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Comparison of Outcome between Lightweight Mesh & Heavy Weight Mesh in Lichtenstein Groin Hernia Repair

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ABSTRACT

Objectives: *To compare the outcome of heavyweight mesh with lightweight mesh in the open repair of inguinal hernia.*

Method: *The Study was a prospective one as a part of single centre randomized study carried over a period of two years 2012 to 2013 conducted on 70 male patients of inguinal hernia, the patients were randomly assigned to the groups of 35 patients each; one group underwent Lichtenstein mesh hernioplasty with heavyweight mesh (HWM) and other group underwent Lichtenstein mesh hernioplasty with lightweight mesh (LWM). Mesh placement and fixation was same in both groups. The patients were monitored in the general ward, all postoperative complications recorded. Severity of pain was analysed by VAS and the patients were assessed in the OPD after discharge, for any complications and recurrence. The patients were followed; complications if any, recorded as per the preset proforma and the two groups were analysed statistically, end point of study was follow up upto one year.*

Results*: The study was conducted on 70 male patients of inguinal hernia, 35 patients in each group. The mean age of the patients in HWM was 54.11 (40-75) years and in LWM was 50.71 (40-66) years, (p >0.05). The difference in height and weight of patients in both the groups was not statistically significant (p >0.05). There was no statistically significant difference between times of occurrence of hernia to operation in both the groups (15 months vs. 14.14 months). Post-operative pain was assessed by Visual analogue scale. The pain scores were calculated at 12 hrs. 24 hrs.7th day, I month and at 6 months. There was no statistically significant difference in the pain scores at 12 hrs. 24 hrs. 7th day and at 1 month. However there was statistically significant difference in mean pain scores (VAS) at six months after operation between HWM group vs. LWM group (0.83 vs. 0.34) p < 0.05. The mean operating time in HWM group was 34.34 min. and that in LWM group was 32.68 min. this difference was statistically insignificant. The mean difference in*

postoperative stay in both HWM and LWM group was not statistically significant (p >0.05). There was no statistically significant difference between Heavyweight mesh group and Lightweight mesh group with respect to return to work (4.8 days in HWM vs. 4.28 days in LWM (p> 0.05). There was no recurrence of hernia in either group.

Conclusion: *Based on our study we believe that lightweight mesh offers benefits over heavyweight mesh for Lichtenstein inguinal hernia repair by reducing the incidence of chronic pain. These benefits did not appear to be at the expense of an increased rate of hernia recurrence.*

Keywords: *Inguinal hernia, Lichtenstein repair, light weight mesh, heavy weight mesh, pain, recurrence.*

INTRODUCTION

The history of hernia repair is the history of surgery[1]. Of all groin hernias, 95% are hernias of inguinal canal with the remaining being femoral hernia defects[2]. The main symptoms are pain and discomfort due to groin swelling. The most severe complication is incarceration of the hernia, which is a surgical emergency.[3] The debut of the first mesh indicated for hernia repair was in 1958 with the introduction of polyethylene mesh by Usher et al[4]. Lichtenstein presented his open mesh repair technique for inguinal hernia in 1986[5], which is now the gold standard and is employed for the majority of primary inguinal hernia repairs. It is so because of the minimal complications and a low recurrence rate

Experimental studies have hypothesised that the inflammatory reaction and scar tissue formation caused by the mesh is responsible for the high incidence of postoperative pain[6]. Tension –free mesh repairs is also associated with complications such as foreign body reaction, infection, pain, fistula formation, migration, shrinkage and recurrence[5,7].

The first generation meshes were made of polypropylene and polyester. These meshes contained too much foreign tissue and led to excess scar formation and stiffness of the abdominal wall after they had been implanted[8]. These are called heavy weight meshes. The idea of introduction of the heavy weight meshes was to guarantee maximum mechanical stability, based on closing the hernia gap with a stiff, non-flexible device with small pores[5], the pores typically being less than 1mm[9]. This also compromised on the elasticity of the mesh (6% stretching at 16 N/cm tension)[9]. The light weight meshes with large pore size result in smaller interface between the mesh and surrounding tissues, low weight per area, greater elasticity (20-30% at 16 N/cm) and a lower burst pressure (physiologic tensile strength of 16 N/cm at minimum)[9]. Most surgeons agree that a tensile strength of 16 N is sufficient for abdominal wall reconstruction. However, 32 N might be necessary for large defects[4].

Light weight meshes are designed to mimic the physiology of abdominal wall and the inguinal region. The tensile strength is adapted to that of local tissues and the surface area in contact with the host tissues is low. This leads to significant reduction in scar tissue formation resulting in a long term flexible repair[9].

Several studies have shown benefits of light weight meshes as compared to heavy weight meshes in terms of accelerated recovery with less postoperative pain, earlier return to normal activity, increased patient comfort with improved quality of life[10]. The use of such meshes may, however, be associated with an increase in hernia recurrence[11]. The search for the ideal prosthetic biomaterial (mesh) has been a longstanding issue with debate over simple versus composite biomaterial and lightweight versus heavyweight meshes[12].

MATERIALS AND METHOD

The Study was a prospective one carried over a period of two years from 2012 to 2013 in the postgraduate dept. of surgery Government Medical College (GMC), Srinagar and SMHS Hospital, as a part of single centre randomized

study. The study was undertaken to compare the outcomes in patients following Lichtenstein's technique of tension free mesh groin hernia repair using prolene and lightweight (ultrapro® vypro®) mesh.

One group received light weight and other group received heavy mesh. Altogether, 70 patients were randomised into two groups during this time period; HW group—patients who received a heavyweight mesh; LW group—patients who received a lightweight mesh. Pre-operative randomisation was done using a simple randomisation system. All pre-operative and post-operative data were collected using standardised forms, fed into computer data base. The method of anaesthesia, type of hernia (direct or indirect), operating time, pain scores at various intervals, return to work etc. were recorded. The patients were followed up for one year.

Statistical analyses were performed by Graph pad Instat version 3.10 for windows. Department of statistics SKUAST-K was consulted for statistical analysis. ANOVA and Fischer's test was used as and when needed.

RESULTS

There were total 70 patients in our group, all men 35 patients in heavyweight mesh (HWM) and 35 patients in lightweight mesh (LWM) groups. The mean age of the patients in HWM was 54.11(40-75) years and in LWM was 50.71(40-66) years ($p > 0.05$).

AGE (Yrs)						
Group	No. Of patients	Mean	Variance	*F* value	*P* value	Remarks
HWM	35	54.11	72.28	3.583622	0.062608	NS
LWM	35	50.71	40.62			

ANOVA

The difference in height and weight of patients in both the groups was not statistically significant ($p > 0.05$).

Weight and Height Distribution

	Group	No. of Patients	Mean	Variance	F value	P value	Remarks
Weight (kg)	HWM	35	64.2	28.75	2.767	0.1009	NS
	LWM	35	62.34	14.87			
Height (cm)	HWM	35	163.66	54.88	2.43	0.12	NS
	LWM	35	161.34	22.23			

ANOVA: Single Factor

There was no statistically significant difference between time of occurrence of hernia to operation in both the groups ($p>0.05$).

Time of Occurance of Hernia to Operation (months)

Group	No. of Patients	Mean	Variance	F value	P value	Remarks
HWM	35	15.00	22.88	0.77	0.38	NS
LWM	35	14.14	10.36			

ANOVA: Single Factor

The number of patients in both HWM and LWM undergoing Lichtenstein hernioplasty under spinal and general anaesthesia were found to be statistically insignificant $p > 0.05$.

There was no statistically significant difference between VAS scores at 12 hrs. 24 hrs. 7th day and 1 month. However chronic pain (at 6 months) as determined by VAS scores were significantly lower in LWM group as compared to HWM group ($p < 0.05$).

Visual Analogue Score: 12 hrs.

Group	No. of Patients	Mean	Variance	F value	P value	Remarks
HWM	35	4.14	1.07	0.05	0.82	NS
LWM	35	4.20	1.22			

ANOVA: SINGLE FACTOR

VISUAL ANALOGUE SCORE: 6 Month

Group	No. of Patients	Mean	Variance	F value	P value	Remarks
HWM	35	0.83	0.44	10.45	0.001	S
LWM	35	0.34	0.34			

ANOVA: Single Factor

The mean operating time in HWM group was 34.34 min. and that in LWM group was 32.68 min. this difference was not statistically significant.

OPERATING TIME

Group	No. of Patients	Mean	Variance	F value	P value	Remarks
HWM	35	34.34	19.88	2.57	0.11	NS
LWM	35	32.69	17.46			

ANOVA: Single Factor

The mean difference in postoperative stay in both HWM and LWM group was not statistically significant ($p > 0.05$).

Hospital Stay

Group	No. of Patients	Mean	Variance	F value	P value	Remarks
HWM	35	2.69	0.75	1.37	0.25	NS
LWM	35	2.94	0.94			

ANOVA: Single Factor

One patient in both HWM and LWM group went into urinary retention which required transient catheterisation. Another complication which occurred in both groups was wound seroma. There was no wound infection and no patient had removal of mesh. These post-operative complications were not statistically significant.

Post-Operative Complications

Postoperative Complications	Seroma	Urinary Retention	Wound Hematoma	Wound Infection	P value	Remarks
HWM	2	1	0	0	1	NS
LWM	1	1	0	0		

Fischer's Test

There was no statistically significant difference between Heavyweight mesh group and Lightweight mesh group with respect to return to work ($p > 0.05$).

Return to Work

Group	No. of Patients	Mean	Variance	F value	P value	Remarks
HWM	35	4.8	1.57	2.56	0.11	NS
LWM	35	4.28	2.03			

ANOVA: Single Factor

No recurrence was noted in lightweight or heavy weight mesh group.

DISCUSSION

Lichtenstein presented his open mesh repair technique for inguinal hernia in 1986[5], which is now the gold standard and is employed for the majority of primary inguinal hernia repairs. It is so because of the minimal complications and a low recurrence rate. Heavy weight meshes, the first generation meshes were made of polypropylene and polyester. These meshes contained too much foreign tissue and led to excess scar formation and stiffness of the abdominal wall after they had been implanted[8]. The idea of introduction of the heavy weight meshes was to guarantee maximum mechanical stability, based on closing the hernia gap with a stiff, non-flexible device with small pores[5], the pores typically being less than 1mm[9]. This also compromised on the elasticity of the mesh (6% stretching at 16 N/cm tension)[9].

The light weight meshes with large pore size result in smaller interface between the mesh and surrounding tissues, low weight per area, greater elasticity (20-30% at 16 N/cm) and a lower burst pressure (physiologic tensile strength of 16 N/cm at minimum)[9]. Most surgeons agree that a tensile strength of 16 N is sufficient for abdominal wall

reconstruction. However, 32 N might be necessary for large defects[4]. Light weight meshes are designed to mimic the physiology of abdominal wall and the inguinal region. The tensile strength is adapted to that of local tissues and the surface area in contact with the host tissues is low. This leads to significant reduction in scar tissue formation resulting in a long term flexible repair[9]. Several studies have shown benefits of light weight meshes as compared to heavy weight meshes in terms of accelerated recovery with less postoperative pain, earlier return to normal activity, increased patient comfort with improved quality of life[10]. The use of such meshes may, however, be associated with an increase in hernia recurrence[11].

The search for the ideal prosthetic biomaterial (mesh) has been a longstanding issue with debate over simple versus composite biomaterial and lightweight versus heavyweight meshes[12]. Our study aimed to compare outcome between light weight and heavy weight in inguinal hernia. The two groups who received light weight and heavy weight meshes were statistically homogenious and underwent same operative procedure (Lichtenstein open repair), and mesh fixation. There was no statistical significant differences in terms of operative time, operative and post operative complication pain, hospital stay or return to work between the two the groups. However the lightweight mesh offers benefits over heavyweight mesh for Lichtenstein inguinal hernia repair by reducing the incidence of chronic pain. These benefits did not appear to be at the expense of an increased rate of hernia recurrence. Our study correlates with various studies on same topic.

CONCLUSION

Based on our study we believe that lightweight mesh offers benefits over heavyweight mesh for Lichtenstein inguinal hernia repair by reducing the incidence of chronic pain. These benefits did not appear to be at the expense of an increased rate of hernia recurrence.

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