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RESEARCH ARTICLE

A COMPARATIVE STUDY BETWEEN TELESCOPIC DISSECTIONS VERSUS LAPAROSCOPIC STONE EXTRACTOR FORCEPS DISSECTION IN TOTAL EXTRA-PERITONEAL (TEP) LAPAROSCOPIC MESH REPAIR OF INGUINAL HERNIA

[1]Dr. Soumitra Chandra, [1,*]Dr. Suresh Kumar Rulaniya, [1]Dr. Prakash Kumar, [1]Dr. Nikhil Agarwal and [2]Dr. Debarshi Jana

[1]Department of General Surgery of Vivekananda Institute of Medical Sciences, Ramakrishna Mission Seva Pratishthan Hospital, 99, Sarat Bose Road, Kolkata – 700026.
[2]Institute of Post-Graduate Medical Education and Research, A.J.C. Bose Road, Kolkata-700020, West Bengal, India

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ABSTRACT

Inguinal hernia repair associated benefits of minimally invasive surgery, such as improved cosmesis, less pain, faster recovery, and improved success rates, have been shown not just in hernia surgery but also in other general surgical procedures like cholecystectomy, gastric banding and appendectomy, as well as in other surgical disciplines like gynaecology and urology. This randomized comparative study was comparing telescopic dissections (TD) versus laparoscopic stone extractor forceps dissection (FD) in total extra-peritoneal (TEP) laparoscopic mesh repair of inguinal hernia. This prospective, comparative, randomised study was conducted at the Department of General Surgery of Vivekananda Institute of Medical Sciences, Ramakrishna Mission SevaPratishthan Hospital, 99, Sarat Bose Road, Kolkata – 700026 and was done from Sept 2016 to April 2018 and 30 patients in each group. For statistical analysis data were entered into a Microsoft excel spread sheet and then analysed by SPSS 20.0.1. In our study it was found that 3 patients had peritoneal breach in both the groups. Association between peritoneal breach in two groups was not statistically significant (p-value=1.000).There is no statistically significant difference of injury to Vas in two groups (p-value= 0.5536).In our study it was found that 3 patients had scrotal edemain both the groups. Association between scrotal edemain two groups was not statistically significant (p-value=1.000).Difference of mean pain score on VAS 6 hrs in two groups was not statistically significant (p=0.7773).Difference of mean pain score on VAS 12hrs in two groups was not statistically significant (p=0.9232). We conclude that laparoscopic stone extractor forceps dissection may be performed safely as an alternative procedure of telescopic dissections, thereby eliminating extra time for changing telescope in this advance surgery.

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INTRODUCTION

Laparoscopic inguinal hernia repair has become popular worldwide can be attributed to two main reasons. First, laparoscopy has allowed placement of a large piece of mesh behind the defect where, according to Laplace's Law, the same forces that cause the hernia are used to reinforce the repair. Second, the associated benefits of minimally invasive surgery, such as improved cosmesis, less pain, faster recovery, and improved success rates, have been shown not just in hernia surgery but also in other general surgical procedures like cholecystectomy, gastric banding and appendectomy, as well as in other surgical disciplines like gynaecology and urology. For patients with inguinal hernia, laparoscopic repair offers significant advantages over open techniques with regard to recurrence risk, pain, and recovery. Surgical procedures have been developed and performed for inguinal hernia repair. Laparoscopy, especially the laparoscopic totally extraperitoneal (TEP) approach, has gained popularity for inguinal hernia repair (Kuhry *et al*., 2007; Simons *et al*., 2009). However, surgeons performing TEP hernia repair should be thoroughly familiar with the posterior anatomical view of the laparoscopic approach and must have enough advanced

Corresponding author: **Dr. Suresh Kumar Rulaniya**
Department of General Surgery of Vivekananda Institute of Medical Sciences, Ramakrishna Mission Seva Pratishthan Hospital, 99, Sarat Bose Road, Kolkata – 700026.

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laparoscopic experience to prevent complications, conversions, and to correction defects (McCormack *et al*., 2005; Lal *et al*., 2004). Most the data published on laparoscopy in hernia surgery have focused on patient outcomes and surgical data. This randomized comparative study was comparing telescopic dissections (TD) versus laparoscopic stone extractor forceps dissection (FD)in total extra-peritoneal (TEP) laparoscopic mesh repair of inguinal hernia.

MATERIALS AND METHODS

This prospective study was planned and carried out at a tertiary care hospital of Kolkata. This study was conducted at the Department of General Surgery of Vivekananda Institute of Medical Sciences, Ramakrishna Mission SevaP ratishthan Hospital, 99, Sarat Bose Road, Kolkata – 700026.Subjects were selected from all patients coming to the outpatient department of General Surgery of Ramakrishna SevaPratishthan Hospital, provided they stay in Kolkata or nearby Kolkata. The study was a prospective, comparative, randomised study. The study was done from Sept 2016 to April 2018 and 30 patients in each group.

Inclusion criteria

- Patients with history of inguinal hernia proven by clinical and considered fit for elective laparoscopic inguinal hernioplasty will included in the study.
- Patients Aged > 18 years.

Exclusion criteria

- Patients unfit for general anesthesia
- Patients with age >65 years
- Irreducible hernia
- Strangulated hernia

Total extra-peritoneal laparoscopic mesh repair (TEP): A 10-mm transverse infra-umbilical skin incision on the left side of midline is made, and then deepened to separate the subcutaneous fat and expose the anterior rectus sheath. A transverse incision is made in the anterior rectus sheath slightly off the midline over the body of the rectus abdominis thus avoiding entering the peritoneal space in the midline, where the anterior and posterior rectus sheaths merge. The underlying rectus muscle fibers are retracted laterally, revealing the glistening white surface of the posterior rectus sheath.

Telescopic dissection (TD): A10-mm 0° laparoscope is introduced with the posterior rectus sheath as a guide and slipped along the anterior surface of the posterior rectus sheath. The telescope is advanced past the arcuate line and into the preperitoneal space, down to the pubic symphysis. The preperitoneal dissection in and around the midline is completed with the scope under direct laparoscopic vision. After adequate dissection is attained, the 10-mm 0° laparoscope is removed and a 30° 10mm scope is fitted to the cemra, the patient is then placed in gentle reverse trendelenburg position, and the preperitoneal space is insufflated with carbon dioxide to a pressure of 12 mm Hg.

Laparoscopic stone extractor forceps dissection (FD): After making 10-mm incision over anterior rectus sheath and revealing the posterior rectus sheath a 10 mm laparoscopic stone extractor forceps mounted on a 10mm trocar is introduced into the retro-rectus space and slipped along the rectus sheath.

Figure 1. Shows laparoscopic stone extractor forceps

Figure 2. Shows forceps introducing with port

Figure 3. Shows blind dissection

The forceps is passed beyond the arcuate line and into the preperitoneal space, down to the pubic symphysis with the bone is felt. The preperitoneal blind dissection in and around the midline is completed with laparoscopic stone extractor forceps. After adequate dissection is attained, the laparoscopic forceps is removed. The patient is then placed in the reverse Trendelenburg position, and the preperitoneal space is insufflated with carbon dioxide to a pressure of 12 mm Hg.

Dissection: After dissection in preperitoneal space future procedure is same in both study.For visual inspection a 10-mm 30° laparoscope is introduced through the umbilical port. Two additional ports are placed in the midline between the umbilicus and pubis: a 5-mm trocar, placed two fingerbreadths above the pubic symphysis, and another 5-mm trocar, placed at the midway point between the lower port and the camera port. The common dissection begins with the exposure of the Cooper's ligament and the inferior epigastric vessels. Gentle dissection with meticulous hemostasis is continued to expose the direct space and the femoral space by clearing the Cooper ligament down to the iliac vessels. Dissection lateral to theinferior epigastric vessels leads to the space of Bogros, the cord structures, and indirect hernias.

Management of hernia sac: After the initial medial and lateral dissection, the assessment of the anatomy and location of the hernia is done. The location of the external iliac vein should be assessed; it may not yet be eminently clear, but the approximate location should be noted.With the anatomy clarified, the hernias can now be safely reduced.

Placement of mesh: Wide preperitoneal dissection ensures that adequate space is available for placement of large mesh prosthesis. After this complete and meticulous dissection, the operative site is assessed. The deep ring should be visualized with only the cord structures traversing its opening into the inguinal canal. Once the requisite dissection is complete, the mesh of 12 X15cm size is folded and introduced under direct vision. The mesh is flattened out across the myopectineal orifice and draped over the cord structures. 2-3tacks is placed at the pubic tubercle; this serves as a fixation point to facilitate arrangement of the mesh in the tight preperitoneal space. The mesh is maneuvered so that its upper border lies above a line draw from the pubic symphysis to the ASIS. A few more tacks are then placed down the Cooper ligament, up the midline, and along the upper border of the mesh.

Port removal, closure and compression: The preperitoneal space is desufflated under direct vision and at this time a blunt grasper is placed against the lower corner of the mesh into the space of Retzious to preventthe mesh from rolling upward than the grasper is genteelly taken out.10mm fascial defect is closed with a polygalactin 2-0 absorbable suture, the skin is approximated, and external compression over the hernia site is given with dynaplast.

Statistical analysis plan: For statistical analysis data were entered into a Microsoft excel spread sheet and then analysed by SPSS 20.0.1. Data have been summarized as mean and standard deviation for numerical variables and count and percentages for categorical variables. The median and the interquartile range have been stated for numerical variables that are not normally distributed. Student's independent sample's t-test was applied to compare normally distributed numerical variables between groups; Unpaired proportions were compared by Chi-square test or Fischer's exact test, as appropriate. p-value $\leq$ 0.05 was considered for statistically significant.

RESULTS

In this study the mean age of patients in Group TD was 52.8667 ± 6.5376 years (Mean± SD) with range 40-68 years and the median age was 52 years and in Group FD it was 52.5333 ± 4.6737 years (Mean± SD) with range 40-59 years and the median age was 52 years. Difference of mean age in two groups was not statistically significant. Thus age was matched in two groups (p-value=0.8211). In our study it was found that 3 patients had peritoneal breach in both the groups. Association between peritoneal breach in two groups was not statistically significant (p-value=1.000). In Group TD 2 (6.7%) patients had required injury to Vas and 1 (3.3%) patients of Group FD had required injury to Vas. There is no statistically significant difference of injury to Vas in two groups (p-value= 0.5536). In Group TD 1 (3.3%) patients had injury to vessels and 3 (10.0%) patients of Group FD had injury to vessels. There is no statistically significant difference of injury to vessels in two groups (p-value= 0.3006) association between required injury to VAS in two groups. 3 (10.0%) patients in Group TD and 4 (13.3%) patients in Group FD needed conversion of TEP to TAPP. There is a no statistically significant (p -value=0.6875) association between conversion of TEP to TAPP in two groups. Patients with conversion of TEP to TAPP were higher in Group FD than in Group TD. In our study it was found that 3 patients had scrotal edemain both the groups. Association between scrotal edemain two groups was not statistically significant (p-value=1.000). In this study the mean pain score on VAS 6 hrs of patients in Group TD was 2.2000 ± 1.7695 (Mean± SD) with range 1-7 and the median was 2 and in Group FD it was 2.3333 ± 1.8631 (Mean± SD) with range 1-8 and the median was 2. Difference of mean pain score on VAS 6 hrs in two groups was not statistically significant (p=0.7773). In this study the mean pain score on VAS 12 hrs of patients in Group TD was 2.7667 ± 1.3047 (Mean± SD) with range 1-6 and the median was 2 and in Group FD it was 2.7333 ± 1.3629 (Mean± SD) with range 1-6 and the median was 2. Difference of mean pain score on VAS 12hrs in two groups was not statistically significant (p=0.9232).

DISCUSSION

Misra MC (2008) *et al* found that the average age was 49 years; 50% of the inguinal hernias were bilateral. Peritoneal breach was noticed during dissection in 36 (64.3%) patients. There was one (3.8%) conversion of TEP to TAPP in group 2. The incidence of scrotal edema was significantly higher in group 2 as compared with group 1 ($p < 0.01$). Patients with indirect inguinal hernias in group 2 presented with a greater number of scrotal edema. Pain score on VAS at 6 h after surgery was significantly higher in group 2 ($p < 0.021$). Patients with age <65 years, bilateral hernias, and indirect hernias had a correlation with higher pain score at 6 h. Of the patients, 17.9% developed seroma in group 1 versus 64.3% in group 2 ($p < 0.001$). Balloon dissection was associated with significantly reduced postoperative pain at 6 h, scrotal edema, and seroma formation. However at 3 months follow-up balloon dissection did not offer significant advantage over direct telescopic dissection in the overall long-term outcome of TEP repairs.

Table 1. Distribution of Mean Age, Pain score on VAS 6 hrs and 12 hrs in two Groups

		Number	Mean	SD	Minimum	Maximum	Median	p-value
Age	Group-A(TD)	30	52.8667	6.5376	40.0000	68.0000	52.0000	0.8211
	Group-B(FD)	30	52.5333	4.6737	40.0000	59.0000	52.0000	
Pain score on VAS 6 HRS	Group-A(TD)	30	2.2000	1.7695	1.0000	7.0000	2.0000	0.7773
	Group-B(FD)	30	2.3333	1.8631	1.0000	8.0000	2.0000	
Pain score on VAS 12 HRS	Group-A(TD)	30	2.7667	1.3047	1.0000	6.0000	2.0000	0.9232
	Group-B(FD)	30	2.7333	1.3629	1.0000	6.0000	2.0000	

Table 2. Distribution of Peritoneal breach, Injury to Vas, Injury to Vessels, Conversion of TEP to TAPP and Scrotal edema in two Groups

		Group-A(TD)	Group-B(FD)	TOTAL	Chi-square value	p-value
Peritoneal breach	NO	27	27	54	0.0000	1.000
	Row %	50.0	50.0	100.0		
	Col %	90.0	90.0	90.0		
	YES	3	3	6		
	Row %	50.0	50.0	100.0		
	Col %	10.0	10.0	10.0		
Injury to Vas	NO	28	29	57	0.3509	0.5536
	Row %	49.1	50.9	100.0		
	Col %	93.3	96.7	95.0		
	YES	2	1	3		
	Row %	66.7	33.3	100.0		
	Col %	6.7	3.3	5.0		
Injury to Vessels	NO	29	27	56	1.0714	0.3006
	Row %	51.8	48.2	100.0		
	Col %	96.7	90.0	93.3		
	YES	1	3	4		
	Row %	25.0	75.0	100.0		
	Col %	3.3	10.0	6.7		
Conversion of TEP to TAPP	NO	27	26	53	0.1617	0.6875
	Row %	50.9	49.1	100.0		
	Col %	90.0	86.7	88.3		
	YES	3	4	7		
	Row %	42.9	57.1	100.0		
	Col %	10.0	13.3	11.7		
Scrotal edema	NO	27	27	54	0.0000	1.000
	Row %	50.0	50.0	100.0		
	Col %	90.0	90.0	90.0		
	YES	3	3	6		
	Row %	50.0	50.0	100.0		
	Col %	10.0	10.0	10.0		

If balloon dissection is considered useful for the beginner, low-cost indigenous balloon may be used to avoid higher cost of commercially available balloon dissector with added early advantages. We found that difference of mean age in two groups was not statistically significant. Thus age was matched in two groups (p-value=0.8211).There is no statistically significant difference of injury to vessels in two groups (p-value= 0.3006). Association between required injuries to Vas in two groups was not statistically significant. The laparoscopic TEP approach combines the benefit of the Stoppa procedure and minimally invasive surgery without injury to the peritonealcavity.[4]In this context, the most important development in hernia repair surgery may be the laparoscopic TEPhernia procedure, which has lower recurrence and complication rates, a shorter hospital stay, a rapid return to normal activities, and more postoperative comfort than does open-repair and other laparoscopic techniques (Simons *et al*., 2009; McCormack *et al*., 2003; Hamza *et al*., 2010; Heikkinen *et al*., 1998). Randomized trials undoubtedly support both surgeons and patients in making clinical decisions in favor of the laparoscopic TEP inguinal hernia repair procedure (Taylor, 2005; Inukai, 2004). Laparoscopic TEP inguinal hernia repair is, however, a challenge for surgeons, especially at the beginning of the learning curve, because of the unfamiliar posterior anatomical view of the inguinal wall anatomy and orientation technical difficulties of laparoscopy. These challenges may cause conversion and serious complications, such as major vascular injury, and bladder and bowel perforation (McCormack *et al*., 2003; Puri *et al*., 2005). We found that there is no statistically significant difference of injury to vessels in two groups (p-value= 0.3006) association between required injury to VAS in two groups. There is a no statistically significant (p-value=0.6875) association between conversion of TEP to TAPP in two groups. A problem unique to the TEP procedure is that technical difficulties can happen any time during dissection and reduction of the hernia sac, possibly resulting in conversion to open surgery. The conversion, as witch from the TEP repair operation to other techniques, can be defined as an intra operative complication and leads to the need for longer administration of analgesics and postoperative hospital stay. This can be attributed largely to the technical difficulties of a narrow preperitoneal space and serious adhesions due to previous surgery (Elshof *et al*., 2009; Paterson *et al*., 2005). Moreover, various study found that these difficulties and reported that performing any conversion procedure can be extremely difficult during laparoscopic TEP hernia repair. For this reason, they suggested that excluding patients with a history of previous surgery would be a better way to prevent conversion, although some reviews have suggested that more than 30 cases are needed to achieve technical proficiency and to reduce the complication rate, in the experienced hand.

Unfortunately, the conversion rate may reach10.6% (Elshof *et al*., 2009; Paterson *et al*., 2005; Feliu-Pala *et al*., 2001). Additionally, several studies and guideline reports, including a Cochrane review describing the technique of the TEP approach, reported their conversion rates; however, they had no clear data regarding the selected conversion types and did not offer an optimal method of conversion during laparoscopic TEP inguinal hernia repair (Feliu-Pala *et al*., 2001; Bittner *et al*., 2011). Most of them used TAPP and Lichtenstein for conversion procedures in their study and did not argue the reason for their choice (Lau *et al*., 2004). Lal *et al* only suggested that converting to the unilateral stoppa procedure during the TEP repair operation has improved the learning curve for TEP hernia repair and decreased the incidence of the initial conversion rate and complications in the last decade (Lal *et al*., 2004). We found that difference of mean pain score on VAS 6 hrs in two groups was not statistically significant (p=0.7773).Difference of mean pain score on VAS 12 hrs in two groups was not statistically significant (p=0.9232).

Conclusion

Our comparative study between telescopic dissections versus laparoscopic stone extractor forceps dissection in total extra-peritoneal (TEP) laparoscopic mesh repair of inguinal hernia shows that laparoscopic stone extractor forceps dissection is as safe and feasible as telescopic dissections. Therefore, we conclude that laparoscopic stone extractor forceps dissection may be performed safely as an alternative procedure of telescopic dissections, thereby eliminating extra time for changing telescope in this advance surgery.

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