International Journal of Science and Research (IJSR)
ISSN: 2319-7064
ResearchGate Impact Factor (2018): 0.28 | SJIF (2018): 7.426

Evaluating Difference between Mesh Fixation and without Mesh Fixation for Post Operative Pain and Early Recurrence in Laparoscopic Inguinal Hernia Repair

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Abstract: ***Hernia is an abnormal protrusion of an organ or tissue through a defect in surrounding wall. Inguinal hernia is most common. Laparoscopic repair can be done by totally extraperitoneal repair or transabdominal preperitoneal repair. Mesh is used in laparoscopic repair. Mesh fixation has its own benefits and Non mesh fixation has its own benifits. The aim of the study is to evaluate the difference between mesh fixation and without mesh fixation for post operative pain and early recurrence in laparoscopic hernia repair. The observational study was conducted in Surat Municipal Institute of Medical Education and Research, Surat in Department of General Surgery from June 2016 to June 2017.There is more pain and high cost in mesh fixation in laparoscopic inguinal hernia repair than without mesh fixation. But there is no significant difference in recurrence in both group. There is close relation between post operative pain and mesh fixation.***

Keywords: Inguinal Hernia, Mesh, Fixation, Laparoscopic repair, Recurrence

1. Introduction

A hernia is the bulging of part of the content of the abdominal cavity through a weakness in the abdominal wall.(1). Inguinal hernia, often reffered to as a rupture by patients, is the most common hernia in men and women but much more common in men. There are two basic types that are fundamentally different in anatomy, causation and complications. However, they are anatomically very close to each, surgical repair techniques are very similar and ultimate reinforcement of the weakend anatomy is identical, so they are often referred to together as inguinal hernia.(1)

The congenital inguinal hernia is known as indirect , oblique or lateral whereas the acquired hernia is called direct or medial. There is a third 'sliding' hernia that is acquired but lateral in position.(1)

Elective surgery for inguinal hernia is a common and simple operation. It can be undertaken under local, regional or general anaesthesia with minimal risk, even in high risk patients.

Surgery for hernia are herniotomy, herniorrhaphy and hernioplasty.

Herniotomy is mainy used in children in lateral hernias.

In adults, some form of muscle strengthening is always required. Herniorrhaphy was previously done.

Now a days mostly mesh plasty is done in hernia surgery.(1). Laparoscopic repair is increasing recently.

Two techniques are described and have been extensively studied in randomised trials. The totally extraperitoneal approach is more widely used than transabdominal preperitoneal approach. In both, the aim of surgery is to reduce the hernia and hernia sac within the abdomen and then place a 10*15 cm mesh just deep to the abdominal wall, extending across the midline into the retropubic space and 5 cm lateral to the deep inguinal ring. The mesh cover Hasselbach's triangle, the deep inguinal ring and the femoral canal. In TEP, the surgeon is able to creat a space just deep to the abdominal muscles without entering the peritoneal cavity whereas, in TAPP, the surgeon enters the peritoneal cavity then incises the peritoneum above the hernia defects, and reflects it away from the muscles, essentially entering the same space as in TEP. Once the hernia has been reduced, an identical mesh inserted and the peritoneum closed over the mesh.(1)

2. Review of Literature

Fixation of the mesh during laparoscopic inguinal hernia repair is thought to be necessary to prevent recurrence. However, mesh fixation may increase postoperative pain and lead to an increase risk of complications. The need for fixation of the mesh is controversial. Some have suggested that fixation of mesh during endoscopic TEP inguinal hernia repair is necessary to prevent hernia recurrence (2)

However, fixation of the mesh is thought to contribute to increase postoperative pain and the risk of nerve injury. Nerve injury has been estimated to occur in 2% to 4% of laparoscopic inguinal hernia repairs with the most commonly injured nerves being the femoral branch of the genitofemoral nerve and the lateral femoral cutaneous nerve.(3)

Hernia recurrence and chronic pain are the main concerns. No operation can be guaranteed to be recurrence free.

Evidence shows that mesh repair have lower recurrence than suture repair. Chronic pain defined as pain present 3 month after surgery, is common after all forms of surgery. It is less common and less severe after laparoscopic surgery. This type of pain is very uncommon after laparoscopic surgery that is performed at adeeper level away from the nerves. Some contribution to chronic pain may be due to the mesh, which can be embedded in a dense collagenous reaction with shrinkage. This cause tissue tension and rigidity.(1)

Nerve injury during laparoscopic repair can occur during the tacking of the mesh to the anterior abdominal wall. Tacks should be avoided in the known areas of nerve structures. Some surgeons prefer to not place any tacking staples at all when performing laparoscopic herniorraphy to avoid this complication altogether.(4)

Since the evoluation of laparoscopic inguinal hernia repair, TEP is the technique most commonly employed by laparoscopic surgeons. This technique involves placement of polypropylene mesh in the preperitoneal space. The issue of fixation of the mesh remains unresolved in TEP inguinal hernia repair. Surgeons have previously fixed the mesh using laparoscopic stapling devices, tacks, suturing techniques and recently adhesives. Fixation of mesh is done to prevent migration of mesh resulting in recurrence but many studies showed without fixation of mesh is not associated with any increased risk of hernia recurrence and however fixing the mesh not only increases the cost and duration of procedure but also can cause complication like post operative pain.(5)

3. Method/Approach

This is the observational study done at Surat Municipal Institute of Medical Education and Research, Surat in Department of General Surgery in time period from June2016 to June 2017.

Inclusion Criteria

- Patients age between 18 to 70 yrs
- Patients willing for laparoscopic surgery
- Patients suitable for elective laparoscopic surgery

Exclusion Criteria

- Age <16yrs
- High anaesthetic risk
- Any medical contraindication for surgery
- Patients having asthma or any lung disorder

A total of 108 patients with symptomatic inguinal hernia were operated by laparoscopic TAPP or TEP. In 54 patients, mesh fixation was done and in other 54 patients reapir done without mesh fixation. All these patients were observed for post operative complications.

4. Results

In our study, 108 patients with inguinal hernia were operated. All were operated with laparoscopic technique either TEP or TAPP. In half patients repair done with mesh fixation and in other half patients mrepair done without mesh fixation.

Age and sex distribution of the patients of LAPAROSCOPIC TAPP or TEP repair is depicted in table no 1

Age Group Wise Distribution of Study Sample			
Age Group	Male	Female	Total
15 to 25	13	1	14
25 to 35	26	2	28
35 to 45	18	2	20
45 to 55	18	2	20
55 to 65	17	1	18
>65	8	0	8
Total	100	8	108

Table 2: For comparison of bilateral and unilateral hernia operated in this study

		Frequency	Percent	Valid Percent
	U/L	68	63.0	63.0
	B/L	40	37.0	37.0
	Total	108	100.0	100.0

Table 3: Showing frequency of LAP, TAPP and TEP hernia repair

NAME		Frequency	Percent
	TAPP	63	58.3
	TEP	45	41.7
	Total	108	100.0

Table 4: Showing number of cases in fixation group and without fixation group

Laparoscopic repair		Frequency	Percent
	With fixation	54	50.0
	Without fixation	54	50.0
	Total	108	100.0

Table 5: Showing proportion of side of hernia in both study group

		fixation		Total
		With fixation	Without fixation	
Blul	U/L	40	28	68
	B/L	14	26	40
Total		54	54	108

The chi-square statistic is 5.7176. The p-value is .016795. The result is significant at $p < .05$.

Table 6: Showing difference of pain score in with fixation and without fixation group at 1 month period

		fixation		Total
		With fixation	Without fixation	
pain1m	Less pain(score 1,2)	2	10	12
	More pain(score 3,4)	52	44	96
Total		54	54	108

The chi-square statistic is 6. The p-value is .014306. The result is significant at $p < .05$.so there is no major significant difference in pain at 1 month after operation in both the group.

Table 7: Showing difference of pain score in with fixation and without fixation group 3 month period

		fixation		Total
		With fixation	Without fixation	
Pain at 3 month	less pain (score 1,2)	41	53	94
	more pain(score 3,4)	13	1	14
Total		54	54	108

Pain intensity had been assessed by a visual analogue scale - VAS (0 (no pain) to 10 (worst pain)). The visual analogue scale (VAS) is a subjective measure of pain. It consists of a 10cm line with two end- points representing 'no pain' and 'worst pain imaginable'. Patients are asked to rate their pain by placing a mark on the line corresponding to their current level of pain. The distance along the line from the 'no pain' marker is then measured with a ruler giving a pain score out of 10. The score can be used as a baseline assessment of pain with follow-up measures providing an indication of whether pain is reducing or not.

The chi-square statistic is 11.8176. The p-value is .000587. The result is significant at $p < .05$.

So from above results, pain at 3 month is more in fixation group compare to non fixation group.

Table 8: Showing Recurrence of Inguinal Hernia in Fixation and Without Fixation Group

		Fixation		
		With fixation	Without fixation	Total
Recurrence	yes	6	5	11
	no	48	49	97
Total		54	54	108

Recurrence was higher among patient having mesh fixation and it was not statistically significant.(The chi-square statistic is 0.1012. The p-value is .750372. The result is not significant at $p < .05$.)

Table 9: Showing Cost in Fixation and without Fixation Group

		fixation		
		With fixation	Without fixation	Total
cost	High cost	52	3	55
	Low cost	2	51	53
Total		54	54	108

The cost was higher among mesh fixation group and it was statistically significant. The chi-square statistic is 88.9564. The p-value is < .00001. The result is significant at $p < .05$.

Table 10: Showing post operative narcotic used time in day in fixation and without fixation group

		fixation	
		With fixation	Without fixation
post operative day of narcotic drug requirement	less than 2	53	49
	more than 2	50	5

Post operative day of narcotic drug requirement was higher among without fixation group and it was statistically significant. The chi-square statistic is 75.0257. The p-value is < .00001. The result is significant at $p < .05$

Table 11: Showing Duration of Hospital Stay in Fixation and Without Fixation Group

		Fixation		Total
		With fixation	Without fixation	
duration of hospital stay in day	less than 3	5	49	54
	more than 3	49	5	54
Total		54	54	108

Patient having been operated without fixation experienced less duration of hospital stay and it was statistically significant. The chi-square statistic is 71.7037. The p-value is < .00001. The result is significant at $p < .05$.

Mean Pain Score at 1 month and 3 month in both groups and there association

Pain Score	With Fixation	Without Fixation	P value
1 Month (Mean ± SD)	3.74 ± 0.62	2.93 ± 0.54	<0.0001
3 Month (Mean ± SD)	1.74 ± 0.87	1.33 ± 0.51	<0.005

Mean pain score was higher among mesh fixation group at both 1 month and 3 month and it was found statistically significant. (SE mean and Z test was applied)

5. Discussion

Inguinal hernias are the most common type of hernia. The incidence is about 25% in males and 2% in females. Inguinal hernia repair contributes significantly to general surgeon's workload.

Since the evolution of laparoscopic inguinal hernia repair, total extra-peritoneal repair (TEP) is the technique most commonly employed by laparoscopic surgeons. This technique involves placement of polypropylene mesh in the pre-peritoneal space. The issue of fixation of the mesh remains unresolved in TEP inguinal hernia repair. Surgeons have previously fixed the mesh using laparoscopic stapling devices, tacks, suturing techniques and recently adhesives. Fixation of mesh is done to prevent migration of mesh resulting in recurrence but many studies showed without fixation of mesh is not associated with any increased risk of hernia recurrence and however fixing the mesh not only increases the cost and duration of procedure but also can cause complications like post-operative pain.(5)

Pain at 1 Month and 3 Month

In **C. M. P. Claus & G. M. Rocha** (6) study ,patients were observed at 6 month of follow up. In which there is no significant difference in both the group after 6 month.

In **Raghu Rami Reddy S., Girish T. U., Sharath Chandra B. J (7),** The postoperative pain scores are analyzed and compared by visual analogue scale at 24hrs, 1 week, and 1 month in both groups. The median VAS score at postoperative day 1 in without fixation of mesh group was 2 compared to 4, mesh fixation group . This difference was statistically significant (4 versus 2, p value <0.0001).the median vas score at 1 month interval in without fixation group was 1 compared to 3 in mesh fixation group.

In Scholars Journal of Applied Medical Sciences (SJAMS), Dr. Ashwani Gupta study (8)

Post-operative pain and severity of pain was assessed using a visual analogue pain scale with a scale of 0 to 10. A statistically significant reduction of painscores post operatively at 24 hours (p- value =0.003), 1 week (p- value =0.007), 1 month (p- value=0.001), 3 months (p-value=0.001) and 6 months (p- value=0.007) were noted in group1 with fixation as comparable to without fixation group 2.

Pain score at follow Ups	Group 1 (mean + SD)	Group 2 (mean + SD)	p-value
At 24 hrs	3.63 + 1.29	2.33 + 0.99	0.003*
1 week	2.33 + 1.84	1.2 + 0.76	0.007*
1 month	1.66 + 0.88	0.56 + 0.56	<.001*
3 month	1.16 + 069	0.26 + 0.44	<.001*
6 month	0.9 + 0.66	0.26 + 0.44	0.007*

*Significant p-value

In taylor study (9)
A new groin pain (all severities) that persisted beyond the initial postoperative period was reported by 38 versus 23% for herniae repaired with fixation versus nonfixation, respectively ($p = 0.0003$). This pain was reportedly felt at least once per week in 22% of patients in the fixation group versus 15% in the nonfixation group ($p = 0.049$), and experienced several times per week in 16% with fixation compared to 8% without fixation ($p = 0.009$). Pain that was moderate or severe (interfering with leisure or occupational activities) was experienced by 2% of fixated repairs, but not reported by any patient with unfixated mesh ($p = 0.06$).

Incidence of new and persistent groin pain

	Fixation	No fixation	*p* value
Any new pain	38%	23%	0.0003
Pain score ≥2	22%	15%	0.049
≥3	16%	8%	0.009
≥4	2%	Nil	0.06

In Garg P, Nair S, Shereef M, Thakur JD, Nain N, Menon GR, et al. (10)

The pain scoring was done on a scale from 1 to 5, with 1 meaning no pain and 5 meaning unbearable pain. The scale was divided into 5 categories: no pain (1), mild (2), moderate (3), severe (4) and intolerable pain (5). Postoperative pain parameters

	Fix (n = 48/90 hernias)	Nonfix (n = 52/96 hernias)	P
Pain score 24 h	1.31 ± 0.4	1.42 ± 0.5	0.23 (ns)
Pain score 1 week	1.25 ± 0.5	1.34 ± 0.6	0.42 (ns)
Pain score 1 month	1.06 ± 0.2	1.17 ± 0.4	0.12 (ns)
Pain score 1 year	1.04 ± 0.2	1.13 ± 0.4	0.11 (ns)
Pain score 2 year	1.03 ± 0.2	1	0.17 (ns)

The mean pain scores at 1 week (Fix, 1.25 ± 0.5; Nonfix, 1.34 ± 0.6, $P = 0.42$) and 1 month (Fix, 1.06 ± 0.2; Nonfix, 1.17 ± 0.4, $P = 0.12$) were not significantly different for both groups

In our study, we observed post operative pain at 1 month and 3 month by using visual analogue scale. Pain intensity had been assessed by a visual analogue scale - VAS (0 (no pain) to 10 (worst pain)). The visual analogue scale (VAS) is a subjective measure of pain. It consists of a 10cm line with two end- points representing 'no pain' and 'worst pain imaginable'. Patients are asked to rate their pain by placing a mark on the line corresponding to their current level of pain. The distance along the line from the 'no pain' marker is then measured with a ruler giving a pain score out of 10. The score can be used as a baseline assessment of pain with follow-up measures providing an indication of whether pain is reducing or not.

There is no significant difference in pain after 1 month in patients of both the group.(without fixation and with fixation group)
After 3 months, there are 41 patients with less pain(vas score <2) and 13 patients with more pain(vas score>2) in with fixation group. And there are 53 patients with less pain(vas score <2) and 1 patients with more pain(vas score>2) in without fixation group.

From above results,pain at 3 month is more in fixation group compare to non fixation group.

Recurrence
In our study ,in fixation group there are 6 cases out of 54 who developed recurrence of hernia and in without fixation group there are 5 caese out of 54 who developed recurrence at 3 month.

In **C. M. P. Claus & G. M. Rocha**(6) study ,There is no significant difference in recurrence rate in both the group.hernia recurrence is considered as mesh displacement.

In **Raghu Rami Reddy S., Girish T. U., Sharath Chandra B. J,(7)**

In the present study none of the study groups had recurrence similar to the study conducted by Taylor C et al in which without fixation of mesh in TEP repair was not associated with an increased risk of hernia recurrence and also in the study done by Koch CA et al and Tam KW et al where there is no recurrence in any of the groups.

In Scholars Journal of Applied Medical Sciences (SJAMS), Dr. Ashwani Gupta study,(8)
Recurrence within 1 month is 1(3%) in without fixation group out of 30 patients and 1(3%) in with fixation group out of 30 patients. And after 1 month, no recurrence observed till 6 month. P value is 1 which is insignificant so there is no major difference in recurrence in both the group.

In taylor study,(9)
There was one recurrence in the fixated group (1/247) whilst none have yet occurred in the unfixated group. One recurrence has thus far been detected after six months (0.2%). This was confirmed by laparoscopy to be a lateral recurrence associated with infolded mesh in a patient in the mesh fixation group, and re-repaired using a laparoscopic transabdominal approach (a 2 cm indirect defect had been

repaired with mesh fixated by eight tacks). No recurrent hernias have yet been observed in the nonfixation group.

In Garg P, Nair S, Shereef M, Thakur JD, Nain N, Menon GR, et al .(10)
Follow up after 2 years observed in which,there is no recurrence in any of the patients. So there is no increase in risk for both groups either fixation or without fixation group.

6. Conclusion

- There is no significant difference in recurrence rate in the both study group either with fixation or without fixation.
- There is no significant difference in pain at one month in the both study group either with fixation or without fixation.
- There is more pain (visual analogue scale more than 2) at three month after operation in fixation group as compared to without fixation group.
- There is also high cost in fixation group compared to without fixation group.
- Duration of hospital stay in fixation group is also more(more than 3 days) compare to without fixation group in which duration of hospital satay is less than 3 day.
- Post operative narcotic analgesic requirement is high (more than 2 days) in fixation group as compared to without fixation group(less than 2 days).

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