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Research Article

A comparative study of postoperative complications of lightweight mesh and conventional prolene mesh in Lichtenstein hernia repair

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ABSTRACT

Background: Inguinal hernia repair is the most frequently performed operation in any general surgical unit. The complications of using the mesh has been the rationale to examine the role of mesh in hernia repair in detail and to begin investigating the biocompatibility of different mesh modifications and to challenge old mesh concepts. Therefore the present study is undertaken to compare the lightweight mesh (Ultrapro) with conventional prolene mesh in lichtenstein hernia repair.
Methods: Thirty one patients with primary unilateral inguinal hernia was subjected either to lightweight mesh Lichtenstein's hernioplasty or standard prolene mesh Lichtenstein's hernioplasty. The patients were followed in the surgical OPD at 1 month, 6 months and 1 year for time taken to return to normal activities, chronic groin pain, foreign body sensation, seroma formation and recurrence.
Results: Chronic pain among patients in standard prolene mesh group at 1 month, 6 month, and 1 year follow up was seen in 45.2%, 16% and 3.2% of the patients respectively, in light weight mesh group patients at 1 month, 6 month and 1 year follow up was 32.2%, 6.4% and none at one year respectively. Foreign body sensation in the light weight mesh group is significantly less compared to patients in standard prolene mesh group. Time taken to return to work was relatively shorter among patients in Light weight mesh group. There was no recurrence in both groups.
Conclusion: Light weight mesh is an ideal choice in Lichenstein's hernioplasty whenever feasible.

Keywords: Inguinal hernia, Prolene mesh, Lightweight mesh, Tension free repair

INTRODUCTION

Inguinal hernias are one of the most common conditions requiring surgery among abdominal wall hernia. Despite the frequency of surgical repair, perfect results continue to elude surgeons. Since 19th century, when modern techniques for repair of groin hernia were first described recurrence was a problem. At that period in late 19th century Bassini's repair which was developed became revolutionary at that time for low recurrence rates. It involved suturing of Bassini's triple layer (internal oblique, transverse abdominis, fascia transversalis) to inguinal ligament with interrupted sutures with recurrence rates of 5 to 15%.[1]

Various tissue based repairs since that period started evolving such as Mc Vays repair which had similar recurrence rate that involves suturing of triple layer to Coopers ligament, Shouldice repair achieved recurrence rate below 2% at the hands of its originators but failed to gain widespread acceptance due to its technical difficulties and inconsistent results outside Shouldice clinic.[2] In 1986 Lichenstein described the tension free inguinal hernia repair with mesh which has become the most popular open technique for inguinal hernia repair and has been shown to have simplicity of repair, the decreased post-operative pain and decreased recurrence rates when compared with tissue based hernia repair.[3-6]

Implantation of conventional prolene mesh resulted in inflammatory reaction which also leads to the formation of a rigid scar plate with loss of abdominal wall pliability and changes in abdominal wall compliance. Patients started to complain of a sensation of stiffness, physical discomfort which started to limit in the activities of daily living. This led to discovery of Lightweight meshes with reduced polypropylene content and larger pore size which demonstrated reduced inflammation and improved integration in surrounding tissues.[7,8]

They are also associated with decreased complaints of pain, paraesthesia and improved abdominal wall compliance while providing adequate strength. Therefore the current study intends to compare post-operative complications of patients undergoing Lichenstein's hernioplasty with Light weight and conventional prolene mesh.

METHODS

This study was carried out after the institutional ethical clearance and informed consent from all the participants. The present comparative study between Lightweight Mesh and standard prolene mesh in Lichtenstein's hernia repair for inguinal hernia was conducted from the patients admitted with the diagnosis of unilateral primary inguinal hernia in a tertiary care hospital, Kolar, India. The diagnosis of unilateral primary inguinal hernia was made on basis of history of reducible groin swelling and essentially on clinical examination.

Only those investigations were done which were relevant to obtain fitness for surgery. This included random blood sugar, blood urea, serum creatinine, ECG, hemoglobin percentage and routine urine analysis for sugar, albumin and microscopy, chest x-ray and ultra sound abdomen. If any patient was found to have any medical contraindication for surgery, he was first treated for these medical problems and then reevaluated for surgery. All cases were done under Spinal anesthesia using 3 ml of bupivacaine 2% (Sensorcaine).

Male patients aged 18years and above with unilateral primary inguinal uncomplicated direct or indirect hernia. Patients with recurrent hernias, strangulated / obstructed hernia, patients undergoing orchidectomy in the same procedure were excluded. For Lightweight mesh a 2.4" x 4.3" (6cm x 11cm) polypropylene+polyglecaprone mesh was used. The mesh has pore size of more than 3mm and has a density of 28g/m2. It is sterilized by Ethylene oxide gas by the manufacturer. Polypropylene 2-0 was used to suture the mesh in place.

Similarly for standard prolene mesh hernia repair, prolene mesh of 2.4" x 4.3" was used. The mesh has pore size of less than 1mm and has a density of 80-85g/m2. It is sterilized by Ethylene oxide gas by the manufacturer. Polypropylene 2-0 was used to suture the mesh in place. A shot of injection ceftriaxone 1g was given intravenously immediately before surgery. The note was taken of the contents of the sac, duration of surgery and any technical difficulty encountered during the surgery. Postoperatively patient was put on Inj. Ceftriaxone 1 g BD intravenously for five days and injection Diclofenac 75 mg i.m. bd for 3 days with one shot of Injection diclofenac being given 3 hrs after surgery (evening dose).

The patients were followed up for postoperative pain which was evaluated using Visual Analogue Scale, wound hematoma, wound seroma, wound infection. Patients were assessed for postoperative pain using Visual Analogue Scale on 7th day after surgery. Visual Analogue Scale consists of a 10 cm line anchored at one end by a label as no pain and at the other end by a label such a severest pain patient experienced in his life time.

We translated this for documentation as 1-3 mild pain, 3-7 moderate pain, 7-10 severe pain. Sutures were removed on the 7th postoperative day and the patients discharged if there was no wound infection, were ambulatory, were taking orally and felt comfortable. Patients were called to the outpatient department and follow up was done at 1, 6 and 12th month for complications like chronic groin pain (inguinodynia), foreign body sensation and recurrence. Time taken to return to normal activity was enquired during their follow up visit.

All patients were encouraged to return to work as soon as possible, patient in both the groups were followed and the post-operative time period that elapsed between day of surgery and the day of joining of duty at their work place was recorded and compared. Patients were followed for recurrence. Recurrence was defined as clinically manifest bulge or a protrusion exacerbated by valsalva manoeuvre in the operated groin. After thoroughly painting with Betadine 5% v/v, drapes were put.

A 5cm incision was made starting from the pubic tubercle medially to the position of the internal ring laterally. The skin incision was deepened. The external oblique aponeurosis was opened and its lower leaf freed from the spermatic cord. The upper leaf of External oblique was freed from the underlying Internal Oblique muscle and aponeuroses. The spermatic cord was mobilized by hooking an index finger around it near pubic tubercle. A thorough search was made for any direct sac. If present, the direct sac was inverted and imbricated using a non-absorbable suture (Prolene 2-0) to flatten the posterior wall. The cremasteric sheath was incised longitudinally and the cord structures separated out and a search for any indirect sac was made.

The indirect sac, if found, was freed from the cord to a point beyond the neck of the sac. The sac was opened. Any contents of peritoneal cavity present were reduced by twisting the sac. The sac was then transligated and excised. To minimize the risk of postoperative ischaemic orchitis, complete nonsliding scrotal hernia sacs were

transected at the midpoint of the canal, leaving the distal section in place. A sheet of 2.4"×4.3" polypropylene (prolene) or lightweight (ultrapro) only mesh was sutured with polypropylene 2-0 continuous sutures into place.

The medial end of the mesh was cut out to the shape of the medial corner of the inguinal canal. The inferomedial border of the mesh was sutured to the soft tissues overlying Pubic Tubercle after obtaining 2-3 cm of overlap here. The periosteum of the bone was avoided.

The inferior border of the mesh was attached to the inguinal ligament with a loose continuous polypropylene suture. A slit was made at the lateral end of the mesh, creating two tails, a wider above and a narrower below. A 3 mm circular piece of mesh was removed at the medial end of the slit for positioning the cord. The wider upper tail was passed around the cord, and was sutured along with the narrower tail to the inguinal ligament with loose continuous suture. Similarly the upper end of mesh was sutured to conjoined tendon. During the procedure every care was taken to prevent entrapment of ilio-inguinal as well as ilio-hypogastric nerves in the sutures. The External Oblique aponeuroses were closed using Prolene 2-0 and skin closed by interrupted sutures with Ethylon 2-0.

Statistical analysis

The data were represented as mean±S.D. The data was analyzed for statistical significance using student t' test; $P<0.05$ was considered significant.

RESULTS

Sixty two cases of unilateral primary inguinal hernia were subjected to Lightweight mesh or Standard prolene mesh Lichtenstein hernia repair. All the patients were evaluated for the history, physical findings, operative findings and postoperative complications. Thirty one patients underwent repair with Lightweight mesh Lichtenstein hernia repair and Thirty one patients underwent repair with standard Prolene mesh Lichtenstein hernia repair. All the cases in both the groups were followed for a period of one year.

Table 1: Associated conditions among the patients included in the study.

Presence of associated conditions	Groups		Total	p value
	Conventional (n=31)	Light weight (n=31)		
Smoking	15	16	31	0.799
Diabetes mellitus	5	6	11	0.740
Hypertension	4	7	11	0.319
Bronchitis	2	4	6	0.390
Benign enlargement of prostate	7	6	13	0.755

Table 2: Hematoma, seroma and wound infection in both the procedures post operatively.

	Groups		Total	p value
	Conventional (n=31)	Light weight (n=31)		
Hematoma	2	2	4	1.00
Seroma	2	2	4	1.00
Wound infection	2	2	4	1.00

Table 3: Recurrence of hernia in both the procedures at different intervals of follow up.

Absence of recurrence during follow up	Groups		Total	
	Conventional	Light weight		
1month	Nil	31	31	62
6 month	Nil	31	31	62
1 year	Nil	31	31	62

The patients were followed up at one month, six month and one year intervals for any complication or recurrence. Any recurrence of hernia was considered an end point. The associated conditions among the patients were shown in Table 1. All the conditions observed were statistically insignificant ($p>0.05$). Table 2 indicates the immediate postoperative complications such as hematoma, seroma and wound infection in both the groups. There was no significant association between two procedures in the immediate complication rate ($p>0.05$). There was no

recurrence in any subject in both the groups at the end of 1year. Hence effectiveness of both the procedure was 100% (Table 3). It can be inferred from the above table that mean time taken to return to normal activity was 17.52 days in conventional method and 15 days in Light weight method. This difference was statistically significant (p= 0.025, Table 4).

It was observed that 32.3% of subjects who underwent conventional surgery had foreign body sensation compared to 9.7% in light weight mesh repair. This difference was also statistically significant (p= 0.025, Table 5).

Table 4: Time taken to return to normal activity in days among both the groups.

	Groups	N	Mean	Std. Deviation	t value	p value
Time taken to return to normal activity in days	Conventional	31	17.52	4.090	2.293	0.025**
	Light weight	31	15.00	4.539		

Table 5: Foreign body sensation among both the groups.

		Groups		Total	P value
		Conventional	Light weight		
Foreign body sensation	Nil	21	28	48	0.028
	Yes	10	3	14	
Total		31	31	62	

DISCUSSION

Inguinal hernia surgeries are one of the most frequently performed operations in general surgery and as such even minor changes in the outcome have appreciable impact. As surgeons we want techniques with short learning curves, but we still want to attain results comparable to the specialist hernia surgeons.

The patients on the other hand want their period of convalescence and rehabilitation to be uncomplicated in both short and long term outcome so as to return to their normal daily activities. They need less pain and better quality of life post operatively with minimal surgical morbidity in the long term. Currently, two major techniques of hernia repair exist pure anatomical repairs and Tension free or mesh repairs. At present, tension-free preshaped mesh hernioplasties have become a gold standard for most operating surgeons and over the last decade several types of meshes have evolved, and are used as single flat meshes or used in conjunction with three dimensional plugs.[9-11]

In 1984, Lichtenstein addressed the issue of tension by popularizing routine use of mesh (monofilament polypropyelene meshes) which was laid on posterior wall of the inguinal canal, and a slit made at the lateral end of the mesh, creating two tails, which pass around the cord as it emerges from the internal ring. Presently newer mesh concepts are the current interest which has less chronic pain, earlier return to normal activities without compromising on recurrence. Light weight mesh is one such concept which meets the above criteria.[12]

The present comparative study is a small study and follow up is limited for period of one year. Therefore, this is a limitation of this study. Pain is difficult to measure objectively. Chronic pain following inguinal hernia repair is becoming a significant clinical problem affecting the quality of life. The exact incidence of chronic pain remains to be elucidated, varying in different series and only a few studies presenting long term follow up and a sufficiently large study population.[13-15]

In the present study, follow up of both group patients revealed that 23 patients had mild pain, 1 patient had moderate pain and 38 patients had no pain at 1 month. At end of 6 months follow up 7patients had mild pain, of which 5patients were from conventional group and 2 patients from light weight group. At 1year follow up only 1patient from conventional group had pain and no patients had pain in light weight group. Return to normal activities and work can be dependent on nutritional status of the patient. Malnourished patients are likely to have longer periods of convalescence.[14]

In the present study conventional group patients with mean of 17.52 days and Light weight mesh group with mean value 15 days. It should be noted that desk workers will usually return to work earlier than manual workers. Time taken to return to work may also be dependent on financial incentives a patient gets at place of work. Times taken to resume normal activities in the present study are comparable with the other study. It is understood that light weight mesh with less amount of foreign body causes less foreign body reaction and thus lesser foreign body sensation.[12,13]

In this study 32.3% patients in the standard prolene mesh group had foreign body sensation compared to 9.7% people in the light weight mesh group. Foreign body sensation is in the present study is comparable to other studies. In the period of one year follow up there was not even a single case of recurrence in both mesh repair groups. The recurrence rate in the present study is comparable with the other studies.

CONCLUSION

Light weight mesh and standard prolene mesh usage in Lichtensteins repair of inguinal hernia are both comparable and effective. Light weight mesh with lesser amount of foreign body causes less foreign body reaction and thus less chronic pain, lesser foreign body sensation and earlier return to normal activities whereas recurrence is similar in both the groups. Seroma formation, immediate pain, wound infection; hematoma is not affected by the type of mesh used. Light weight mesh is an ideal choice in Lichenstein's hernioplasty whenever it is feasible.

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