



SURGICAL OUTCOME OF MODIFIED LAPAROSCOPIC RETRORECTUS APPROACH FOR UPPER MIDLINE VENTRAL AND UMBILICAL HERNIAS

General Surgery

Sharath S Honnani	MBBS, MS (General surgery), Fellowship in Surgical Gastroenterology, Assistant Professor Department of General Surgery Yenepoya Medical College Hospital Deralakatte, Mangalore.
Gagan Deep	MBBS, MS (General surgery), Senior Resident, Department of General Surgery, Yenepoya Medical College Hospital, Deralakatte, Mangalore.
Juveria Iman	MBBS, Junior Resident, Department of General Surgery, Yenepoya Medical College Hospital, Deralakatte, Mangalore
P S M Ameer Ali	MBBS, MS (General Surgery), Professor, Department of General Surgery, Yenepoya Medical College Hospital, Deralakatte, Mangalore

ABSTRACT

Background: The incidence of ventral hernias such as umbilical, epigastric and midline incisional hernias has increased over the years. Many surgical modalities of treatment have been evolved for better management and outcome of hernia repair. Igor Belyansky performed the first successful endoscopic Rives Stoppa procedure (eTEP). The current Laparoscopic retrorectus repair needs more than three ports, and it also requires USG marking of the retrorectus space. Crossing over to the opposite retrorectus space will be difficult for beginners. This study standardises the easy and ergonomically better Laparoscopic Retrorectus approach for umbilical and upper midline hernias using three ports in the suprapubic area. **Aim And Objectives:** To study the feasibility and effectiveness of the Modified Laparoscopic Retrorectus approach. **Material And Methods:** This prospective study involved 18 patients admitted to tertiary health center, with umbilical hernia, epigastric hernia and upper midline ventral hernia. We performed the analysis after taking institutional ethical committee approval and informed consent from patients. A qualified surgeon performed laparoscopic retrorectus hernioplasty (e-TEP) with modification in port placement. An observational analysis was done on the feasibility and outcome of the modified approach. SPSS version 20. was used to perform the statistical analysis. Unpaired t-test, Pearson's correlation coefficient was applied. **Results:** A total of 18 patients were included in the study, with a mean age of 48.78 years. The hernia was predominantly seen in the female gender, overweight or obese patients. The mean duration of the procedure with the modified approach was 160 minutes. The patients' numeric rating scale of pain on postoperative day 1 and day 2 was mild in 66.6% of patients. We noted seroma formation in two patients, which was significantly associated with the duration of surgery ($p=0.0069$). Most of the patients were discharged on postoperative day 5. Follow up of patients up to 1 year had no history of recurrence or chronic pain. **Conclusion:** The standard of care for ventral hernia repair is the laparoscopic e-TEP approach. This study's modification of port placement showed better cosmetic results with reduced risk of chronic pain and low recurrence rate. The prolene mesh used during this procedure is very economical, making laparoscopic hernia surgery affordable for low socio-economic populations in developing countries.

KEYWORDS

Enhanced view total extraperitoneal, IPOM, laparoscopic ventral hernia repair, retrorectus repair, umbilical hernia, ventral hernia

INTRODUCTION

The abdominal wall is a complex structure composed primarily of muscle, bones and fascia. Its primary function is to protect the enclosed organs of the gastrointestinal and urogenital tracts.^[1] Hernias have been defined as a protrusion of contents of the abdominal cavity through a weakness in the abdominal wall.^[1-4] Weakness of abdominal muscle may be the result of sharp trauma. Most commonly, this results from abdominal surgery.^[5] A surgical scar, even with perfect wound healing, has only 70% of the initial muscle strength. This loss of strength can result in herniation in at least 10% of surgical incisions.^[1,6] Ventral hernia is defined as the protrusion of preperitoneal fat, omentum or loop of intestine through a defect or weakened region of the abdominal wall.^[7,8] The incidence of ventral hernias such as umbilical, epigastric and midline incisional hernias has increased over the years, and many surgical modalities have evolved for better management and outcome in hernia repair.

Rives Stoppa technique is the gold standard in open ventral hernia repair. Igor Belyansky has succeeded in the first endoscopic Rives Stoppa procedure (eTEP – enhanced view total extra-peritoneal approach), where a large polypropylene mesh is placed into the retrorectus space.^[9-11] The current Laparoscopic retrorectus repair needs more than three ports, and it also requires USG marking of the retrorectus space. Crossing over to the opposite retrorectus space will be difficult for beginners. Correcting the defect in the peritoneum is difficult. Since the rectus muscles lie directly over the transverse abdominus fascia below the arcuate line, it is easy to access the retrorectus plane below it by placing the port at the suprapubic area.

MATERIALS AND METHODS

The study was conducted on patients admitted to Yenepoya Medical College Hospital between 1st September 2019 to 30th September 2021 with a diagnosis of umbilical hernia, epigastric hernia, upper midline ventral hernia, and any other cases of this with recurrence due to the

previous repair by a different technique. Institutional ethical committee approval has been obtained before the initiation of the study. Data of 18 patients were collected in the form of history taking, physical examination, ultrasound abdomen or CECT abdomen to know the size of the defect.

Patients with the following criteria were included in the study:

1. Patients with a diagnosis of umbilical hernia, epigastric hernia, upper midline ventral hernia, any of this with recurrence due to the previous repair by a different technique.
2. Age more than 18 years.
3. Defect size less than 7 cms.

Informed consent was taken from patients included in the study after explaining in detail about the study. The patient underwent modified laparoscopic retrorectus hernioplasty (e-TEP) by a qualified surgeon. The patient is placed in a French position with bilateral upper extremities tucked by the patient's side and the surgeon standing between the legs (Figure 1). Three ports were placed below the transubercular plane with four finger spaces between each port. (Figure 2)

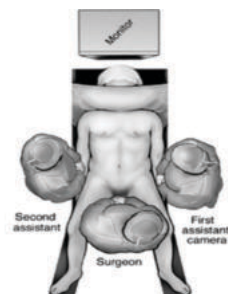


Figure 1: French position of the patient

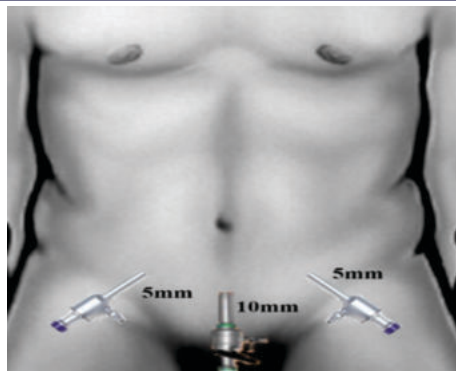


Figure 2: Modified port placement

Retrorectus plane was created between the posterior rectus sheath and rectus muscle without entering the peritoneal cavity (Figure 3, Figure 4). Anterior and posterior fascial defects closed using prolene sutures (Figure 5: Closure of the anterior defect). Prolene mesh was placed in the retrorectus plane and **Figure 4:** Posterior rectus sheath dissection on left side. exsufflation is done slowly (Figure 6: Placement of mesh).

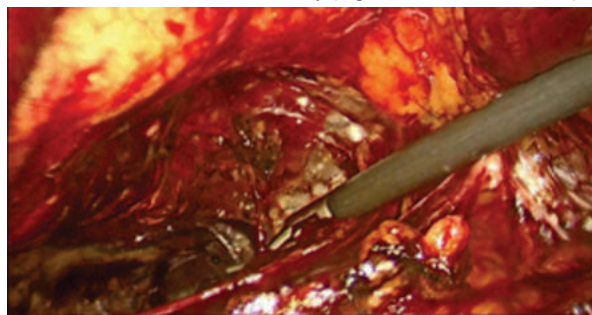


Figure 3: Posterior rectus sheath dissection on right side.

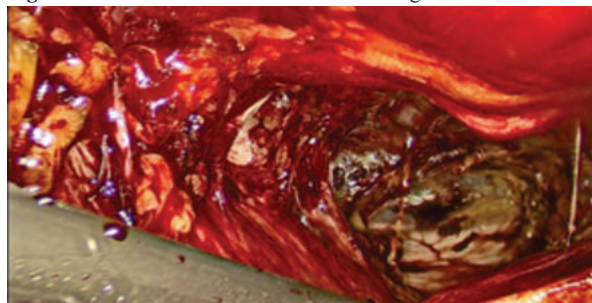


Figure 4: Posterior rectus sheath dissection on left side.

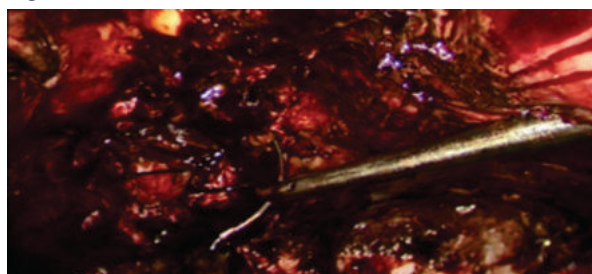


Figure 5: Closure of the anterior defect

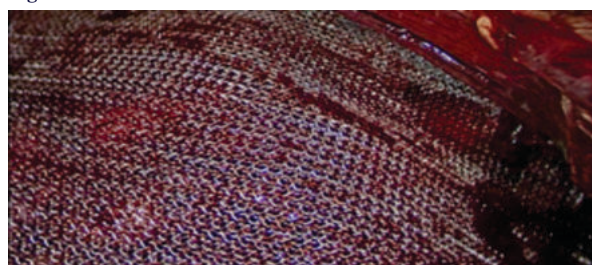


Figure 6: Placement of mesh

Details on parameters such as duration of surgery, complications (intra – operative and post – operative), drain tube placed, length of hospital stay, conversion to open and recurrence were collected. The data collected from the study subject was strictly kept confidential.

Data was entered in the excel spreadsheet. Descriptive statistics of the explanatory and outcome variables were calculated by the mean, standard deviation for quantitative variables, frequency and proportions for qualitative variables. SPSS (Statistical Package for Social Sciences) version 20. was used to perform the statistical analysis. The unpaired t – test is applied to test the statistical significance between drain kept, content, complications with relation to the duration of surgery and BMI. Pearson's correlation coefficient was applied to test the correlation between two continuous variables like BMI, Duration of surgery, size of defect, abdominal girth and pain score. The level of significance was set at 5%.

RESULTS

A total of 18 patients were studied with a mean age of participants was 48.78 years with SD of 12.18. Minimum age was 29 years and maximum age was 68 years. Majority of the patients were females (11) with a mean age of 47.36 years and males (7) with a mean age of 51 years.

In this study, 77% of the patients were overweight, with a mean BMI of 28.32 kg/m² and SD of 6.47. Minimum BMI of 21.2 kg/m² and maximum BMI of 44.9 kg/m². BMI and duration of surgery showed a statistically significant result with p value of 0.027.

Mean size of abdominal wall defect was 2.59cms with SD of 1.05. Minimum size of 1cms and maximum size of 5cms. Size of the defect and BMI had no significant relationship since p value was 0.751.

Table I: Type of hernia

Type	Frequency	Percent
Para umbilical hernia	9	50.0
Umbilical hernia	9	50.0
Total	18	100.0

Table II: Content of hernia

Content	Frequency	Percent
Bowel	10	55.6
Omentum	8	44.4
Total	18	100.0

Table III: Relationship between content and duration of surgery

Content	N	Duration of surgery		Mean difference	p value*
		Mean	Std. Deviation		
Bowel	10	165	60.00	11.250	0.662
Omentum	8	153.75	43.074		

There was no significant relationship noted between the content and duration of surgery (p value = 0.662).

In this study, 13 patients (72.2%) had a short duration of surgery, time <180 minutes. Mean operative time was 160 minutes with SD of 51.99. Minimum operative time was 120 minutes and maximum operative time was 255 minutes. In 8 of the patients drain was kept and 10 patients had no drain.

Table IV: Relationship between drain and duration of surgery

Drain	N	Duration of surgery		Mean difference	P value*
		Mean	Std. Deviation		
Kept	8	166.25	55.726	34.250	0.084
Not kept	10	132.00	17.512		

*unpaired t - test

There was no significant relationship between the duration of surgery and drain placement (p value = 0.084). There was no significant relationship noted between drain placement and BMI (p value = 0.30).

Table V: Pain score

Pain score	Frequency	Percent
2	5	27.8
3	7	38.9
4	6	33.3
Total	18	100.0

Numeric rating scale was used to calculate pain score of the patient on post-operative day 1 and day 2. Majority of the patient had mild pain, that is pain score between 1 to 3.

Table VI: Complications and duration of surgery

Complication	N	Duration of surgery		Mean difference	P value*
		Mean	Std. Deviation		
seroma	2	247.5	10.607	98.440	0.0069
Nil	16	149.06	43.674		

*unpaired t test

This technique was associated with seroma as a complication in 2 patients which had significant relationship with the duration of surgery (p value=0.0069).

Majority of the patients (15/18) in this study were discharged on post-operative day 5. One patient had developed seroma with high drain output hence was discharged on post-operative day 15.

DISCUSSION

For many centuries abdominal wall hernias have been a significant burden for health care. The incidence of ventral hernias is higher in females because of the decreased tone of the abdominal wall, stretching of the anterior abdominal wall, and replacement of collagen with elastic fibres in multiparous women.^[1,12,13] There was a similar result noted in this study. Obesity, physical strain and pregnancy are important risk factors in the development of umbilical, paraumbilical and epigastric hernias. Aponeuroses weaken due to adipose tissue deposition between muscle fibres and favours the development of paraumbilical/umbilical hernia.^[13] In our study majority of the patients had a BMI of more than 25kg/m² (overweight). Obesity has become a major health issue where men and postmenopausal women accumulate more fat in the intraabdominal depot resulting in an increased risk of herniation.^[14-16]

Many surgeons have described different techniques to prevent and treat hernias. K A LeBlanc and W V Booth described the first laparoscopic ventral hernia repair – intraperitoneal onlay mesh (IPOM) in 1993.^[17] Since then, many different techniques have been demonstrated as transabdominal preperitoneal repair (TAPP), transabdominal retromuscular repair, enhanced – view totally extraperitoneal repair (e-TEP) and endoscopic mini/less open sublay technique/repair (EMILOS).

Many surgeons commonly prefer the laparoscopic IPOM repair for ventral hernia due to its technical feasibility, but the PTFE mesh used in this procedure is expensive and increases the patients' economic burden. A meta-analysis study conducted by Goodney et al. in 2002 showed no significant difference in operating time between laparoscopic and open hernia repair, but a significantly shorter duration of hospital stay was noted in the laparoscopic group.^[18]

Prasad et al. conducted a prospective study in 2009 on the outcome of laparoscopic TAPP and IPOM, which showed a shorter operative time for laparoscopic IPOM than TAPP.^[19] The study also showed an overall lower cost in the TAPP group than the IPOM group due to the use of polypropylene mesh. Rives and Stoppa introduced the retro muscular sublay technique, in which the mesh is placed over the closed posterior rectus sheath and peritoneum.^[20,21] Igor Belyansky et al. showed that the e-TEP technique for laparoscopic retromuscular hernia repair is more feasible and effective.^[9,10,22] This study demonstrated the new approach to the standard technique introduced by Igor Belyansky. Since access into the retrorectus plane is comparatively easier below the arcuate line. The mean operative time in our study was 160minutes ± 51.99, which was significantly shorter compared to the Igor Belyansky et al. study.^[10] Polypropylene mesh was used in our study, which reduced the economic burden on patients significantly.

Mesh fixation during laparoscopic ventral hernia repair (IPOM) can be done using sutures or tackers. A study conducted by Nguyen SQ et al. showed that both sutures and tackers are associated with moderate pain at one week of surgery and minimal pain on further follow-up.^[23] The transabdominal sutures entrap the intercostal nerves causing chronic, persistent neuropathic pain was proposed by Cobb et al.^[24] Sutures penetrate the entire thickness of the abdominal wall musculature and fascia, causing local muscle ischemia resulting in severe pain postoperatively. The advantage of the mesh placement in the retrorectus plane is that there is no need for mesh fixation with sutures

or tackers; hence there is no risk of chronic pain. Pneumoperitoneum is released under direct vision, assuring that the mesh is sandwiched between the posterior layer of the rectus sheath and rectus abdominus muscle. Hence, this study noted mild pain up to post-operative day two according to the numeric rating scale for pain. Long term follow-up of patients up to 1 year had no complaints of chronic pain.

The most common complication noted after laparoscopic ventral hernia repair is seroma formation.^[25] A systematic review conducted by Bedi et al. showed an incidence rate of 5.4%.^[26] In our study, seroma was noted in two patients, which showed a significant relationship with the duration of surgery. Many studies have shown no recurrence of hernia post laparoscopic eTEP repair of ventral hernia; similar results have been noted in our study when patients were followed up for one year.^[3,27] There is no risk of adhesion or fistula formation since the mesh is placed outside the abdominal cavity. In the study, patients had a short hospital stay of 5 days after surgery. Only one patient had high drain output which was serous, hence had a hospital stay of 15 days post-surgery.

The cosmetic outcomes of various ventral hernia repair techniques are an understudied and underappreciated concept. It is one of the important and common indications for surgery in many patients. Burger et al. used a 10-point visual analog scale to compare patient-reported cosmetic scores of laparoscopic versus open repair.^[28] A case-control study conducted by Bellido Luque et al. showed that the eTEP technique gave better cosmetic results than the IPOM technique.^[29] Patients complained of midline fatty tissue bulging after defect closure in the IPOM group, and the hernia sac is not resected, resulting in the worse cosmetic result. However, in the eTEP group, the anterior and posterior rectus sheaths defect was closed in two planes resulting in an even distribution of midline fatty tissue giving better cosmetic results.^[1,3,29] In this study, one 10mm and two 5mm skin incisions were made at the waistline, and the standard eTEP technique gave the patients a better cosmetic result. The skin incision scar is well hidden with the inner garments worn by the patients.

CONCLUSION

The laparoscopic e – TEP approach is considered as a standard of care for ventral hernia repair. In this study, we have established the feasibility and the better outcome of the standard e-TEP approach with the modification of traditional port placement. In this study, the port placement was done in the lower abdomen at the waist level giving a better cosmetic scar with a similar outcome as laparoscopic ventral hernia repair (e – TEP).

As the anterior and posterior defects are closed anatomically, the chance of recurrence is low and cosmetic outcome is better in e-TEP compared to the IPOM. The mesh is placed in the retrorectus plane without the need for fixation, leading to no mesh-related complications and a significantly reduced risk of chronic pain. The mesh used in e – TEP is economical compared to the IPOM mesh, thus reducing the economic burden on the benefitting patient and making hernioplasty affordable and available to a wide diversity of the socio-economical population in the society.

One of the study's shortcomings is a smaller sample size which could be attributed to the fact that this study was carried out during the covid-19 period. Hence, to have a definite conclusion about the prognosis of the outcome of the modified technique, a study should be carried out with larger sample size.

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