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Starting Laparoscopic Inguinal Hernia in a Tertiary Hospital of a Developing Country

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Abstract

Introduction: Transabdominal preperitoneal (TAPP) and Total extraperitoneal (TEP) are preferred choices of inguinal hernia repair. This study aims to find incidence of acute and chronic post-operative pain, operative time, learning curve and incidence of intra-operative and post-operative complications. **Methods:** This prospective observational,analytical, cohort hospital based study was conducted from December 2015- November 2018 in 152 adult patients aged 18-80 years. **Results:**TAPP was done in 177 inguinal hernias of 152 patients. Pain was significantly less at 48 hours post-operative(p=0.00).Pain was less in patients managed with light weight mesh (LWM) than with polypropylene (PP) mesh (p=0.00). There was no difference in pain when PP mesh was compared to 3D mesh (p=0.5) and LWM compared to 3D mesh (p=0.47). There was no difference in pain based on type of tackers used (p=0.47). The operative time averaged 65.72 minutes. A significant reduction in operative time was noted after first 50 number of cases (p=0.00).The intra-operative complications included injury to inferior epigastric artery and vas deferens in 2(1.12%) patients each. The post-operative complications were pneumoscrotom in 12(6.77%), seroma in 8(4.91%), cord induration in 1(0.56%), port site hematoma in 1(0.56%), mesh infection in 1(0.56%), recurrence in 1(0.56%) and inguinodynia in 12(7.89%) cases. **Conclusions:**TAPP is associated with less acute and chronic post-operative pain. The operative time is longer than past studies and learning curve is shorter than previous studies. The various intra and post-operative complications are similar to other studies.

Keywords: complications; hernia, inguinal; pain; TAPP; TEP.

Introduction

The inguinal hernias (IH) are the most common operation, performed by general surgeon. It can be performed laparoscopically by Transabdominal preperitoneal (TAPP) or Total extraperitoneal (TEP) approach. In contrast to open mesh repair of IH laparoscopic repair is associated with decreased acute and chronic pain, less recurrence and early recovery. This is the reason why the surgeons prefer minimal invasive repair of IH over the open mesh repair.

The main aim of this study is to find the acute and chronic post-operative pain, operative time, evaluation of learning curve and to find out the incidences of various intra-operative and post-operative complications in a tertiary care hospital.

Methods

This prospective observational, analytical, cohort hospital based study was conducted in the Department of Surgery of Manipal Teaching Hospital Unit –I from December 2015- November 2018. The study was performed after approval from the Institutional Review Board and taking written, informed consent. The patients 18-80 years with a primary, unilateral/bilateral, reducible and irreducible inguinal hernia who were able to tolerate pneumoperitoneum and consented to

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undergo a laparoscopic repair of inguinal hernia (IH) were included in the study. The patients with heart, liver and lung dysfunction, and those who would not tolerate pneumoperitoneum, American Society of Anesthesiologist(ASA) physical status of 3 or more, pregnant women and those patients who did not give consent for laparoscopic repair of IH were excluded from the study.

Considering the life-time prevalence rate of 25% for inguinal hernia; with 95% confidence interval and 7% allowable error, sample size was calculated using following formula:

$n = Z^2(p \times q)/d^2$

$= 1.96^2 \times (0.25 \times 0.75)/0.07^2$

$= 150$

where,

n = sample size

p = prevalence of hernia (i.e. 25%)

q = 1-p

d = margin of error (i.e. 7%)

z = 1.96 at 95% CI

The minimum sample size required was 150, total of 152 cases were taken into the study.

Operative technique

All the cases were done under general anesthesia. The patients were kept in supine position with bilateral arms tucked by the side of body. Once the patients were intubated, catheterization was done. The 10mm trocar was introduced in supra umbilical area. Two additional trocars were placed on either side at the level of umbilicus on the lateral border of rectus abdominus muscle under direct vision. The patients were then placed in the trendelenburg position with lateral tilt contralateral to hernia site such that bowel fell away from pelvis, providing excellent access. A 30˚telescope was used to inspect the inguinal region for diagnosis and to see for occult hernia. The peritoneal flap was created approximately 4cm above the superior edge of defect, extending from anterior superior iliac spine to median umbilical ligament. Peritoneal flap was created using blunt and sharp dissection. Lateral, medial and central dissection were completed by skeletonizing the cord structures. The sac of direct hernia was reduced from hernia orifice by gentle traction and counter-traction. The sac of bubonocele and funicular hernias were mobilized from cord structure and reduced to peritoneal cavity. In cases of complete hernia and hernias with large sac with dense adhesion between the sac and cord structure, the sac was divided distal to deep ring leaving rest of the sac in situ.A mesh of 15X10 cm was introduced from the supra-umbilical port and placed over myopectineal orifice covering direct, indirect and femoral spaces. The mesh was fixed with absorbable and non-absorbable tacks. The mesh was fixed with 6-12 tacks and peritoneum closed. All the surgeries were done by first author with the experience in laparoscopic surgery of over three years to avoid inter-individual bias while calculating the learning curve. The post-operative pain was rated by Visual analogue scale (VAS); where zero means no pain and 10 means the worst possible pain one can tolerate. Pain scoring was done 24 hours and 48 hours post-operative by the other authors. The post-operative analgesia was provided with Injection Paracetamol 1 gm iv tds and injection Ketorolac 30 mg iv tds until first post-operative day. We collected the data including age, sex, type of hernia, type of mesh used, type of tackers used, operative time and intra-operative complications as injury to inferior epigastric vessels and vas deferens.Post-operatively VAS score was recorded and post-operative complications as pneumoscrotom, seroma, cord in duration, port site hematoma, mesh infection, recurrence and inguinodynia were also noted. The duration of hospital stay was recorded. All the patients were followed-up for a duration of 6 months and the pain that persisted upto 6 months was defined as chronic pain. The operative time was defined as the time from skin incision to the application of last stapler.

The statistical analysis was carried out using statistical package for social sciences (SPSS Inc, Chicago, IL version 21.0 for windows). All parametric data were expressed as mean ±standard deviation and non-parametric data expressed as median and inter-quartile range. Categorical data were compared by Chi- square or Fischer exact test whichever was applicable. Independent t test was used for analysis of difference in pain score and the type of mesh used and learning curve was evaluated using one way ANOVA. P value $\leq$ 0.05 was considered statistically significant.

Results

Transabdominal preperitoneal (TAPP) repair was done in 177 hernias (152 patients).Visual Analogue Scale(VAS)Score for pain was significantly less at 48 hours post-operative (Table 1).

Table 1:Post-operative VAS Score.

VAS at 24 hour	VAS at 48 hour	p Value
5.07 ± 1.54	3.20 ± 1.2	0.00

VAS: Visual Analogue Scale Score

There was less pain in patients whose hernias were repaired using light weight mesh (LWM) when compared with polypropylene (PP) mesh at both 24 and 48 hours post-operative. There was no difference in pain score when PP mesh was compared to 3D mesh and LWM compared to 3D mesh (Table 2).

Table 2:Pain score and the types of mesh used.

Type of Mesh kept	VAS at 24 hour	p Value	VAS at 48 hour	p Value
Prolypropylene (PP) mesh	5.48 ± 1.26	0.002*	3.49 ± 0.99	0.00*
Light weight mesh (LWM)	4.70 ± 1.66	0.48†	2.93 ± 1.29	0.58†
3D mesh	5.08 ± 1.83	0.51‡	3.25 ± 1.42	0.47‡,

VAS: Visual Analogue Scale Score, *PP mesh vs. LWM, †PP mesh vs. 3D mesh, ‡LWM vs. 3D mesh

Likewise, there was no difference in pain score whether absorbable or non- absorbable tackers were used (Table 3).

Table 3:Pain score vs. use of absorbable or non- absorbable tackers.

VAS at 24 hour	Absorbable Tackers	Non- Absorbable Tackers	p Value
1	0 (0.0%)	2(1.5%)	
2	1(5.6%)	2(1.5%)	
3	2 (11.1%)	21(15.7%)	
4	4(22.2%)	17(12.7%)	0.47
5	6(33.3%)	39(29.1%)	
6	4(22.2%)	28(20.9%)	
7	0(0.0%)	15(11.2%)	
8	1(5.6%)	10(7.5%)	
VAS at 48 hour			
0	0 (0.0%)	1(0.7%)	
1	0 (0.0%)	6(4.5%)	
2	8(44.4%)	33(24.6%)	
3	4(22.2%)	39(29.1%)	0.15
4	6(33.3%)	35(26.1%)	
5	0 (0.0%)	14(10.4%)	
6	0 (0.0%)	6(4.5%)	

VAS: Visual Analogue Scale Score

The operative time averaged 65.52±33.85 minutes (Range25–180 minutes)and none of the cases were converted to open surgery. There was significant reduction in operative time after first 50 number of cases (Table 4).

Table 4:Learning curve.

Number of Cases	Duration of Surgery	p Value
1 – 50 cases	81.90 ± 41.62	
51- 102 cases	56.80 ± 28.65	0.00
103- 152 cases	58.20 ± 23.29	

The intra-operative complications included injury to inferior epigastric vessels in two (1.12%) patients and injury to vas deferens was in two (1.12%) patients. The post-operative complications were pneumoscrotom 12 patients (6.77%), seroma in eight patients (4.91%), cord induration and port site hematoma in one patient each (1.12%), mesh infection/abscess in one (0.56%) patient and recurrence in one (0.56%) patient. A total of 12 patients (7.89%) complained of inguinodynia on follow up period of 6 months.The mean hospital stay following laparoscopic repair of hernia was 2 days. Varieties of unilateral and bilateral inguinal hernia that had undergone surgeries are shown in (Table 5 and Table 6). The demographic variables of the patients are shown in (Figure 1). Out of 152 patients, 10 were females in whom inguinal hernia was predominant.

Table 5:Cases of bilateral inguinal hernias.

Types of bilateral hernia	Number of patients	Mixed type of bilateral inguinal hernia	Number of patients
Bilateral Direct Inguinal Hernia	14	RIIH Funicular + LDIH	1
Bilateral Indirect Inguinal Hernia	2	Right recurrent inguinal hernia + LDIH	1
Bilateral Pantaloons Hernia	2	RIIH Bubonocele + Left recurrent inguinal hernia	1
Bilateral Femoral Hernia	1	RDIH + Left recurrent inguinal hernia	1
Bilateral Recurrent Hernia	1	RDIH + LIIH Bubonocele	1
Total	20	Total	5

RIIH (Right indirect inguinal hernia), LIIH (Left indirect inguinal hernia), RDIH (Right direct inguinal hernia), LDIH (Left direct inguinal hernia)

Table 6: Cases of unilateral inguinal hernias.

Types of right inguinal hernia	Number of patients	Types of left inguinal hernia	Number of patients
RDIH	15	LDIH	7
RIIH Bubonocele	5	LIIH Bubonocele	10
RIIH Funicular	30	LIIH Funicular	23
RIIH Complete	13	LIIH Complete	9
RightPantaloons	2	LeftPantaloons	1
RightRecurrent	3	LeftRecurrent	0
Right Irreducible	4	LeftIrreducible	1
Right Femoral	2	Left Femoral	2
Total	74	Total	53

RIIH (Right indirect inguinal hernia), LIIH (Left indirect inguinal hernia), RDIH (Right direct inguinal hernia), LDIH (Left direct inguinal hernia)

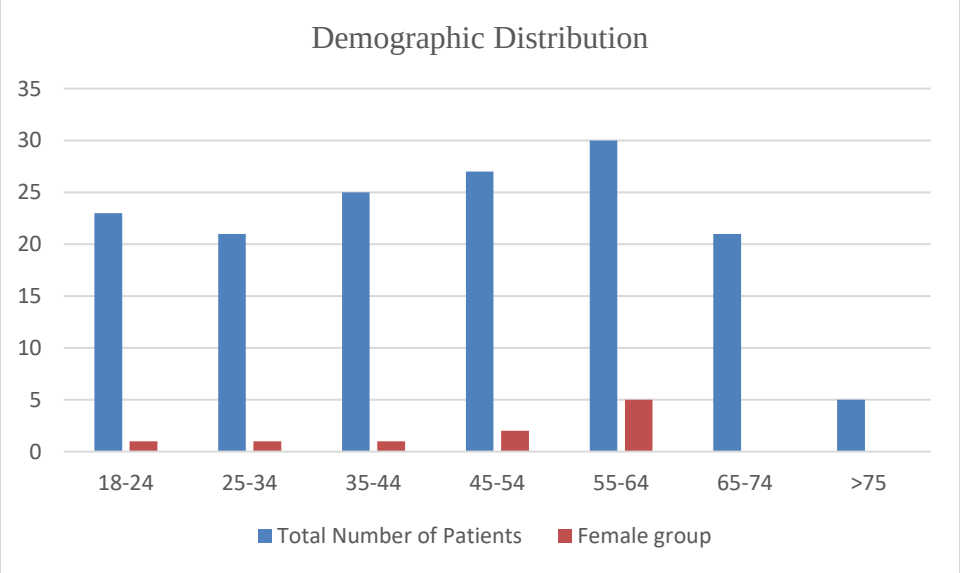

Fig 1:Age and sex distribution with respect to inguinal hernias.

Discussion

The repair of inguinal hernia (IH) is the most commonly performed elective operation in general surgery. Transabdominal preperitoneal (TAPP) and Total extraperitoneal (TEP) are widely used for laparoscopic repair of IH. The advantages of laparoscopic repair are decreased incidence of post-operative pain, chronic pain, recurrence and early recovery. The disadvantages include increased cost, steeper learning curve and frequent complications during early phase of surgeon's training [1-2].Laparoscopic IH repair is associated with less post-operative pain.Our findings of decreased post-operative pain at 48 hours (3.20 ± 1.2) is comparable to the findings of Shakya et al (2.8±1.1)[1].Post-operative pain was less in patients whose hernia was repaired with light weight mesh (LWM) when compared with polypropylene and 3 D mesh. It is because heavy propylene non-absorbable mesh results in intense inflammatory reaction and scar formation than light propylene or partially absorbable variant. This has been confirmed by past studies where LWM resulted in less post-operative pain [1-8].

In our study, there was no difference in postoperative pain whether non - absorbable or absorbable tackers were used. This can be explained on the basis of past study which has shown that there might be no difference in the pain score for the first 6 months, however by one year when the absorbale tacks are completely absorbed there is significant decline in pain [9].Laparoscopic IH repair takes longer than open mesh repair. In a metanalysis published by Schmidt et al. involving 34 trials the average operating time of 65.7 minute is comparable to our study [10].However, the mean operative time (65.52 ± 33.85 minutes) in our study seems longer than other studies. The operative time of Cui et al was (48.42 ± 13.81) but these cases were done in the age group of 13-18 years [11].Kapiris et al have reported their operative time as 40 (IQR 30-50) and Smith et al have reported mean operative time as 30 minutes [12-13].This might be due to early experience of the surgeon in TAPP in this study. However, after performing first 50 cases, the operative time has reduced significantly in contrast to the evidence that learning curve of laparoscopic IH repair ranges from 200-300 cases [4].Chronic pain at 6 months following Lichtenstein repair has been reported to be as high as 39.4 % by Manangi et al. This is probably the reason why surgeons these days prefer minimal invasive repair of IH[14]. The incidence of chronic pain was 6.89% in our study which is in accordance with past studies (1-28.7%) [15-16].In the intra-operative period the complications that occurred were injury to vas deferens and inferior epigastric artery. The injury to vas deferens after open repair have been reported to be 0.1-0.53% [17].However, its occurrence in laparoscopic surgery is uncommon. Furtado et al in their study have reported the incidence of 0.3 % which is much lower as compared to our study[1]. In our study, vas deferens was injured in two (1.12%) patients and both of them had undergone retro-pubic prostatectomy in past placing them at an increased risk. The inferior epigastric artery was injured in two (1.12%) cases which is comparable to that mentioned in the literature (i.e.0.2-2%) [18].This complication was managed by suturing in one case and application of clip on the other. The pneumoscrotom was the most frequent complications noted in our study (12 patients; 6.77%). It subsided on its own within 24 hours. The incidence is less than the findings of Shakya et al [4].

Seroma is the most common post-operative complications following repair of IH with the incidence ranging from 0.5-15%. The incidence of 4.91% was observed in our study which is as per the findings of the past [12, 13, 19-20].The patients in our study who developed seroma were managed with aspirations and watchful waiting for a period of 2-3 weeks. The recurrence rate of 0.56% was observed in our study which is much lower than that mentioned in the literature (i.e. 0.6-5%) [1, 13,17]. Recurrence had occurred in the patient with chronic cough and Benign Enlargement of Prostrate (BEP) or else it would have been nil. The reason for low recurrence rate in our study is probably due to use of proper sized mesh. The incidence of mesh infection is poorly reported which is mostly due to lack of concrete definitions. The incidence as high as 10% has been reported with the use of polytetrafluroethylene (PTFE) mesh. However this value cannot be generalized for other types of mesh used and the incidence of infection in polypropylene mesh, LWM and 3D mesh is less as compared to PTFE mesh and those were the meshes used in our study [21].This complication was present in one(0.56%) patient which was managed by drainage and antibiotics. Likewise we had other minor complications as port site hematoma and cord in duration which had self-resolution.

Conclusion

Transabdominal preperitoneal repair of inguinal hernia is associated with less acute and chronic post-operative pain. The operative time is longer than past studies however the learning curve is shorter than the previous studies. The various intra-operative and post-operative complications are comparable to other studies.

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