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ORIGINAL RESEARCH

Endoscopic eTEP-RS for small ventral hernia: Initial experience at MGH hospital

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ABSTRACT

A cutting-edge surgical method is the enhanced-view extended completely extraperitoneal (eTEP) approach for ventral hernia repair. We give an update on this strategy and the findings from the MGH Hospital's initial experience with eTEP repair Rives-Stoppa (eTEP-RS). The eTEP-RS was used to treat 38 patients with ventral hernia between July 2019 and July 2022. The traits of the patients, the specifics of the operation, and the complications were examined. The median follow-up period was 16 months, with a range of 6-24. Twelve (31.6%) patients with primary ventral hernias and 26 (68.4%) patients with ventral incisional hernias had an eTEP-RS operation. The average size of the prosthesis was 380 cm2, and the average defect area was 21 cm2. We noted problems in four cases (10.5%); on the tenth postoperative day, one patient developed intestinal obstruction, and two patients experienced an asymptomatic seroma (Clavien-Dindo grade 1). (Clavien–Dindo grade 3B). The median hospital stay was 3.9 days (with a range of 2–6). There was no recurrence of the hernia. A practical and secure method for ventral hernia repair using minimally invasive surgery is the eTEP-RS. To define patient selection and determine long-term outcomes, more research is required.

Keywords: Ventral hernia · eTEP · Rives–Stoppa · Incisional hernia

INTRODUCTION

Over time, ventral hernia repair (VHR) has changed. From fundamental fascial or anatomical repairs across the various layers of the abdominal wall to minimally invasive operations in a natural anatomical plane, i.e., the retromuscular preperitoneal plane, the science of restoring a normal abdominal anatomy has advanced. Rives et al. were the first to adopt the retromucular preperitoneal plane for mesh placement in groyne hernias. They thought it was the best plane for the insertion of a broad mesh that operated on the idea of applying radially dispersed intra-abdominal strain to the mesh in order to repair it. [1] Later, the massive ventral hernias were successfully treated using this approach. [2,3]

In 1993, Leblanc and Booth developed the laparoscopic ventral hernia repair (LVHR), which had favourable results in terms of recurrence rates and wound problems due to the placement of an intra-peritoneal onlay mesh as a barrier. [4] Heniford et al. standardised this method, and laparoscopic repair was proven to be superior than open surgery. [5] Despite a method that is easily adaptable and advancements in biological composite mesh prosthesis, the intra peritoneal placement of the mesh has had drawbacks over the years, including adhesive

obstruction, enterocutaneus fistula, and mesh erosion from direct contact with the abdominal viscera. To get around these problems with intra peritoneal mesh implantation, Prasad et al. described the transabdominal pre peritoneal (TAPP) approach. [6]. The Rives-Stoppa approach, which involves restoring the linea alba and inserting a prosthesis between the ventral rectus muscle and the posterior rectus sheath dorsally (retromuscular-suprafascial) of the rectus muscle, is the gold standard for open ventral hernia repair [7,8].

The initial advancement in the treatment of this condition was the laparoscopic repair of the wall defect and implantation of an intraperitoneal mesh (IPOM) [9]. Laparoscopic repair offered a shorter hospital stay, fewer surgical site infection, and a comparable recurrence rate when compared to open surgery. Despite the great results attained globally, indications for laparoscopic IPOM for ventral hernia repair were questioned following the initial enthusiasm. Large defects, prosthetic erosion, intestinal blockage caused by adhesions, acute and persistent discomfort brought on by traumatic fxation techniques, and uncommon enterocutaneous fstulas were the limits. In fact, IPOM demands that an intraperitoneal mesh be placed in direct contact with the abdominal viscera and overlapped widely [10, 11].

Other minimally invasive procedures for ventral hernia repair, such as the trans-abdominal preperitoneal approach (TAPP), totally endoscopic sublay repair (TES), endoscopic mini/less open sublay technique (EMILOS), retrorectal sublay mesh repair, subcutaneous onlay laparoscopic approach (SCOLA), and extended view-totally extraperitoneal approach (e-TEP), have been developed in an effort to avoid placing prostheses in the peritoneal cavity and The eTEP technique avoids placing the mesh in direct contact with abdominal viscera and its transparietal fixation by combining a minimally invasive approach with the surgical steps of the Rives-Stoppa technique (eTEP-RS). In the current study, we describe the preliminary findings from a group of ventral hernia patients who had eTEP-RS and we discuss the current understanding of this surgical procedure. The 75 cases that made up the current investigation—which was conducted retrospectively—were all processed via our centre using the same eTEP guidelines.

MATERIALS AND METHODS

This investigation was conducted at a MGH Hospital facility at a single location. In the three years between July 2019 and July 2022, eTEP repair was performed in 38 cases of ventral hernia. A single team of three people led by the first author carried out the procedures. All patients had clinical evaluations and were categorised in accordance with European Hernia Society (EHS) recommendations. Only complicated hernias were subjected to computed CT examination. No matter how difficult the hernia was, all patients had eTEP after preoperative surface marking under ultrasound guidance. Hernia defects larger than 15 cm, loss of domain hernia, poor scarring, skin ulceration, prior mesh infection, sinus tract, and prior retro rectus mesh insertion were among the exclusion criteria. In case sheets that were especially created, pertinent information from the medical records department was gathered. The Chi square test and SPSS 22.0 software (SPSS, Inc., Chicago, IL, USA) and GraphPad Prism version 5.0 (GraphPad Software, Inc., La Jolla, CA, USA) were used for the statistical analysis, with P 0.05 being considered to be a significant level of significance.

Our surgical approach adheres to the fundamentals outlined in the seminal work by Igor Belyansky et al. [13] To make it appropriate for newcomers to advanced endoscopic surgery and encourage widespread adoption, we made various modifications.

In order to increase the distance between the rib border and the anterior superior iliac crest, the patient is positioned supine on the operating table with their arms tucked along their bodies. To give the surgeon a front view during all surgical steps, two monitors are employed, one placed at the patient's head and the other at the feet. The placement of the ports varies on where the defect is located, but the eTEP's basic idea is to start by separating

the retromuscular area on one side before moving on to the contralateral one. Typically, a minor skin incision in the subcostal area, measuring about 12 mm broad, is performed to identify and incise the rectum's anterior fascia in order to insert the first trocar. The surgeon first uses his index finger to expand the area between the rectus muscle and the posterior fascia, followed by the use of gauze, a surgical tool, or a balloon dissector. This method reduces the risk of entering the peritoneum during the subsequent endoscopic treatment by exposing the area posterior to the rectum under direct vision. A 10 mm 30-degree laparoscope is then introduced for appropriate exploration of the space between the rectus muscle and its posterior fascia, followed by the insertion of a 12 mm optical trocar, carbon dioxide insufflation, and a pressure of 12 mmHg. The remaining ports are then added after making room for them: a 10 mm port 5 cm below the optical trocar medial to the semilunar line and a further 5 mm port below this. Electrified scissors or a hook are used for diathermy coagulation dissection up till the medial edge of the rectus abdominis' posterior sheath. Instead, the neurovascular bundles that emerge medially in the semilunar line and pierce the posterior lamina of the internal oblique aponeurosis, receiving branches from the deep epigastric arteries, serve as a representation of the dissection's lateral limit. These run for a brief distance before becoming epifascial and puncturing the rectum of the abdomen.

When observed, they seem to emerge vertically from the posterior pocket as a series of five or six bundles that resemble street lamps (the lamppost sign). The belly of the transverse muscle can also be seen medial to them. The posterior fascia is cut at this point in the epigastric region, exposing the linea alba and revealing the adipose tissue that makes up the falciform ligament, which is detached anteriorly from the latter without harming it (cranial crossover). In order to produce the retromuscular plane, which is prolonged as far caudally as feasible, the contralateral posterior fascia is now incised at the medial margin of the contralateral rectus abdominis muscle and split from the rectus muscle with the use of gas.

Another port is positioned in the opposite subcostal region to accomplish this. The preperitoneal space centrally (falciform ligament and Retzius space) is connected to the bilaterality retrorectal regions up to the Bogros spaces in order to form a unified retromuscular anatomical plane. Numerous technical modifications to the specified craniocaudal technique are possible in relation to the abdominal confirmation and hernia features (size and position). In reality, the same approach can be carried out, for instance in the treatment of epigastric ventral hernias, by performing a first crossover in the sub-umbilical region and inserting the first trocar through either the right or left forehead (caudal crossover). In this instance, take care not to harm the linea alba when incising the medial insertions of both posterior bands up to the hernia site. The hernial sac is reduced as a result of the preperitoneal fat or the peritoneum itself being cut or bluntly separated from the linea alba. It is occasionally required to induce pneumoperitoneum in big hernias before dissecting and shrinking the hernial sac in order to detect hernia adhesions. This is done by introducing a port through a 5 mm lateral access. An ipsilateral or bilateral transversus abdominis release (TAR) can be performed as it is in the open technique for larger defects or when it is difficult to approximate the median margins of the posterior fascia. Care should be taken to create a section of the transverse abdominal muscle through an ideal operative triangulation by strategically positioning 3 trocars in the right quadrant and 3 trocars in the left quadrant. The linea alba is first stitched anteriorly during reconstructive surgery by stitching the sheath at the medial borders of the right and left rectus muscles.

The retromuscular box is where the prosthesis is kept after it has been placed. Its fastening is optional and can be accomplished using fibrin glue or afixing points. When treating big incisional ventral hernias, it is best to use non-absorbable stitches to secure the mesh superiorly to Cooper's ligaments and on the pubic symphysis, and cranially to the xiphoid process, positioning the prosthesis in the fat triangle. Fibrin glue can be used to strengthen the

fixation even more. It's not usually necessary to put a drain after surgery, however in some circumstances using one or two over artificial suction drains may be beneficial. The patient will wear a postoperative girdle for 30 days after the operation, along with a compression dressing for the first 48 hours. Following the surgery, abdominal echotomography and physical examinations were used to screen all patients for morbidity and recurrence in the outpatient clinic at 1, 6, and 12 months. The follow-up period lasted 16 (6-24) months on average. There were no lost patients to follow-up.

RESULTS

The 38 patients who underwent surgery during the study period had a mean age of 58.9 (range: 46-72) years, with 16 (42.1%) men and 22 (57.9%) women. The characteristics of the patients were compiled in Table 1. According to the classification of the European Hernia Society (Tables 2), ventral incisional hernias were present in 26 (68.4%) instances, whereas primary ventral hernias (umbilical or epigastric) were present in 12 (31.6%) patients.

36 patients (94%) had e-TEP-RS, although two patients (6%), one of whom with the biggest lesion (W2), needed a right unilateral TAR. The prosthesis' average size was 380 cm2, while the defect area was 21 cm2 on average (Table 3). There were no intraoperative problems, and the average length of the procedure was 171 minutes (range: 110-260 minutes). The median hospital stay was 3.9 days (with a range of 2–6). 10.5% of patients experienced postoperative morbidity overall. One of the two patients who experienced a problem within the first 30 days underwent a laparoscopic surgical revision due to a bowel obstruction on the 10th postoperative day. It happened as a result of the small intestine adhering to the barbed suture's exposed end. On the fifteenth postoperative day, there was an asymptomatic seroma that needed no treatment and simply a clinical observation before it went away after 35 days. Postoperative mortality was non-existent. No late problems (beyond 30 days) or recurrences were noted during the observation period.

Table 1: Patient characteristics

Variables	N (%)
N	38
Gender Male: female	 16:22
Mean age (in years)	58.9 ±13
BMI (kg/m^2)	26.6 ±2.8
Hypertension	14 (36.8)
Diabetes mellitus	6 (15.8)
Ischemic Heart disease	2 (5.3)
Primary Hernia	12 (31.6)
Incisional Hernia	26 (68.4)

Table 2: Primary abdominal wall hernia (according to EHS classification)

	Small (<2 cm)	Medium (2-4cm)	Large (> 4cm)
Epigastric	0	2	2
Umbilical	0	8	0

Table 3: Intraoperative parameters

	Value
e-TEP RS	36 (94%)
e-TEP RS+ unilateral TAR	2 (6%)
Mean operative time (minutes)	171 (range: 110–260)

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Mean defect area in (cm^2)	21 (range: 13–67)
Mean mesh area in (cm^2)	380 (range: 236–550)

DISCUSSION

Since René Stoppa and Jean Rives independently described their technique in France 50 years ago, open sublay repair techniques have developed. These techniques, along with laparoscopic intraperitoneal repair with a prosthesis (IPOM), are now the most frequently used methods for treating ventral hernias, both primary and incisional [14–18]. Transabdominal preperitoneal repair (TAPP) and totally extraperitoneal repair (TEP) are two laparoscopic techniques that were first introduced in the early 1990s by Leonard Schultz and Jean-Louis Dulucq and have since grown in popularity as the most widely used minimally invasive inguinal hernia repair methods [19, 20]. Even though the latter method has been shown to produce outcomes similar to Lichtenstein's open anterior tension-free mesh repair, it has poor ergonomics, a small workspace for dissection, and a small number of trocars that can be set up. [21–23]

The indications (selection of the type of defect and patient to be operated on), as well as the necessary learning curve for eTEP-RS, have not yet been defined when compared to other abdominal wall repair techniques. This is because eTEP-RS is a relatively new surgical technique and there are few published works about it. The first factor to take into account relates to the kinds of problems that can be corrected using this method. In particular, we have used eTEP-RS to treat patients in our case series who had primary and incisional ventral hernias, including numerous parietal defects (Swiss cheese hernia), in a manner consistent with other authors' reports [37–39]. We chose tiny to medium-sized faults because we were just starting off with ours; the mean defect area was 21 cm2 and the biggest defect's was 67 cm2. Only the authors who created the technique described their experience with huge defects (average defect size of 132.1 cm2), but the majority of research reporting the outcomes of eTEP-RS focused on the treatment of such defects [24-27].

The placement of the problem is a second issue. These faults were medium in our experience. Additionally, as previously observed by other authors, they can be both supra- and sub-umbilical, influencing the decision regarding the first trocar's insertion position as well as the ones that follow during the procedure [24-27]. After a unilateral transversus abdominis release (TAR), we were able to approximate the defect margins in one patient (6%) with an incisional W2 hernia in our case series [28]. If necessary, the addition of a transversus abdominis release (TAR) offers tension-free myofascial progression that enables the correction of bigger lesions, much like the open Rives-Stoppa treatment [24]. We did not record any recurrence, even with the brief follow-up time. Although other studies show comparable findings, it should be noted that other authors [24,27] indicate recurrence rates ranging from 1.7 to 4.7%.

The learning curve for eTEP-RS is quite steep because it is a complicated approach. Before treating ventral hernias with eTEP-RS, we advise the surgeons to first treat sufficiently many inguinal hernias with TEP and eTEP. A single-institution experience with eTEP-RS was recently published by Sanna et al. This study is the second Italian publication to evaluate the effectiveness of eTEP-RS in treating ventral hernias. It would support the encouraging outcomes attained by other authors employing this technique, despite its limitations due to the small number of cases, the brief follow-up, and the absence of comparison with other procedures.

CONCLUSION

Surgeons with sufficient experience in minimally invasive surgery of the abdominal wall can execute the eTEP-RS approach to repair ventral hernias and produce effective and repeatable

results. Since it is a new procedure, research with long-term follow-up will be required to better define the results over time. Comparative studies with existing ventral hernia repair techniques will also be required to understand the technique's indications and restrictions.

REFERENCES

1. Rives J, Stoppa R, Fortesa L, Nicaise H. Dacron patches and their place in surgery of groin hernia. 65 cases collected from a complete series of 274 hernia operations. Ann Chir 1968;22:159-71.
2. Stoppa RE. The treatment of complicated groin and incisional hernias. World J Surg 1989;13:545-54.
3. Rives J, Pire JC, Flament JB, Palot JP, Body C. Treatment of large eventrations. New therapeutic indications apropos of 322 cases. Chirurgie 1985;111:215-25.
4. LeBlanc KA, Booth WV. Laparoscopic repair of incisional abdominal hernias using expanded polytetrafluoroethylene: Preliminary findings. Surg Laparosc Endosc 1993;3:39-41.
5. Heniford BT, Park A, Ramshaw BJ, Voeller G. Laparoscopic repair of ventral hernias: Nine years' experience with 850 consecutive hernias. Ann Surg 2003;238:391-9.
6. Prasad P, Tantia O, Patle NM, Khanna S, Sen B. Laparoscopic ventral hernia repair: A comparative study of transabdominal preperitoneal versus intraperitoneal onlay mesh repair. J Laparoendosc Adv Surg Tech A 2011;21:477-83.
7. Rives J, Lardennois B, Pire JC, Hibon J. Large incisional hernias. The importance of fail abdomen and of subsequent respiratory disorders. Chirurgie 1973; 99:547–563
8. Stoppa RE. The treatment of complicated groin and incisional hernias. World J Surg 1989;13:545–554.
9. LeBlanc KA, Booth WV. Laparoscopic repair of incisional abdominal hernias using expanded polytetrafuoroethylene: preliminary fndings. Surg Laparosc Endosc 1993;3:39–41
10. Muysoms FE, Bontinck J, Pletinckx P. Complications of mesh devices for intraperitoneal umbilical hernia repair: a word of caution. Hernia. 2011; 15:463–468.
11. Ramakrishna HK, Lakshman K. Intra peritoneal polypropylene mesh and newer meshes in ventral hernia repair: what ebm says? Indian J Surg. 2013; 75:346–351.
12. Belyansky I, Daes J, Radu VG, Balasubramanian R, Reza Zahiri H, Weltz AS, et al. A novel approach using the enhanced-view totally extraperitoneal (eTEP) technique for laparoscopic retromuscular hernia repair. Surg Endosc 2018;32:1525-32.
13. Ramana B, Arora E, Belyansky I. Signs and landmarks in eTEP rives-stoppa repair of ventral hernias. Hernia 2021;25:545-50.
14. Stoppa RE. The treatment of complicated groin and incisional hernias. World J Surg 1989;13:545–554.
15. LeBlanc KA, Booth WV. Laparoscopic repair of incisional abdominal hernias using expanded polytetrafuoroethylene: preliminary fndings. Surg Laparosc Endosc.1993; 3:39–41
16. Muysoms FE, Bontinck J, Pletinckx P. Complications of mesh devices for intraperitoneal umbilical hernia repair: a word of caution. Hernia.2011; 15:463–468.
17. Ramakrishna HK, Lakshman K. Intra peritoneal polypropylene mesh and newer meshes in ventral hernia repair: what ebm says? Indian J Surg 2013; 75:346–351.
18. Bittner R, Bain K, Bansal VK, Berrevoet F, Bingener-Casey J, Chen D et al. Update of guidelines for laparoscopic treatment of ventral and incisional abdominal wall hernias (International Endohernia Society (IEHS)): part B. Surg Endosc.2019; 33:3511–3549.
19. Dulucq JL.Traitement des hernies de l'aine par la mise en place d'un patch prothetique par laparoscopie. Voi totalement extraperitoneale Cah Chir.1991; 79:15–16

20. Schultz L, Graber J, Pietraftta J, Hickok D. Laser laparoscopic herniorraphy: a clinical trial preliminary results. J Laparoendosc Surg.1990; 1:41–45.
21. Dulucq JL, Wintringer P, Mahajna A. Laparoscopic totally extraperitoneal inguinal hernia repair: lessons learned from 3100 hernia repairs over 15 years. Surg Endosc 2009;23:482–486
22. Feliu X, Clavería R, Besora P, Camps J, Fernández-Sallent E, Viñas X, Abad JM. Bilateral inguinal hernia repair: laparoscopic or open approach? Hernia.2011; 15:15–18.
23. Köckerling F, Stechemesser B, Hukauf M, Kuthe A, Schug-Pass C. TEP versus Lichtenstein: which technique is better for the repair of primary unilateral inguinal hernias in men? Surg Endosc.2016; 30:3304–3313.
24. Salido Fernandez S, Fraile Vilarrasa M, Osorio Silla I, Georgiev Hristov T, Bernar de Oriol J, González-Ayora S, Pardo García R, Guadalajara LH. Extended totally extraperitoneal (eTEP) approach for ventral hernia repair: initial results. Cir Esp 2020; 98:260– 266.
25. Mitura K, Rzewuska A, Skolimowska-Rzewuska M, Romańczuk M, Kisielewski K, Wyrzykowska D. Laparoscopic enhanced-view totally extraperitoneal Rives–Stoppa repair (eTEPRS) for ventral and incisional hernias - early operative outcomes and technical remarks on a novel retromuscular approach. Wideochir Inne Tech Maloinwazyjne.2020; 15:533–545.
26. Prakhar G, Parthasarathi R, Cumar B, Subbaiah R, Nalankilli VP, Praveen Raj P, Palanivelu C.Extended view: totally extra peritoneal (e-TEP) approach for ventral and incisional hernia-early results from a single center. Surg Endosc. 2020.
27. Baig SJ, Priya P. Extended totally extraperitoneal repair (eTEP) for ventral hernias: Short-term results from a single centre. J Minim Access Surg.2019; 15:198–203.
28. Novitsky YW, Elliott HL, Orenstein SB, Rosen MJ. Transversus abdominis muscle release: a novel approach to posterior component separation during complex abdominal wall reconstruction. Am J Surg.2012; 204:709–716