of intestine and fistula formation and infection.[9]

Composite (lightweight) mesh is a two layered mesh comprising of polygalactin and polypropylene is placed preperitoneally as a sublay with polygalactin surface towards the peritoneum to minimize or prevent adhesions to the visceral surface and polypropylene layer to maximize fibrous ingrowth on the parietal surface. The disadvantage of this mesh is its high cost.[10,11]

Review of Literatures
Incisional hernias are frequent complication of laparotomies and surgeons spend a significant part of their practice repairing such defects. Traditional incisional hernia repairs have a relatively high failure rate. Some of the failures are due to patient-related factors such as obesity, steroid use, tobacco abuse, or abdominal stressors such as chronic cough. However, one of the most common technical causes of failure is failure to identify all fascial defects. Many incisional hernias have multiple components, some of which are not apparent on physical examination. If a surgeon fails to repair all the defects, recurrence is almost certain to occur.[7]

LVHR offers a superior view of the fascial defect and hence reduces the likelihood that a surgeon will fail to identify the extent of the problem that needs to be fixed.[7] In LVHR, the mesh is placed in direct contact with the viscera. As in open inlay repairs, this carries the risk of development of chronic inflammation, fistula, infection, and mesh migration. To minimize these risks, dual-sided mesh prostheses have been developed and should be utilized in LVHR. These implants are coated with materials designed to prevent adhesion formation on the side exposed to the viscera.[7]

In a randomized controlled trial evaluating lightweight versus heavy weight polypropylene mesh for ventral hernia repair, the recurrence rate was more than twice that in the lightweight group (17% versus 7% for heavyweight mesh), which approached statistical significance[12] (P =.052). Most randomized studies comparing different types of meshes used has shown r educed post operative pain, earlier return to work, lesser complication and recurrence with lightweight mesh while increasing the total cost.[12,13,14]

AIMS AND OBJECTIVES

The main aim of this study was to determine the safety and efficacy of laparoscopic repair in incisional/ventral hernias and to know the outcome of lightweight mesh in comparison to heavyweight mesh used in the study.

MATERIALS AND METHODS

Patient and assessor blind, Randomized Controlled Clinical Trial was conducted on all consenting patients with ventral hernia presenting to our institute from July 2015 - 2016. Patients with massive and incarcerated ventral hernias, those who were unfit for laparoscopic surgery and had defect less than 2 cm were excluded from the study.

All the patients presenting with incisional and anterior wall swelling were assessed thoroughly. History was taken about the number and duration of swellings, past abdominal surgeries, any association of pain, constipation, chronic cough and the change in size of swelling on supine, erect posture or straining. Physical examination including number and size of swelling, scar marks, presence of cough impulse, reducibility, defect size were noted. Routine preoperative blood investigations were performed in all patients, ultrasound of the abdomen to screen any related abdominal pathologies and to measure the defect size. CT scan of the abdomen was done in patients in whom ultrasound was inconclusive.

Informed consent in their native language about the study, procedure, possible complications and possibility of conversion to open was taken. In all cases randomization to lightweight and heavyweight mesh was done by sealed envelope.

All patients underwent 3 or 4 ports laparoscopic hernia repair with either heavyweight or lightweight mesh placement. The goals of port placement were to maintain proper triangulation for working, and to eliminate camera angles that result in paradoxical motions on the screen. We feel that the ports need to be far enough away from the hernia so that angled scopes are not required to visualize the defect. A 30° angled laparoscope was used to evaluate the abdominal cavity and perform any required adhesiolysis and reduce the hernia content.

Once the edges of the hernia were clearly visible, the defect size was measured. Then proper size of the mesh to be used was determined by overlapping more than 3 cm of the defect size. The mesh was fixed circumferentially with interrupted 3-0 nonabsorbable sutures or tackers.

After the study, a standard analgesic regimen was administered (IV tramadol 50 mg 8 hourly and on demand) for pain relief. Ampicillin+Sulbactum was continued for 5 days. Post operative analgesia requirements and visual analogue pain score (VAS) were used to assess the post operative pain prospectively.

Feeding was resumed soon after full regain of consciousness.

All patients received similar instructions to return to normal activity. Patients were then reviewed at outpatient department at weeks 1, 2, 4 and 6 months after surgery.

At the end of the study the two groups of patients and data were compared statistically on the basis of Patient characteristics, Duration of symptoms, Procedure time, Intra operative and post operative complications, Post operative pain and recurrence rates.

The collected data were edited and then entered in Microsoft excel 2010 and converted into SPSS 20 version for statistical analysis. For descriptive statistics, mean, standard deviation, percentage will be calculated and also graphical and tabular presentation were made.

RESULT AND DISCUSSION

There were a total of 43 patients with incisional/ventral hernias operated between July 2015-16 and 30 were included in the study after exclusion. Fifteen patients each were included in heavyweight and lightweight mesh group.

There were total 12 male patients and 18 female patients in the study of which 5 male and 10 female patients were included in lightweight group and 7 male and 8 female patients were included in heavyweight group. The age of the patients in the study ranged between 24-82 years (mean age 50.63±16.25). The mean age of the patients in lightweight group was 51.67±15.44 years ranging from 25 to 82 years, those of heavyweight group were 49.6±17.51 years ranging from 24 to 73 years. The

duration of presentation ranged from 1 month to 7 years (mean 16.3±19.91 months). Among the 30 patients, 20 patients (66.66%) had incisional hernia, 7 patients (23.33%) had umbilical hernia and 2 patients (6.66%) had epigastric hernia.

The total operative time for lightweight group ranged from 40-120 minutes (mean 79.67±26.28 min) where as heavyweight group ranged from 45-120 minutes with (mean 80.67±21.94 min) The mean operative time for laparoscopic ventral hernia repair was 80.17±23.79 min.

One of the main limitations of laparoscopic repair of incisional/ventral hernia repair could be the long operative time as reported by many authors[5,15,16] due to the fact that laparoscopic hernia repair is comparatively a new technique with a limited experience of the surgeons, has a steep learning curve and was not being routinely done in our institution.

The lightweight group patients required less analgesia (7.13±0.99) as compared to the heavyweight group (8.47±0.99) during their hospital stay which was statistically significant (p value 0.008) which may be sue to the fact that meshes with small pores and greater foreign body reaction (heavyweight mesh) have higher rate of chronic pain.[17]

Decreasing the density of mesh has a reduced "foreign-body response", resulting in improved abdominal wall compliance leading to less post operative pain thus allowing a better integration in host tissues.[18,19]

There was one patient in our study in the heavyweight mesh group who complained of persistent pain at the incision (mesh) site for which re-exploration, removal of mesh and en masse closure was done.

Patients in the lightweight group had a shorter median hospital stay of 3 days (mean 3.33±1.29 days) ranging from 2 to 6 days as compared to heavyweight group with median hospital stay of 4 days (mean 4.2±1.14 days) ranging from 2 to 6 days which is consistent with the results of various other studies conducted.[3,15,20] This may be probably due to the higher analgesic requirements in the heavyweight as compared to the lightweight group.

The time taken by patients in the lightweight group to resume normal activities was significantly lower (median of 5 days) as compared to the patients in heavyweight group (median of 8 days), which turned out to be statistically significant (p 0.03).

Resumption of daily activities is significantly quicker following laparoscopic surgeries, several studies suggest that after laparoscopic surgery patients are expected to mobilize and recover faster.[3,21,22]

Table. 1.

	Male	Female	Age (inyrs)	Operative time (in mins)	Analgesics required*	Hospital stay (in days)	Return to activity (in days) *
Lightweight group	5	10	51.67±15.44 (25 to 82)	79.67±26.28 (40-120)	7.13±0.99	3.33±1.29 (2 to 6)	5
Heavyweight group	7	8	49.6±17.51 (24 to 73)	80.67±21.94 (45-120)	8.47±0.99	4.2±1.14 (2 to 6)	8

*statictically significant data

Out of total patients there were no incidence of intraoperative complications in the study and none of the cases were converted to open.

Of the 15 patients in lightweight group, 1 patient had seroma formation (6.66%) after 2 weeks of surgery, which resolved after single aspiration. 1 patient had recurrence of hernia (6.66%) who underwent open mesh repair later.

Of the 15 patients in heavyweight group, 1 patient had port site infection (6.66%) after 8 days which required stapler removal and dressing, 1 patient had seroma formation (6.66%) following 10 days of surgery which had to be aspirated three times to resolve and 1 patient had persistent pain (6.66%) over the hernia site with recurrence. The patient was reoperated, mesh removed and En masse closure was done.

Different studies show seroma formation in 1.97% - 11.5%, port site infection in 1.1% - 1.23% of the patients and recurrence rate in 2.3% - 7.5% of the patients.[15,16,23,24] The higher recurrence rates in our study may attribute to the technical failure and relative inexperience of the surgeons.

Table. 2.

	Seroma	Port-site infection	Chronic pain	Recurrence
Lightweight group	1	0	0	1
Heavyweight group	1	1	1	0

As clearly evident, lightweight mesh has a definite advantage over heavyweight mesh in terms of reduced post operative pain to the patient with faster return to his daily routine activities. The lightweight mesh has a less postoperative incidence of surgical site infection rate as compared heavyweight mesh. Recurrences in lightweight group can be attributed to operative technique and any such further such mishaps can be avoided as we become more familiar with the anatomy and technique because the more we practice, the more we stride towards perfection.

Fig. 1. Incisional hernia over lower abdomen.

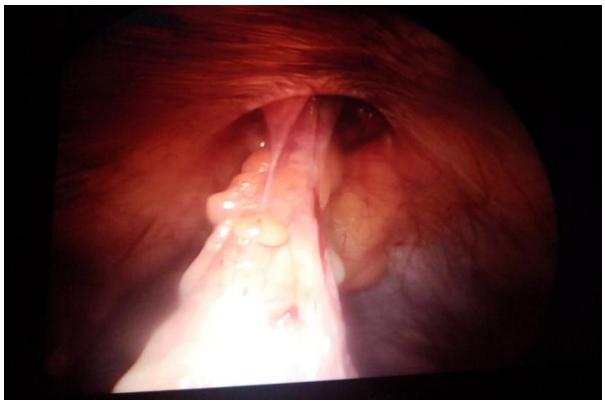

Fig. 2. Laparoscopic view of the incisional hernia.

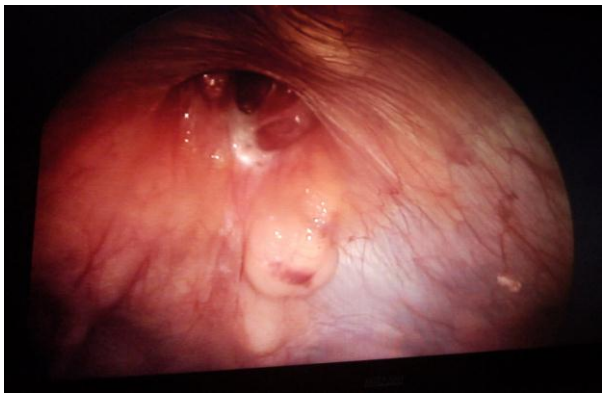

Fig. 3. Reduction of hernia content.

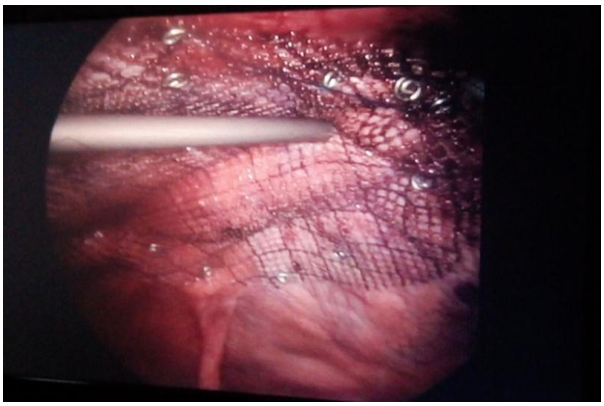

Fig. 4. Laparoscopic fixation of mesh with tackers.

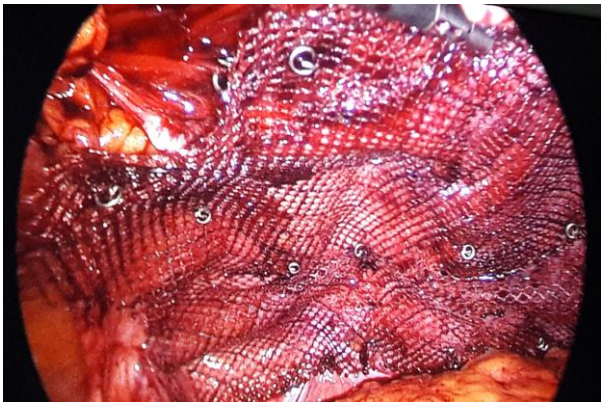

Fig. 5. Mesh in situ.

CONCLUSION

In this era of minimal invasive surgeries, laparoscopic repair of ventral hernia with lightweight mesh is safe, effective alternate to the conventional repair. Even though the operative time is slightly more, less postoperative pain, early return to normal activities and reduced hospital stay favors laparoscopic repair with lightweight mesh. Cosmesis, reduced surgical site infection, seroma are some of the benefits over the conventional approach.

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