International Journal Dental and Medical Sciences Research
Volume 3, Issue 4, July-Aug 2021 pp 524-530 www.ijdmsrjournal.com ISSN: 2582-6018

Comparison of Trans Abdominal Pre Peritoneal versus Lichtenstein Mesh Repair in inguinal hernia: A Prospective study

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Submitted: 30-07-2021 Revised: 05-08-2021 Accepted: 08-08-2021

ABSTRACT
Background: Inguinal hernia is vast problem and has fascinated surgeons worldwide for centuries. Non-uniformity in management of inguinal hernia has made the problem ambiguous & conducting the studies onerous. Despite Trans-abdominal Pre-peritoneal (TAPP) repair being standardized procedure for inguinal hernia; its general acceptability is low. [1] Primary aim of the study is to compare the Lichtenstein tension free mesh repair with TAPP for inguinal hernia on the basis of their outcomes, duration of surgery & cost of treatment
Methods: Prospective study of inguinal hernia patients managed by Lichtenstein & TAPP repair from Sept 2018 – Sept 2020. 160 patients were enrolled in the study with 80 patients in Lichtenstein & TAPP group each. Patients followed-up for 12 months for early recurrence & chronic groin pain. Statistical analysis used was carried out using the standard statistical software.
Results: Mean duration of surgery was 73.94mins in Lichtenstein group & 101.81mins for TAPP group with significant p value 0.01. In our study, mean duration of hospital stay was 6.06 days & 5.04 days for Lichtenstein & TAPP group respectively with significant p value of 0.02. Cost of TAPP was more than 3 times the cost of Lichtenstein procedure.
Conclusions: TAPP repair is as good as Lichtenstein mesh repair in most aspects. However, we find that TAPP repair is costly & has significant learning curve, especially in budding surgeons. Lichtenstein mesh repair achieves most aspects of TAPP repair & is additionally cost-effective, fast and easier to perform & learn.
Keywords: Inguinal Hernia, Trans abdominal pre peritoneal (TAPP), Lichtenstein mesh.

I. INTRODUCTION

Inguinal hernia is accounting 75% of all abdominal-wall hernias and a life-time risk of 27% in men and 3% in women. [2,3] Inguinal hernia repair is a challenge which has been the focus of surgeons since the 18th century .The laparoscopic path to inguinal hernia repair was born with the efforts of Ger in 1982. [4] Laparoscopic repairs of groin hernia have been standardized in to two main approaches: Trans Abdominal Pre Peritoneal (TAPP; Arregui 1991) [5] and Totally Extra Peritoneal (TEP; Dulucq 1991). [6] With rising experience Laparoscopic Inguinal Hernia Surgery has shown excellent results and several advantages over open repair.[7-10] However, any significant benefit over Lichtenstein repair is yet to be demonstrated. [11]Aim of this study is to compare the Lichtenstein mesh repair with TAPP for inguinal hernia based on outcome in term of recurrence, cost of procedure, duration of surgery, post-operative and chronic pain, duration of hospital stay.

II. MATERIALS AND METHODS

This study was hospital-based prospective observational study includes 160 patients, who are admitted in the Department of General surgery, Kalinga Institute of Medical Sciences, Bhubaneswar with inguinal hernia during the period September 2018 to September 2020. The study was approved by ethics committee of the hospital and informed written consent was obtained from all patients

Detailed history of the patient, clinical examination of patient, routine investigations: - complete blood count, blood sugar, blood urea and creatinine, serum electrolyte, viral markers (HIV, HBsAg & HCV) and USG inguino-scrotal region was done in all patients.

Criteria for patient selection
Inclusion Criteria:
1. Patients undergoing TAPP or Lichtenstein's mesh repair.
2. Patients at or above age of 18 years.

Exclusion Criteria:
1. Patients undergoing other varieties of repair.
2. Patients having irreducible/strangulated or complicated hernia.

International Journal Dental and Medical Sciences Research
Volume 3, Issue 4, July-Aug 2021 pp 524-530 www.ijdmsrjournal.com ISSN: 2582-6018

3. Patients with history of extensive abdominal surgery.
4. Patients who have immune compromised status
5. Patients having cardiopulmonary compromise / renal / liver failure

Patients were observed from the date of admission, pre-operatively, intra-operatively and postoperatively till the date of discharge and follow up for one year.

Data Analysis is carried out using Categorical variables will be presented as frequency (-1). Continual parameters will be shown as mean (+-). To compare any 2 categorical variables, chi-square test and Fishers end test was used. To compare the mean level of continuous, normally distributed parameter between the 2 groups, independent t – test will be used. Skewed data will be analysed by Wilcoxon Rank Sum Test. A p value of < 0.05 will be considered as statistically significant. All the analysis will be carried out using the standard statistical software.

Conduction of operation

A. Lichtenstein's Repair surgical technique:

After the patient is paint-draped the primary surgeon stands on the side of hernia and begins by giving the skin incision. Care is taken to safeguard the ilio-inguinal & ilio-hypogastric nerves whenever possible. After incising the scarpa's & campar's fascia the external oblique aponeurosis is visible as glistening white sheet. It is incised along the axis of its fibres to open the inguinal canal. The cord contents are gently lifted from the canal by finger swipe action, taking care not to injure the vas deferens or the genital branch of genitor-femoral nerve. Sac is dissected from the cord by splaying the cord contents and fine dissection by forceps. After identifying the sac, it is separated from the cord starting from the fundus upto the neck of sac. After the sac is reduced the internal ring is approximated and an appropriate size rectangular flat mesh is placed in oblique fashion parallel to direction of fibres of external oblique muscles. The tip of the mesh should cross the pubic tubercle by atleast 1.5 cm to prevent lateral migration of mesh & subsequent recurrence (figure-1). Then the mesh is fixed to the four cardinal points by creating a fish-tail in the lateral 1/3rd. The external aponeurosis is closed, subcutaneous tissue closed & skin sutured/stapled

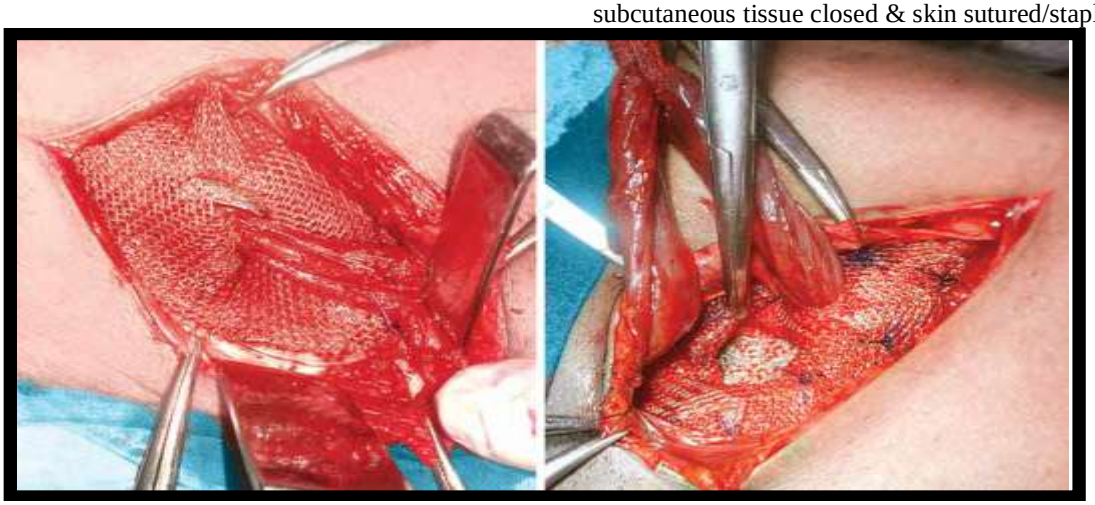

Fig 1 – Lichtenstein mesh repair – Final mesh position after fish-tail

B. Trans Abdominal Pre Peritoneal mesh repair (TAPP) [12]

After the introduction of a 10 mm port at the umbilicus and two 5mm port are placed just lateral to the rectus muscle. The anatomic land marks including the median and medial umbilical ligaments, the bladder, the inferior epigastric vessels, the vas deferens, the spermatic cord, external iliac vessels and the hernial defect are identified. An incision of the peritoneum is initiated at the medial umbilical ligament at least 2 cms above hernial defect and extend laterally towards the anterior superior iliac spine.

The preperitoneal space is exposed using blunt and sharp dissection, mobilizing the peritoneal flap inferiorly. The symphysis pubis, cooper's ligament, iliopubic tract and the cord structures and identified. Direct hernia sac is reduced during this dissection. A small sac should be reduced, but if a large sac descending into the scrotum is present, it may be divided. The proximal sac then is closed before reduction, and the distal

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sac is opened distally as far as possible on the side opposite the cord. Finally, the peritoneal flap is dissected inferiorly well proximal to the divergence of the vas and the internal spermatic vessels. A large piece of mesh, 15x11cm or greater, is introduced into the abdominal cavity is positioned over the myopectineal orifice so that it completely covers the direct, indirect, and femoral spaces. To prevent the chances of mesh migration or shrinkage we use staples, tacks (figure-2). The landmark for the fixation of the prosthesis are the contralateral pubic tubercle and the symphysis pubis for the medial edge, cooper's ligament or the tissue just above it for the inferior border and the posterior rectus sheath transversalis fascia atleast 2 cm above the iliac spine to assure wide overlap. The peritoneum is then closed taking into consideration not to leave any gaps

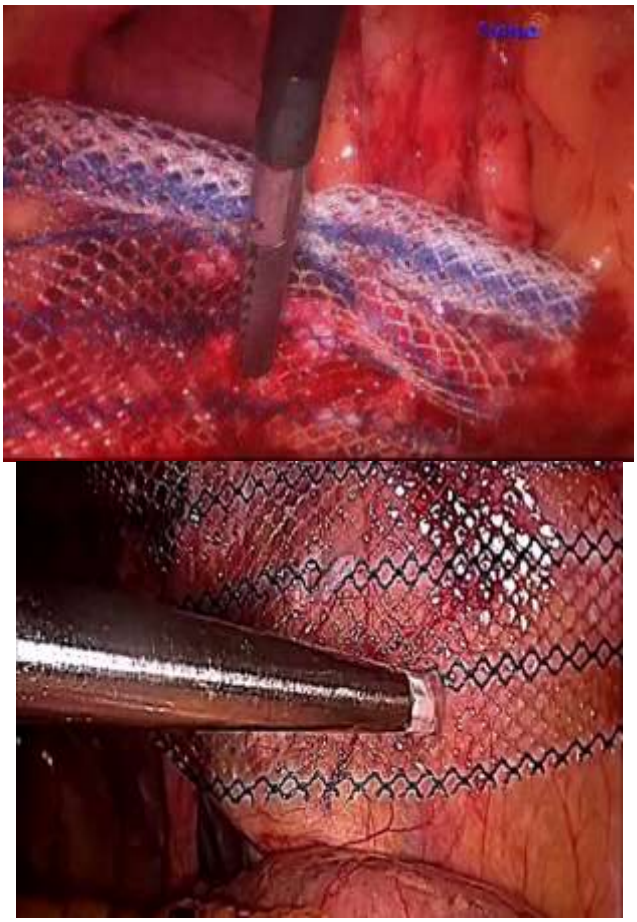

Fig 2 – TAPP – Mesh unrolling & Mesh fixation by tacker

Postoperative Management All patients in both groups received 2 doses of Inj Amoxycillin – Clavulinic acid (1.2g) except diabetic patients who received 4 doses each. All patients received Inj Paracetamol 1g IV 8 hourly in immediate post-operative period until patients no longer complained of pain.

III. RESULTS

Age & Sex

The mean age of presentation in the Lichtenstein tension free mesh group was 53.85years, while that in the TAPP group was 50.40year. Out of 160 patients 2 were female, presented with a unilateral indirect inguinal hernia, and underwent TAPP for the same.

Table 1 Comparison of types of hernia in Lichtenstein & TAPP group:

			Procedure Done		Total
			Lichtenstein	TAPP	
Type of Hernia	Unilateral	Count	21	19	40

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(EHS)	Direct	% within Procedure Done	26.3%	23.8%	25.0%
	Unilateral Indirect	Count	55	40	95
		% within Procedure Done	68.8%	50.0%	59.4%
	Unilateral Both	Count	4	11	15
		% within Procedure Done	5.0%	13.8%	9.4%
	Bilateral	Count	0	10	10
		% within Procedure Done	0.0%	12.5%	6.3%
Total		Count	80	80	160
		% within Procedure Done	100.0%	100.0%	100.0%

In our study all bilateral hernias were operated by TAPP. Rest unilateral hernias were equally distributed among the two groups with no significant difference.

Sac adhesions

Table 2 Comparison of sac adhesions in Lichtenstein & TAPP groups:

			Procedure Done		
			Lichtenstein	TAPP	Total
Sac Adhesion	Absent	Count	73	69	142
		% within Procedure Done	91.3%	86.3%	88.8%
	Present	Count	7	11	18
		% within Procedure Done	8.8%	13.8%	11.3%
Total		Count	80	80	160
		% within Procedure Done	100.0%	100.0%	100.0%

In our study 18 cases had significant sac adhesions requiring dissection, of which 7 were in Lichtenstein group and 11 in TAPP group. However the finding did not affect outcome in both groups.

Estimated Intra-operative Blood Loss (EIBL)

Table 3 Comparison of Estimated intra-operative blood loss (EIBL):

	Procedure Done	Mean (ml)	Std. Deviation	Std. Error Mean
EIBL in ml	Lichtenstein	31.88	14.677	1.641
	TAPP	33.25	15.571	1.741

The average EIBL was similar in both groups and the difference found to be not significant. (p value 0.566)

Intra-operative injury

In our study there did not occur any intra-operative injury in either Lichtenstein Tension free repair group or the TAPP group

Post-operative complications

There was no incidence of any early post-operative complication with respect to seroma, hematoma, wound infection & mesh infection.

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Duration of surgery

Table 4 Comparison of duration of surgery:

Surgery Duration		Procedure Done		Total	p-value
		Lichtenstein	TAPP		
<=60 min	Count	25	0	25	.01
	% within Procedure Done	31.3%	0.0%	15.6%	
61-120 min	Count	54	73	127	
	% within Procedure Done	67.5%	91.3%	79.4%	
>120 min	Count	1	7	8	
	% within Procedure Done	1.3%	8.7%	5.0%	

The average duration for Lichtenstein tension free mesh repair was calculated as 73.94 mins and average duration of TAPP was 101.81 mins. The difference in means was significant with p value 0.01.

Post-operative analgesic requirement

Table 5 Comparison of Number of IV Analgesic Dose required Post-Operatively:

			Procedure Done		
			Lichtenstein	TAPP	Total
No. of Post Op IV Analgesic Dose	2	Count	47	51	98
		% within Procedure Done	58.8%	63.7%	61.3%
	3	Count	31	28	59
		% within Procedure Done	38.8%	35.0%	36.9%
	5	Count	2	1	3
		% within Procedure Done	2.5%	1.3%	1.9%
Total		Count	80	80	160
		% within Procedure Done	100.0%	100.0%	100.0%

The average dose IV analgesic in the immediate post-operative period required for Lichtenstein group was 2.46 doses and that for TAPP group was 2.39 doses. However the difference was statistically insignificant with p value being 0.43.

Hospital stay

Table 6 Comparison of Complete Hospital stay in Lichtenstein & TAPP groups:

Hospital stay in days		Procedure Done		Total	p-value
		Lichtenstein	TAPP		
≤5 days	Count	40	55	95	0.024
	% within Procedure done	50.0%	68.8%	59.4%	
5-10 days	Count	39	25	64	
	% within Procedure	48.8%	31.3%	40.0%	

	done				
>10 days	Count	1	0	1	
	% within Procedure done	1.3%	0.0%	.6%	
Total	Count	80	80	160	

Average hospital stay in Lichtenstein repair patients was 6.06 days for Lichtenstein repair patients and 5.04 days for TAPP patients. The difference was statistically significant with p value 0.024.

Follow up & Recurrences The patients were followed up for a variable period of 2 to 12 months. There were many dropouts in the early postoperative follow up period. No recurrences or chronic groin pain incidences were noted in the postoperative follow up period.

IV. DISCUSSION

Our study included patients from age 18yrs to the oldest patient being 80 years. The mean age of presentation in the Lichtenstein tension free mesh group was 53.85 years, while that in the TAPP group was 50.40 years. Out of 160 patients enrolled in the study, 158 were males and 2 females. All surgeries were done using polypropylene mesh. Wound healing rates were equal in both the groups on day by day basis with removal of staples on 7th post-operative day. There were no intra-operative injuries encountered in our study in either group. Intra-operative blood loss monitoring was done by visual assessment of swabs & gauze pieces & measuring suction container. There was no significant difference in either group.

Duration of surgery was measured from the time of incision till the time of applying dressing over incision site. The average duration in Lichtenstein group was only 73.94 mins and that for TAPP was more 101.81 mins consistent with findings by Z. Demetrashvili et al [13] However our study shows a significant statistical difference and p value of 0.01 with regard to duration of surgeries.

Several studies comparing LIHS & Lichtenstein have found no significant difference in post-operative pain scores. [14, 15, 16] ur Our results suggest that average analgesic dose requirement after Lichtenstein (2.46) and TAPP (2.39) surgeries are similar with Lichtenstein repair & TAPP group. The difference was statistically insignificant with p value being 0.43

This is in contrast to findings of Z. Demetrashvili et al[13] and Khalid et.al. [17] who found analgesic requirement significantly less with TAPP repair compared to Lichtenstein repair.

Hospital stay of patients was observed in our study and found that average hospital stay after TAPP was 5.04 days compared to 6.06 days after Lichtenstein repair. This difference was statistically significant with p value 0.024. This finding is consistent with findings of Z. Demetrashvili et. al. [13] but in the study of Wright D et al[18] and Pokorny H et al [19] there is no significant statistical difference regarding postoperative hospital stay in either open or laparoscopic hernia repair

The cost of procedure was conspicuously higher for TAPP than Lichtenstein repair for obvious reasons of use of General anaesthesia, duration of surgery and laparoscopic equipments for the TAPP group.

V. CONCLUSION

Our study shows that TAPP mesh repair is as good as Lichtenstein's Tension Free Mesh repair for inguinal hernia in most aspects for a experienced and skilled hand. The study shows that TAPP is better in terms of short hospital stay but immediate post-operative pain is similar to Lichtenstein's repair. Lichtenstein's repair is far better in terms of duration of surgery and cost effectiveness. Hence, the choice may depend on patient's financial status and surgeon's expertise. A larger randomized, multi-institutional study is required to evaluate future possibilities.

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