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Article received on:

27/12/2017

Accepted for publication:

20/06/2018

Received after proof reading:

06/11/2018

INTRODUCTION

Inguinal hernia surgeries are among the commonest procedures done by the general surgeons around the world.¹ Although with the mesh repairs, the incidence of recurrence has fallen from 40% to nearly 0.1% to 8.3%. It still remains a major source of morbidity and concern for patients as well as surgeons.^{2,3} There has been a gradual evolution of surgical techniques in an attempt to improve the quality of life and prevent recurrences, with progress accompanying technological leaps like the development of implantable meshes leading to the Lichtenstein repair overtaking earlier forms progressing to introduction of minimally invasive surgery. Over the last few years Totally Extraperitoneal (TEP) Hernia Repair for inguinal hernia has gained importance

EXTRAPERITONIAL HERNIA REPAIR; TELESCOPIC TOTALLY EXTRAPERITONIAL HERNIA REPAIR – A LEARNING CURVE PERSPECTIVE

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ABSTRACT... Objectives: To explore the learning curve associated with laparoscopic totally extraperitoneal repair of inguinal hernia, procedure being carried out by single surgeon at tertiary care hospital. **Study Design:** Prospective cohort. **Place and Duration:** It was conducted at Shifa International Hospital Islamabad from October 2014 to March 2016. **Patients and Methods:** Consecutive patients undergoing Laparoscopic TEP repair for unilateral or bilateral inguinal hernia from October 2014 to March 2016 were included in the study and divided in two groups: group 1 of first 50 and group 2 consisting of the next 50 patients. **Results:** A total of 100 patients divided in two groups (50 in each) were included in the study. Group I included first 1 to 50 cases with mean age of 46.6 years (SD +14.81) including 46 (92%) male and 4 (8%) female with similar distribution in group II which consisted of 51 to 100 cases with mean age 45.3 years (SD +14.43) including 44 (88%) male and 6 (12%) female. The mean operative time in group I was 78 min (SD +32.30) while in group II the mean operative time was 41.2 minutes (SD+15.99). **Conclusion:** Although our results are from single centre and single surgeon study, we believe that at least 20 to 30 laparoscopic TEP hernia operations are required to help young surgeon familiarize with the anatomy of the region. The learning curve for TEP according to our study is 50 cases.

Key words: Hernia, Inguinal, Laparoscopic, Extraperitoneal, TEP.

Article Citation: Aziz W, Siddiq G, Khizar S, Choudry UK, Haider MI, Vaqar S, Sattar F. Extraperitoneal hernia repair; telescopic totally extraperitoneal hernia repair – a learning curve perspective. Professional Med J 2018; 25(11):1627-1632. DOI:10.29309/TPMJ/18.4608

as new minimally invasive technique with short hospital stay and early recovery.^{5,6} Multiple studies conducted locally and internationally have reported favourable results with TEP repair with low post-operative pain score and shorter hospital stay.⁴⁻⁷

Laparoscopic TEP has become new standard technique for unilateral, bilateral and recurrent inguinal hernias.⁸ There are two variants of TEP procedure, differing in the method of dissection for pre-peritoneal space comprising of balloon dissection and telescopic dissection, with very few studies on latter.

With the growth of global laparoscopic proficiency the trend of TEP is catching on^{2,14} exploration of the

associated learning curve in an institution where the procedure has been recently introduced will help guide training for future general surgeon and help compare learning dynamics of telescopic dissection when compared to balloon assisted repair. Although some data is available on the learning curve of TEP however reconfirmation of the learning curve for telescopic procedures will add to the collective understanding of the surgical community. Over last few years we have been performing laparoscopic TEP hernia repair in our institute with good results. It is becoming a common procedure, yet still, no local data is available on the learning curve, success/recurrence rate. This article is a prospective analysis of patients undergoing Laparoscopic TEP repair for inguinal hernia at our institute under one surgeon, in order to assess the learning curve involved in the procedure using the balloon free technique. This study presents data from large number of patients as compared to previous local studies.

MATERIALS AND METHODS

We conducted a prospective cohort study which included all consecutive patients undergoing Laparoscopic TEP repair for unilateral or bilateral inguinal hernia from October 2014 to March 2016 and divided in two groups: group 1 of first 50 and group 2 consisting of the next consecutive 50 patients. The technique used for TEP repair is described later. At our institute, instead of the balloon dissection we used telescope for the same purpose; saving approximately Pkr17000 (cost of the balloon).

The patient data was collected and comparison in terms of operative time, rate of complications, post operative pain, hospital stay and recurrence was made between these two groups at the time of the surgery and at 6 months post operatively. The recurrence was defined as any reducible swelling in the region of surgery which recurred within the first 6 months after the surgery. Post op pain was assessed by using visual analogue scale during the immediate post op period. Data was extracted from using a self-designed questionnaire and analysed using SPSS software 20.0. After accounting for differences

like bilateral concomitant cases the averages of the two halves were compared to assess any significant improvements in three specific areas: complication rates, conversion to open rates and mean operative time.

PATIENTS SELECTION CRITERIA

All consenting patients operated using elective Laparoscopic TEP technique were included regardless of age, gender or outcomes. Patients with history of past hernia repair, associated abnormalities like collagen disorders, any hernia other than inguinal and those with strangulated hernias were excluded from the study to remove all the confounders.

OPERATIVE TECHNIQUE

Patient was placed in supine position, prepared and draped in usual sterile fashion after induction of general anaesthesia and urinary catheterization. A 1.5 cm transverse incision was made in the infra umbilical region and subcutaneous tissue was dissected down to the rectus sheath. Two anchoring stitches with Vicryl 2/0 were taken on either side of the midline and the rectus sheath was incised. Following this the rectus muscle was separated and a space was created with blunt finger dissection. After creating the space, Hasson Trocar was introduced and anchored in place using the above mentioned Vicryl stitches. At this stage Carbon Dioxide insufflation was done to a pressure of 12-15 mmHg. The remaining dissection was carried out using a 30 degree laparoscope with gentle side to side movements down to the symphysis pubis.

At this stage the inferior epigastric vessels were clearly identified and the space of Retzius was expanded. We then placed two 5 mm ports under direct vision between the umbilicus and symphysis pubis. The hernia defect was then identified and the hernia sac was dissected off the cord structures in case of an indirect hernia, while it was peeled off the anterior abdominal wall defect in case of a direct hernia or both in case of combined hernias. Once dissection was completed and an appropriate space was created and a polypropylene mesh measuring 10 by 15 cm was introduced from the 10 mm port and fixed

in place using a metallic tacker while making sure there was sufficient overlap.

An 18 French drain was then placed in the preperitoneal space and anchored with silk 1 sutures. After desufflation the trocars were removed and fascial closure was applied to the infraumbilical incision. Skin closure was achieved with surgical clips and aseptic dressing was applied.

In case of conversion to open a standard Lichtenstein tension free repair using adequate sized mesh was done.

The data collected was analysed using SPSS software (IBM version 20) and statistical analysis was done. Univariate analysis was performed to identify the potential difference between the two groups and Chi Square test (with CI 95%) was applied. A p value less than 0.05 was considered to be significant.

RESULTS

After taking approval from the ethical committee, a total of 100 patients divided in two groups (50 in each) were included in the study. Group I included first 1 to 50 cases with mean age of 46.6 years (SD +14.81) including 46 (92%) male and 4 (8%) female with similar distribution in group II which consisted of 51 to 100 cases with mean age 45.3 years (SD +14.43) including 44 (88%) male and 6 (12%) female (p value 0.43). Right sided hernia

was seen more frequently in both groups followed by bilateral hernias. In both groups the operative time was divided in two three sets: 60 minutes, between 60 and 120 minutes and between 120 to 180 minutes. However the overall mean operative time in group I was 78 min (SD +32.30) while in group II the mean operative time was 41.2 minutes (SD+15.99) as shown in Table-I. The p value was calculated to be <0.05 in comparison of the two groups in terms of the operative time. Conversion to open was necessitated in 2 cases in group I due to dense adhesions, difficult anatomy and difficult land marks.

The main complication seen (Table-II) was formation of a seroma in both groups, (in two out of first 10 cases in group I and one in group II); in all patients it was aspirated in clinic setting and settled within 2 weeks. There was no mortality and all patients were discharged on 1st postoperative day. The mean pain score in group I was 5 (+3.1) while in group II it was 3 (+2.4) on first postoperative day. Recurrence was observed in 2 patients at 6 months after surgery in group I, both on the right side (one had undergone repair for bilateral hernias), in one open mesh repair was done and other was lost to follow up, none was observed in group II. Our results indicate a significant improvement in the application of telescopic hernia repair in general population. With regular utilization of this technique, it will become the mainstay of treatment for inguinal hernia given its cost effectiveness.

Location	Group I			Group II			p value
	Operative time			Operative time			
	60	60-120	120-180	60	60-120	120-180	
Mean time	45+9.3	83+ 11.5	145+ 15	24+17.2	64+8.6	0	
Right	3 (6%)	23 (46%)	3 (6%)	19 (38%)	8 (16%)	-	
Left	1 (2%)	5 (10%)	0	4 (8%)	3 (6%)	-	
Bilateral	3 (6%)	6 (12%)	6 (12%)	10 (20%)	6 (12%)	-	
Total	7 (14%)	34 (68%)	9 (18%)	33 (66%)	17 (34%)	0	<0.05

Table-I. Operative outcomes in both groups

Complications	Group I	Group II	P value
Conversion to Open	2 (4%)	0	0.495
Seroma	2 (4%)	1 (2%)	0.153
Hematoma	1 (2%)	0	0.485
Intractable pain	1 (2%)	0	0.485
Recurrence (after 6months)	2 (4%)	0	0.495

Table-II. Comparison of post operative complications in both groups

DISCUSSION

Laparoscopic totally extraperitoneal hernia repair has over last few decades gained importance as new minimally invasive approach and over time expertise in the procedure has increased. The learning curve for any particular procedure is defined as the minimum number of cases needed to acquire adequate surgical skills and knowledge of pitfalls and technical aspects of the procedure with minimum operative time and decrease in complication rates.⁹⁻¹¹ In literature, various cut-off limits for the learning period of laparoscopic hernia repair have been recommended, reaching up to a minimum of 250 cases being regarded as comfort zone.⁷ In another review, performing atleast 30 to 100 operations was suggested as a critical threshold level to become experienced surgeon.^{5,12} Our study shows that after first 20 to 30 cases the surgeon can become more comfortable as recommended in other local and international studies.

Various studies recommend less than one hour operative time when stating the learning curve precisely. As in the present study however it is possible to perform the operation within one hour time even in the beginning. Mastering the technique does not only mean short operative time but also low recurrence rates.¹²⁻¹⁴ During TEP repair it is important to dissect all possible sites and identify the hernial sac as short term or early recurrence is strongly associated with failure to identify the hernial sac during the dissection.¹⁵ Although in our study there was no incidence of early recurrence, we strongly recommend the thorough dissection of the cord structures and identification of the sac as a measure of prevention of recurrence. Many authors quote that there is not much difference when comparing the incidence of recurrence in open and laparoscopic technique, there is huge difference in immediate pain score and patient quality of life.²¹ The pain score seemed to improve which can be explained by more efficient dissection which comes with increasing experience and understanding of anatomy.^{15,17} With every case the familiarity with anatomical structures increases and so does the efficiency of the surgeon.

The seroma formation has been one of the main issues concerning the surgeons as it predisposes to mesh infection which in itself is bigger problem requiring removal of mesh at times, which explains the need of drain placement in all cases. However further comparative studies should be done to further evaluate the advantage of using a drain.

The use of telescope for dissection of the preperitoneal space has been applied by few authors, and it has shown to be as adequate as the balloon while saving the cost¹⁸ as in a developing country like ours cost is one of the major issues. The study shows that telescope can be safely used for dissection. The perceived pressure to complete the procedure efficiently within appropriate time limit has been thought as leading factor for conversion rates.¹⁵⁻¹⁶ In our study conversion to open was seen only in 2 cases in first group (4%) as compared to no conversion in the last 50 group. The main reason we think for the conversion was difficult anatomy and failure to identify the sac. Other studies also state peritoneal injury as one of the reasons of conversion, however there was none in the present study.¹⁸⁻¹⁹

With the paradigm shift there is more focus being on the quality of life after the surgery in terms of pain relief, mobility rather than long term recurrence.^{8,20} In order to document the learning curve we think that the patient selection also has important effect on the outcome, as patients in our study who presented with recurrence were from older age group, which increases the risk of complications which indicates the need of a randomized control trial comparing the different age groups and gender separately.

CONCLUSION

Although our results are from a single centre and a single surgeon study, we believe that atleast 20 to 30 laparoscopic TEP hernia operations are required to help young surgeons familiarize themselves with the anatomy. The learning curve for TEP according to our study is 30 cases. The presence of an experienced supervisor could definitely be helpful in shortening the duration of

surgery and prevent unnecessary complications. Also from our experience we can confidently say that telescope can be safely used for dissection. We recommend the use of telescopic hernia repair as a first line approach for inguinal hernias.

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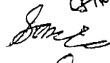
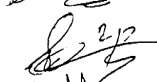
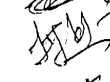
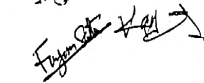
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*When prayer becomes a habit...
Victory becomes a lifestyle.*

– Unknown –

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