ORIGINAL ARTICLE

A Prospective Study Comparing Flat Polypropylenee Mesh and 3D Monofilament Mesh in Laparoscopic Mesh Hernioplasty

Kuldeep Singh[1], Anand Singla[2], Megha Sharma[3]

[1]Associate Professor, [2]Senior Resident, [3]Junior Resident, Department of General Surgery, G.M.C. Patiala, Punjab, India

Corresponding author: Anand Singla, Senior Resident, Department of General Surgery, G.M.C. Patiala, Punjab, India

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ABSTRACT

Introduction: Synthetic mesh implants are one of the commonly used materials in many surgical interventions, especially during hernia repair. Mesh implants are basically made of polypropylene (PP), polyethylene terephthalate (PET), expanded polytetrafluoroethylene (ePTFE), polyvinylidenefluoride (PVDF), and absorbable materials, such as polylactide (PLA), polyglycolic acid (PGA) and polydioxanone (PDO). The present study was carried out in the Govt. Medical College/Rajindra hospital, Patiala to compare this 3D polypropylene mesh with flat polypropylene mesh in laparoscopic inguinal hernia repair.

Material and methods: The present study consisted of 60 patients reporting to the Department of Surgery at Rajindra Hospital, Government Medical College, Patiala. Patients with densely scarred abdomen, acute abdomen with strangulated of infarcted bowel and younger than 18 years were not included in the study. In Group A flat polypropylene mesh and in Group B 3D polypropylene mesh is placed in the preperitoneal space. Rescue analgesic doses were administered on demand of patient after assessing VAS at 6,24 and 48 hrs of surgery.

Results: In group A, the dose of injectable analgesic required ranged from 2-4 doses with mean of 2.13+0.51. In group B, the dose of injectable analgesic ranged from 2-6 doses with mean of 2.20+0.61. In groupA 25(83.3%) patients were discharged within 1-2 days and in group B, 29(96.6%) patients were discharged in 1-2 days. This was found to be statistically significant ($p<0.05$). At 6 month follow up, one of the patients in group A or none in group B had pain/ discomfort in groin area.

Conclusion: It can be concluded from this study that the complication rate is comparable in both the groups. There is no significant difference in post operative pain The post operative hospital stay is significantly less in patients with 3D mesh whereas time to return to work in both the groups is comparable. There were no recurrences in the period of 6 months. There was no mortality in hernia surgery in any of the group

Keywords: Analgesic, Hernia, Infarcted, Pain

INTRODUCTION

Synthetic mesh implants are one of the commonly used materials in many surgical interventions, especially during hernia repair. Mesh implants are basically made of polypropylene (PP), polyethylene terephthalate (PET), expanded polytetrafluoroethylene (ePTFE), polyvinylidenefluoride (PVDF), and absorbable materials, such as polylactide (PLA), polyglycolic acid (PGA) and polydioxanone (PDO). Since the introduction of PP in 1962, four different material groups have become available for hernia repair and abdominal wall reconstruction: Polypropylene (PP), Polytetrafluorethylene (PTFE) and Polyester (POL). PP is a hydrophobic polymer made up of carbon atoms with alternating methyl molecules. This is flexible, very strong, can be cut easily, gets integrated into the surrounding tissues and prevents infection. Being monofilament in nature, it provides large pores leading to fibrovascular ingrowth and improved compliance. PP is the most popular material in mesh repair of hernia.[1,2] Potential mesh-related complications include chronic infections, chronic pain and mesh rupture.[3-5] There exists a controversy regarding reasons for chronic pain and the impact of mesh fixation.[6,7] Concomitant inflammatory and fibrotic reactions to the foreign body favour chronic infection, hence hindering the local clearance from bacteria which leads to a chronic inflammatory wound with prominent scarring, loss of compliance, contraction and migration of mesh, physiochemical changes, seroma and infection, and in some cases, eventual removal of mesh is required to resolve the problem.[8]

The present prospective study was conducted in the Govt. Medical College/Rajindra hospital, Patiala to compare

this 3D polypropylene mesh with flat polypropylene mesh in laparoscopic inguinal hernia repair.

MATERIAL AND METHODS

The present study enrolled 60 patients reporting to the Department of Surgery at Rajindra Hospital, Government Medical College, Patiala. Patients with densely scarred abdomen, acute abdomen with strangulated of infarcted bowel and younger than 18 years were not included in the study. The study was ethically approved by the Institute's ethical board. All the patients were informed about the study in their vernacular language and a written informed consent was obtained from everybody.

Procedure: The patient was kept fasting over night. The operative site was shaved on the morning of operation. Under general anaesthesia with endotracheal intubation, a subumbilical port was placed which was followed by placement of 11 mm trocar. A 10mm telescope attached to the light source and camera was introduced through the subumbilical trocar. One 5 mm port was inserted in the midline under direct vision about 1 cm above the symphysis pubis. Another 5mm port was inserted in the midline midway between the suprapubic and subumbilical trocar followed by dissection of the hernia sac. Dissection of the preperitoneal space was done with placement and fixation of the mesh. In Group A flat polypropylene mesh and in Group B 3D polypropylene mesh is placed in the preperitoneal space. Layer by layer closure was done.

For postoperative analgesia, patients were administered one ampoule (3ml 50 mg) of Diclofenac Sodium intramuscularly immediately after surgery in the recovery room of the operation theatre itself followed by rescue analgesic doses.Rescue analgesic doses were administered on demand of patient after assessing VAS at 6,24 and 48 hrs of surgery.Total doses of injectable anagesic (3 ml/50 mg of Declofenac Sodium) required by each patient were recorded and compared. Patients at the time of their discharge were asked about their experience of surgery both intraoperative and postoperative and results were recorded. Checkup for complications like pain/ discomfort,wound infections, swelling, ambulation and recurrence were carried out in detail on follow up visits and the observation made were recorded. The results were arranged in a tabulated form and analysed using SPSS software.

Sr No.	No. of doses of Inj.	Group A		Group B	
		No.	%	No.	%
1	2-3	28	93.3%	27	90%
2	4-5	2	6.6%	3	10%
3	>6	-	-	-	-
4	Total	30	100%	30	100%
5	Range	2-4		2-4	
6	Mean + SD	2.13+0.51		2.20+0.61	
7	T and P	0.4412		0.6624	
8	Significance	Not significant			

Table-1: Comparison for analgesic requirement

RESULTS

Table 1 shows the amount of rescue analgesics taken. In group A, the dose of injectable analgesic required ranged from 2-4 doses with mean of 2.13+0.51. In group B, the dose of injectable analgesic ranged from 2-6 doses with mean of 2.20+0.61. The difference in the two groups was not found to be significant.

Table 2 shows the incidence of intraoperative and postoperative complications. Minor haemorrhage occurred during operation in one patient in each group. In group A patient, the haemorrhage was controlled by

Sr No	Complications	Group A (n=30)		Group B (n=30)		P	Sig
		No.	%	No.	%		
1	INTRA OP Haemorrhage	1	3.33%	1	3.33%	>0.05	NS
	Bladder injury	-	-	-	-	-	-
	Conversion to TAPP	1	3.33%	3	9.99%	>0.05	NS
2	Post OP Fever	-		1	3.33%	>0.05	NS
	Urinary Retention	1	3.33%	2	6.66%	>0.02	NS
	UTI	1	3.33%	-		>0.05	NS
	Wound Seroma	2	6.66%	2	6.66%	>0.05	NS
	Wound infection	-		2	6.66%	>0.05	NS
	Surgical emphysema	-	-	-	3.33%	-	NS
	Testicular swelling	3.33%		1		>0.05	NS
	Testicular Tenderness	1	3.33%	0	-	>0.05	NS
3	Late Transient groin pain	0	-	0	-	>0.05	NS
	Testicular Tenderness	-		0	-	>0.05	NS
	Testicular atrophy	0	-	-		>0.05	NS
	Recurrence	0	-	-		>0.05	NS
4	Total complications	8		12		>0.05	NS

Table-2: Comparison of complications in two groups

electrocautery and in the end, romovac suction drain was put for the drainage of any residual collection. The drain was removed at 36 hours of surgery, as there was no significant serous fluid collection in drain. In group B patient; the haemorrhage was controlled the same way. In postoperative period there was no hematoma at operated site and neither was any scrotal complication.2 patients in each group had wound seroma and 2 in group B had wound infection which wasn't drained and resolved spontaneously(with antibiotics).None of the patients in group A or B had urinary bladder injury. Pneumoperitoneum occurred in 1 case of group A due to abnormal obturator vessel and 3 cases in group B due to opening of peritoneum either while creating extra pneumoperitoneum or during dissection. In all cases, the pneumoperitoneum was released by putting in verres needle intraabdominally at Palmer's point after putting in of Ryle's tube by anaesthesiologist and repair of the inguinal hernia completed. No cardiovascular and hemodynamic complications occurred in any cases. Amongst postoperative complications, urinary retention occurred in 1 patient (%) of group A and 2 patients (%) of group B this being the commonest complication. Wound seroma in 2 (%) in group A (resolved spontaneously) and 2 (%) in group B (resolved spontaneously. Wound infection occurred in 2(%) patients of group B. Wound infection was treated with antibiotics after pus culture and sensitivity. Infection subsided and there arose no need for mesh removal. None of the patients in group A/B has wound hematoma/abscess. Easy testicular tenderness was observed in 1(%) case of group A and none of group B.

Sr No.	Post op hospital stay	Group A		Group B	
		No.	%	No.	%
1	1-2 Days	25	83.3%	29	96.6%
2	3-4 Days	2	6.6%	1	3.3%
3	5-6 Days	3	10%	0	-
4	>6 Days	-	-	-	-
5	Total	30	100%	30	100%
6	Range	1-5 Days		1-4 Days	
7	Mean + SD	1.7+/-1.26		1.13+/-0.57	
8	T and P	2.2068		0.0354	
9	Significance	Significant			

Table-3: Comparison of postoperative hospital stay

In group A testicular tenderness persisted during 10th day follow up and subsided after 15 days.1 patients in each group had testicular swelling which resolved within 2 weeks. No patient in group A/B had orchitis/ testicular ischemia/ testicular necrosis. No patient in group A/B had surgical emphysema post-operatively.

Table 3 shows the duration of hospital stay. They were discharged from the hospital after they become ambulatory were talking orally, were passing urine normally and felt comfortable. The postoperative hospital stay on comparison in both groups showed that the mean postoperative hospital stay in patients in group A was 1.7+/-1.26 days whereas in patients of group B it was 1.13+/-0.57 days. However in groupA 25(83.3%) patients were discharged within 1-2 days and in group B, 29(96.6%) patients were discharged in 1-2 days. This was found to be statistically significant ($p<0.05$).

Table 4 shows the results of the study after 6 months of follow up. At 6 month follow up, one of the patients in group A or none in group B had pain/discomfort in groin area. No patient in either group had wound infection,swelling,recurrence during this period. Ambulation of all the patients was normal.

DISCUSSION

Various operative procedures have been facilitated by the development of laparoscopic techniques like adult inguinal hernia surgery. A totally extraperitoneal preperitoneal (TEP) repair was carried out using 3D Max Light (C.R. Bard, Inc.) without balloon dilation. A 3D Max Light which is an anatomically contoured 3D lightweight mesh was used in laparoscopic inguinal hernia repair. Twenty patients with the mean age of 60.9 years which included 7 cases of unilateral hernias and 13 cases of bilateral hernias underwent TEP using 3D Max Light in our institute between May2011 and September 2011. The mean operative time was 81.8min (range,55-166min) in case unilateral hernia and 133.0 min (range,88-173min) incase of bilateral hernias. The mean hospital stay duration was 3.0 days. They were followed up for 1-6months. One patient had seroma 1 month after surgery, but there were no recurrences or complications. This is economical and useful method for decreasing postoperative complications like neuralgia and recurrences. According to the study this operative method with 3D Max Light should be

Sr No.	Complication	Group A (n=30)		Group B (n=30)		p	Sig
		No.	%	No.	%		
1	Pain/discomfort	1	-	0	-	>0.05	NS
2	Wound infection	0	-	0	-	>0.05	NS
3	Ambulation	Normal		-		>0.05	NS
4	Swelling	0		-		>0.05	NS
5	Recurrence	0	-	-		>0.05	NS
5	Total complications	1		0		>0.05	NS

Table-4: Comparison of follow up(6 month)

consisdered a standard approach for the treatment of inguinal hernia.[9]

According to a study by Craig taylor et al, Mesh fixation appears to be unnecessary in TEP repair of small hernia defects, it is associated with higher operative costs and an increased likelihood of developing chronic groin pain. the omission of mesh fixation did not increase the risk of early hernia recurrence.[10] There is another method (open technique) of creating extra pneumoperitoneum in which Hassan's cannula is used to reach the posterior aspect of the rectus abdominis muscle under vision by giving infraumbilical incision. This technique is safe and chances of pneumoperitoneum are very less with it.[11] Van der Hem et al[12] reported 4 cases of unintended pneumoperitoneum during preperitoneal dissection in study of 104 cases of TEP. All four operation were converted to transabdominal preperitoneal technique intraoperatively. In our study 1 patient in group A and 2 patients in group B had urinary retention because of which patients were catheterized.

Fitzgibbons, jr et al[13], Bringman et al[14], Neumayer et al[15] have reported post operative urinary retention in 5.8%,2.2%,2.8% cases of laparoscopic repair respectively. The treatment is repeated catheterization till normal voiding resumes. some surgeon prefer indwelling foley's catheter for early discharge of patient and catheter can later on be removed in outpatient area.[13] The issues if seroma or hematoma formation have more to do with the extensive subcutaneous soft tissue dissection that is necessary with open repair.[16] Van der Ham et al[12], Neumayer et al[15] have reported seromas in 12% a9%of patients of TEP. Yamamoto et al[16] reported seroma in 47 patients (4%) of 1144 repairs and 13% of 108 PHS repairs respectively. In our study, seroma occurred in 2 cases in each group, all of them resolved spontaneously with conservative management.None of the patients in group A/B developed surgical emphysema postoperatively. Van der Ham et al[12] reported transient subcutaneous emphysema in 1 patient out of 104 cases of TEP repair. Pikoulis et al[17] also reported surgical emphysema in 2.4% cases of laparoscopic repair. Fitzgibbons jr et al[13] and Neumayer et al[15] have reported testicular complications in 1.8% and 1.4% cases of TEP. In our study, testicular tenderness was observed in 1 case in group B, but none of the patients in either group had testicular atrophy.

In laparoscopic TEP repair,testicular complications are far less as it is posterior repair and therefore the dissection of cord structures is less as compared to open hernia repairs. However, they occur in laparoscopic repair and resolve spontaneously.[11]

CONCLUSION

It can be concluded from this study that the complication rate is comparable in both the groups. There is no significant difference in post operative pain The post operative hospital stay is significantly less in patients with 3D mesh whereas time to return to work in both the groups is comparable. There were no recurrences in the period of 6 months. There was no mortality in hernia surgery in any of the group.

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