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FIXATION VS NON-FIXATION OF MESH IN INGUINAL HERNIA REPAIR USING THE TEP (TOTALLY EXTRAPERITONEAL) TECHNIQUE

Dr Priyesh Prabhakar Naik

MS DNB General & Laparoscopic Surgeon
Director Infinity Medisurge & Infinity Prime Hospital
Thane
Consultant Laparoscopic Surgeon Jupiter Hospital
Thane, Maharashtra

Address for correspondence
priyeshnaik23@yahoo.com.in

ABSTRACT

Background: Laparoscopic inguinal hernia repair is associated with two major complications including chronic groin pain and recurrence. Laparoscopic hernia repair utilizes mesh fixing using trackers which can increase chronic groin pain due to nerve injuries which led to the use of non-fixation of mesh. However, it does not decrease the recurrence.

Aim: The present study aimed to assess the outcomes of fixation versus non-fixation of mesh in Inguinal hernia repair using the TEP (totally extraperitoneal) technique.

Methods: The present study assessed 61 subjects retrospectively where mesh fixation was done in 22 subjects and non-fixation in 39 subjects and had a minimum of 1 year follow-up. In all subjects, chronic groin pain and recurrence were assessed along with cost, days needed for return to routine, hospital stay duration, urinary retention incidence, immediate post-operative pain, and operative time.

Results: For unilateral inguinal hernia repair with and without mesh fixation, the operative time was 41.6±11.6 and 35.7±9.9 min (p=0.02), whereas, for bilateral inguinal hernia repair, the operative time was 66.4±15.4 and 55.1±14.4 (p=0.01) mins respectively. In the two groups, the mean pain score was 3.46±1.4 and 3.03±1.2 respectively with p=0.03. Incidence of chronic groin pain was 3.33% (n=1) and 3.22% (n=1) (p=1.00) at mean follow-up of 18.9±6.4 and 33.4±17.2 months respectively.

Conclusions: The present study concludes that increased recurrence is not associated with non-fixation of mesh in laparoscopic inguinal hernia repair. However, non-fixation of mesh is not associated with decreased chronic groin pain incidence. The advantages of non-mesh fixation include decreased treatment cost, lesser postoperative pain, and decreased intraoperative time.

Keywords: Chronic groin pain, inguinal hernia, laparoscopy, non-fixation of mesh, recurrence, totally extraperitoneal repair

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INTRODUCTION

Inguinal hernia repair using the laparoscopic approach over open surgery is the treatment of choice, recommended, and is widely accepted and used procedures for both recurrent and bilateral inguinal hernias. It is also a treatment option for managing the unilateral inguinal hernia. Laparoscopy for the management of inguinal hernia was first described and used in the 1980s.[1] Since its introduction, various techniques have been used and developed for laparoscopic repair of the inguinal hernia. Presently, the two techniques of laparoscopic inguinal hernia repair are TAPP (transabdominal preperitoneal) and TEP (totally extraperitoneal) techniques. Among these two techniques, the more accepted and favored technique is TEP.[2]

The most common complication associated with surgical management of inguinal hernia is high recurrence. However, recent literature studies have consistently reported a low recurrence rate with surgical management of inguinal hernia, the focus has been laid on other complications such as QoL (quality of life) and chronic groin pain following surgery. The reported range of chronic groin pain incidence following inguinal hernia surgeries is between 0.02% to 31%.[3,4]

With the advancement in various techniques and technologies in the field of laparoscopic surgery, improved outcomes are being seen following laparoscopic inguinal hernia repair surgeries. Quality of life is adversely affected in subjects undergoing inguinal hernia surgery by chronic groin pain alone which remains the vital aspect for laparoscopic surgeons to improve. Chronic groin pain is usually seen due to damage of nerves during laparoscopic inguinal hernia repair surgeries which can be attributed to either dissection or fixation of the mesh.[5]

Fixation of the mesh during laparoscopic inguinal hernia repair surgeries is usually done using laparoscopic trackers and multiple tacks. Recently, the number of tacks used in laparoscopic inguinal hernia repair surgeries has been reduced to two to reduce the incidence of chronic groin pain. Among the two tacks used, one tack is placed laterally at the anterior superior iliac spine level and another over the cooper ligament.[6.7]

Also, attempts are being made to completely eradicate the fixation of mesh during laparoscopic inguinal hernia repair surgeries. However, completely avoiding mesh fixation which is primarily aimed to decrease the chronic groin pain incidence can increase the chances of recurrence of inguinal hernia as non-fixation can lead to the mesh displacement as the mesh is not fixed. Recent literature data has published few studies where it has been reported that non-fixation of mesh in laparoscopic inguinal hernia surgeries does not lead to increased incidence of recurrence.[8]

Considering the existing evidence, the present study aimed to assess the outcomes of fixation versus non-fixation of mesh in Inguinal hernia repair using the TEP (totally extraperitoneal) technique.

MATERIALS AND METHODS

The present retrospective clinical study was aimed to assess the outcomes of fixation versus non-fixation of mesh in Inguinal hernia repair using the TEP (totally extraperitoneal) technique. The study was done at….from…to….after the clearance was given by the concerned Institutional

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Ethical committee. The study population was from the Department of General Surgery of the Institute. Informed consent in verbal and written form was taken from all the subjects before study participation.

The present study assessed 61 subjects from both genders retrospectively where mesh fixation was done in 22 subjects and non-fixation in 39 subjects and had a minimum of 1 year follow-up. In all subjects, chronic groin pain and recurrence were assessed along with cost, days needed for return to routine, hospital stay duration, urinary retention incidence, immediate post-operative pain, and operative time. The inclusion criteria for the study were subjects with complete data for assessment, subjects managed with TEP for inguinal hernia, adult subjects, and those having an uncomplicated inguinal hernia. The exclusion criteria for the study were subjects not fit for general anesthesia, complicated hernia, and having large lower midline scars.

At the time of induction, 100mg amoxicillin and 200mg clavulanic acid injection were given as the prophylaxis along with the two doses given postoperatively. All the procedures were carried out under general anesthesia. Urinary bladder catheterization was not done in any subject of either group.

For the TEP procedure, on the side of the hernia, a paraumbilical port of 10mm was made. In cases with bilateral inguinal hernia, a port was made on the side of the larger sac. Anterior rectus sheath was incised and retraction of rectus muscle was done laterally. With this, preperitoneal access was gained and a 10 mm trocar was placed for a 10mm 30^{o} telescope. Pneumo-preperitoneal was made and blunt dissection was done using a telescope to create the preperitoneal space.

In the midline, two ports of 5mm were placed. One port was placed in between the 5mm suprapubic port and the 10 mm port, and another port was placed just above the symphysis pubis. This was followed by the dissection of the entire posterior floor. The sac reduction was then done in all the subjects except for subjects having adhesions where sac division was done at the deep ring. Fascia over lateral cutaneous and genitofemoral nerves were kept intact after their identification.

Proximal to the point of medial turning of deferens, the peritoneum was teased down to define Hasselbach's triangle and triangle of doom. Following dissection, a rolled polypropylene mesh of 12 X 15 cm was introduced through the 10 mm port. Mesh was spread to cover the whole myopectineal area on the affected side. In cases with bilateral inguinal hernia, two mesh were placed to overlap each other in midline. Absorbable tackers were used to fix the mesh laterally above the iliopubic tract near the anterior superior iliac spine and medially on Cooper's ligament. In non-fixation cases, these steps were not followed. In a bilateral inguinal hernia, a similar procedure was done on the other side allowing the mesh to overlap medially by 1-2 cm. Skin staplers were used to close the port sites.

Postoperatively, instructions were given to all the subjects. For analgesia on the day of surgery, 1 gm paracetamol injection every 8 hours. After 6 hours of surgery, oral fluids were allowed to all the subjects, and a normal diet was allowed on the next day of the surgery. Postoperative pain in

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the study subjects was assessed using the visual analog scale scores on a scale of 0-10 where 0 signified no pain and 10 depicted extreme pain.

Regular follow-up was done for all the subjects at 1 week, 3 months, 6 months, and 1 year after the surgery. A minimum of 1 year of follow-up was completed by all the study subjects. A telephone interview was done for the subjects that did not turn up on follow-up visits.

The data gathered were analyzed statistically using the SPSS software version 21.0 (IBM Corp., Armonk, NY, USA) using Fisher's exact and chi-square tests. Student's t-test was used for comparison of continuous variables. The data were expressed as mean and standard deviation and frequency and percentage. The significance level was kept at a p-value of <0.05.

RESULTS

The present retrospective clinical study was aimed to assess the outcomes of fixation versus non-fixation of mesh in Inguinal hernia repair using the TEP (totally extraperitoneal) technique. The present study assessed 61 subjects from both genders retrospectively where mesh fixation was done in 22 subjects and non-fixation in 39 subjects and had a minimum of 1 year follow-up. The mean age of the study subjects in the fixation and non-fixation group was 49.6±19.7 and 47.3±13.6 years respectively with the age ranges of 18-72 and 22-78 years. There were 95.45% (n=21) males and 4.54% (n=1) females in the fixation group and 97.43% (n=38) males and 2.56% (n=1) females in the non-fixation group. The mean duration of hernia symptoms was 22.3±9.5 and 18.4±7.4 months respectively in the fixation and non-fixation group. ASA grade I was seen in 63.6% (n=14) and 61.5% (n=24) subjects of the fixation and non-fixation group, and ASA II in 36.3% (n=8) and 38.46% (n=15) subjects of fixation and non-fixation group respectively. Unilateral and bilateral hernia was seen in 63.6% (n=14) and 36.36% (n=8) subjects from fixation and 58.97% (n=23) and 41.02% (n=16) subjects from the non-fixation group respectively. The primary hernia was seen in 90.90% (n=20) and 92.305 (n=36) subjects from the fixation and non-fixation group and recurrent hernia in 9.09% (n=2) and 7.69% (n=3) subjects from fixation and non-fixation group respectively. The total number of repairs done in the fixation and non-fixation group were 30 and 56 respectively (Table 1).

On assessing the intraoperative factors and complications in two groups of study subjects, the mean operative time for bilateral hernia in the fixation and non-fixation group was 66.4±15.4 and 55.5±14.4 minutes respectively with significantly higher operative time in mesh fixation with p=0.01. A similar significantly higher fixation time was seen in the unilateral mesh fixation group with p=0.02. The conversion was seen in 4.54% (n=1) subjects from the fixation group and no subjects from the non-fixation group showing a non-significant difference with p=0.14. Extensive surgical emphysema and testicular vessel injury were seen in 4.54% (n=1) subjects from fixation and 2.56% (n=1) subjects from non-fixation group (p=1.000). Inferior epigastric vessel injury was seen in 4.54% (n=1) and 5.12% (n=2) subjects from the fixation and non-fixation groups respectively showing non-significant differences with p=0.645. Major vessel injury, vas deferens injury, and viscera injury were not seen in any subject from either group as shown in Table 2.

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The study results showed that for postoperative factors and complications in two groups of study subjects, it was seen that days taken for return to normal activities were comparable in the fixation and non-fixation groups with 7.93±2.3 and 7.94±2.2 days respectively (p=0.875). Mean hospital stay duration was 1.44±0.5 and 1.38±0.6 days in fixation and non-fixation groups which was non-significant with p=0.875. No wound infection or ischemic orchitis was seen in any subject from either group. Ecchymosis and funiculitis were seen in 4.54% (n=1) and 2.56% (n=1) subjects from fixation and non-fixation groups respectively showing non-significant differences with p=1.000. At 1 week, seroma was seen in 9.09% (n=2) and 7.69% (n=3) subjects from the fixation and non-fixation groups respectively depicting non-significant differences with p=0.711. Urinary retention was seen in 4.54% (n=1) subjects from the fixation and in 7.69% (n=3) subjects from the non-fixation group with p=0.701. The mean pain scores at 24 hours in the fixation and non-fixation group were 3.42±1.4 and 3.03±1.2 respectively which was significantly higher in the fixation group with p=0.03 as shown in Table 3.

It was seen that for the short-term outcomes and follow-up results in two groups of study subjects, the mean follow-up duration for the fixation and non-fixation groups was 33.4±16.8 and 18.9±6.0 months respectively. The recurrence was seen in 4.54% (n=1) subjects from the fixation and no subjects from the non-fixation group with p=0.116. Port site hernia was seen in no subject from either group. Chronic groin pain was seen in 4.54% (n=1) and 2.56% (n=1) subjects from fixation and non-fixation groups respectively with p=1.000. mesh infection was not seen in any subject from the non-fixation group and 4.54% (n=1) subjects from the fixation group with p=0.116 as summarized in Table 4.

DISCUSSION

The present study assessed 61 subjects from both genders retrospectively where mesh fixation was done in 22 subjects and non-fixation in 39 subjects and had a minimum of 1 year follow-up. The mean age of the study subjects in the fixation and non-fixation group was 49.6±19.7 and 47.3±13.6 years respectively with the age ranges of 18-72 and 22-78 years. There were 95.45% (n=21) males and 4.54% (n=1) females in the fixation group and 97.43% (n=38) males and 2.56% (n=1) females in the non-fixation group. The mean duration of hernia symptoms was 22.3±9.5 and 18.4±7.4 months respectively in the fixation and non-fixation group. ASA grade I was seen in 63.6% (n=14) and 61.5% (n=24) subjects of the fixation and non-fixation group, and ASA II in 36.3% (n=8) and 38.46% (n=15) subjects of fixation and non-fixation group respectively. Unilateral and bilateral hernia was seen in 63.6% (n=14) and 36.36% (n=8) subjects from fixation and 58.97% (n=23) and 41.02% (n=16) subjects from the non-fixation group respectively. The primary hernia was seen in 90.90% (n=20) and 92.305 (n=36) subjects from the fixation and non-fixation group and recurrent hernia in 9.09% (n=2) and 7.69% (n=3) subjects from fixation and non-fixation group respectively. The total number of repairs done in the fixation and non-fixation groups was 30 and 56 respectively. These data were similar to the studies of Tam KW et al[9] in 2010 and Teng YJ et al[10] in 2011 where authors assessed subjects with demographic data comparable to the present study.

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It was seen that on assessing the intraoperative factors and complications in two groups of study subjects, the mean operative time for bilateral hernia in fixation and non-fixation groups was 66.4±15.4 and 55.5±14.4 minutes respectively with significantly higher operative time in mesh fixation with p=0.01. A similar significantly higher fixation time was seen in the unilateral mesh fixation group with p=0.02. The conversion was seen in 4.54% (n=1) subjects from the fixation group and no subjects from the non-fixation group showing a non-significant difference with p=0.14. Extensive surgical emphysema and testicular vessel injury were seen in 4.54% (n=1) subjects from fixation and 2.56% (n=1) subjects from non-fixation group (p=1.000). Inferior epigastric vessel injury was seen in 4.54% (n=1) and 5.12% (n=2) subjects from the fixation and non-fixation groups respectively showing non-significant differences with p=0.645. Major vessel injury, vas deferens injury, and viscera injury were not seen in any subject from either group. These results were consistent with the studies of Moreno-Egea A[11] in 2004 and Li JW et al[12] in 2007 where similar complications and intraoperative factors were reported by the authors in their studies as seen in the present study.

It was seen that for postoperative factors and complications in two groups of study subjects, it was seen that days taken for return to normal activities were comparable in the fixation and non-fixation groups with 7.93±2.3 and 7.94±2.2 days respectively (p=0.875). Mean hospital stay duration was 1.44±0.5 and 1.38±0.6 days in fixation and non-fixation groups which was non-significant with p=0.875. No wound infection or ischemic orchitis was seen in any subject from either group. Ecchymosis and funiculitis were seen in 4.54% (n=1) and 2.56% (n=1) subjects from fixation and non-fixation groups respectively showing non-significant differences with p=1.000. At 1 week, seroma was seen in 9.09% (n=2) and 7.69% (n=3) subjects from the fixation and non-fixation groups respectively depicting non-significant differences with p=0.711. Urinary retention was seen in 4.54% (n=1) subjects from fixation and in 7.69% (n=3) subjects from non-fixation group with p=0.701. The mean pain scores at 24 hours in the fixation and non-fixation group were 3.42±1.4 and 3.03±1.2 respectively which was significantly higher in the fixation group with p=0.03. These results were in agreement with the findings of Muysoms FE et al[13] in 2013 and Koch CA et al[14] in 2006 where postoperative complications reported by the authors were similar to the complications reported by authors following fixation and non-fixation inguinal hernia repair.

The study results showed that for the short-term outcomes and follow-up results in two groups of study subjects, the mean follow-up duration for the fixation and non-fixation groups was 33.4±16.8 and 18.9±6.0 months respectively. The recurrence was seen in 4.54% (n=1) subjects from the fixation and no subjects from the non-fixation group with p=0.116. Port site hernia was seen in no subject from either group. Chronic groin pain was seen in 4.54% (n=1) and 2.56% (n=1) subjects from fixation and non-fixation groups respectively with p=1.000. mesh infection was not seen in any subjects from the non-fixation group and in 4.54% (n=1) subjects from the fixation group with p=0.116. These findings were in line with the findings of Lau H et al[15] in 2004 and Sajid MS et al[16] in 2012 where authors reported comparable incidence of chronic groin pain and recurrence after hernia was reported by the authors as present study in their respective studies.

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CONCLUSIONS

Considering its limitations, the present study concludes that increased recurrence is not associated with non-fixation of mesh in laparoscopic inguinal hernia repair. However, the non-fixation of mesh is not associated with decreased chronic groin pain incidence. The advantages of non-mesh fixation include decreased treatment cost, lesser postoperative pain, and decreased intraoperative time.

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TABLES

S. No	Characteristics	Fixation		Non-fixation	
		n=22	**%**	**n=39**	**%**
1.	**Mean age (years)**	49.6±19.7		47.3±13.6	
2.	**Age range (years)**	18-72		22-78	
3.	**Gender**				
a)	Males	21	95.45	38	97.43
b)	Females	1	4.54	1	2.56
4.	**Symptom duration (months)**	22.3±9.5		18.4±7.4	
5.	**ASA Grade**				
a)	I	14	63.6	24	61.5
b)	II	8	36.3	15	38.46
6.	**Hernia side**				
a)	**Unilateral**	14	63.6	23	58.97
i.	Left	10	71.42	17	73.91

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ii.	Right	4	28.57	6	26.08
b)	**Bilateral**	8	36.36	16	41.02
7.	**Hernia type**				
a)	Primary	20	90.90	36	92.30
b)	Recurrent	2	9.09	3	7.69
8.	**Repair number**	30		56	

Table 1: Demographic and disease data in study subjects

S. No	**Parameters**	**Fixation**		**Non-fixation**		**p-value**
		n=22	**%**	**n=39**	**%**	
1.	**Mean operative time (mins)**					
a)	Bilateral	66.4±15.4		55.5±14.4		**0.01**
b)	Unilateral	41.6±11.6		35.7±9.9		**0.02**
2.	**Conversion**	1	4.54	0	0	0.14
3.	**Extensive surgical emphysema**	1	4.54	1	2.56	1.000
4.	**Major vessel injury**	0	0	0	0	**-**
5.	**Inferior epigastric vessel injury**	1	4.54	2	5.12	0.645
6.	**Testicular vessels injury**	1	4.54	1	2.56	1.000
7.	**Vas deferens injury**	0	0	0	0	**-**
8.	**Viscera injury**	0	0	0	0	**-**

Table 2: Intraoperative factors and complications in two groups of study subjects

S. No	**Parameters**	**Fixation**		**Non-fixation**		**p-value**
		n=22	**%**	**n=39**	**%**	
1.	**Routine return (days)**	7.93±2.3		7.94±2.2		0.875
2.	**Hospital stay (days)**	1.44±0.5		1.38±0.6		0.660
3.	**Wound infections**	0	0	0	0	-
4.	**Ecchymosis**	1	4.54	1	2.56	1.000
5.	**Ischemic orchitis**	0	0	0	0	-
6.	**Funiculitis**	1	4.54	1	2.56	1.000
7.	**Seroma at week 1**	2	9.09	3	7.69	0.711

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8.	**Urinary retention**	1	4.54	3	7.69	0.701
9.	**Pain score (24 hours)**	3.42±1.4		3.03±1.2		**0.03**

Table 3: Postoperative factors and complications in two groups of study subjects

S. No	**Parameters**	**Fixation**		**Non-fixation**		**p-value**
		n=22	**%**	**n=39**	**%**	
1.	**Mean follow-up (months)**	33.4±16.8		18.9±6.0		-
2.	**Recurrence**	1	4.54	0	0	0.116
3.	**Port site hernia**	0	0	0	0	-
4.	**Chronic groin pain**	1	4.54	1	2.56	1.000
5.	**Mesh infection**	1	4.54	0	0	0.116

Table 4: Short outcomes and follow-up results in two groups of study subjects