Personal Viewpoint

Enhanced view totally extraperitoneal approach: The best available option for recurrent incisional hernias following previous laparoscopic intraperitoneal onlay mesh plus repairs

K. Ganesh Shenoy

Department of Minimal Access, GI and Bariatric Surgery, Fortis Hospital, Bengaluru, Karnataka, India

Abstract

The available options for recurrent incisional hernias (RIH) following previous laparoscopic intraperitoneal onlay mesh (IPOM) plus were open onlay repair, open Rives–Stoppa (RS), laparoscopic enhanced view totally extraperitoneal-RS (ETEP-RS) and laparoscopic subcutaneous onlay mesh repair. Majority of these RIH were managed by open onlay mesh repairs or laparoscopic Redo IPOM plus. There are not much data available in the literature on the ETEP approach for RIH following previous IPOM plus with the placement of mesh in the retrorectus space. In this article, I would like to share technical aspects, challenges faced and tips to overcome these challenges of performing ETEP for RIH following previous IPOM plus repairs.

Keywords: Enhanced view totally extraperitoneal-Rives–Stoppa for recurrent incisional hernia, recurrence following intraperitoneal onlay mesh plus, recurrent incisional hernia, transversus abdominis release for recurrent incisional hernia

Address for correspondence: Dr. K. Ganesh Shenoy, Department of Minimal Access, GI and Bariatric Surgery, Fortis Hospital, No. 14, Cunningham Road, Vasanth Nagar, Bengaluru - 560 052, Karnataka, India.
E-mail: drshenoyganesh@gmail.com

Submitted: 31-May-2024, **Revised:** 28-Jul-2024, **Accepted:** 21-Aug-2024, **Published:** 09-Oct-2024

INTRODUCTION

Recurrent incisional hernias (RIH) after previous mesh repair meet the criteria for complex abdominal wall hernias.[1] Usually, surgeons feel comfortable in performing surgeries in a virgin plane in RIH. This is the reason behind why laparoscopic intraperitoneal onlay mesh (IPOM) plus was favoured in cases where the primary repair was an anterior open repair with smaller defect size. The updated guidelines of the European Association of Endoscopic Surgery and the European Hernia Society (EHS) state that, as a strong recommendation (panel consensus 100%), 'incisional hernia recurrence can be treated by laparoscopy either after primary open or laparoscopic surgery without the need for mesh removal'.[2] Unlike redolaparoscopic inguinal hernia (IH) repair for recurrences following previous laparoendoscopic repair, majority of the surgeons trained in performing laparoscopic IPOM plus repair were confident of redo IPOM repairs. The most common difficulty encountered in redo IPOM was bowel adhesions to the previously placed composite mesh (CM) unlike in groin hernias where there are major

Access this article online	
Quick Response Code:	Website: https://journals.lww.com/JMAS
	DOI: 10.4103/jmas.jmas_152_24

How to cite this article: Shenoy KG. Enhanced view totally extraperitoneal approach: The best available option for recurrent incisional hernias following previous laparoscopic intraperitoneal onlay mesh plus repairs. J Min Access Surg 2025;21:217-22.

neurovascular structures and urinary bladder to deal in addition to fibrosed planes due to previous surgery and polypropylene (PP) mesh. Most of the adhesions in redo IPOM were flimsy and surgeons could perform safe adhesiolysis. In case of dense adhesions, part of the mesh or posterior rectus sheath (PRS) was left on the bowel wall to avoid risk of enterotomy. However, we have very less/no information about the physiology of mesh integration when a new CM was placed over the previously placed CM. Placing another CM over the previous one carries the same risk of complications of intraperitoneal mesh.

Although one may feel previous IPOM may not interfere as enhanced view totally extraperitoneal (ETEP) is a new virgin plane, the challenges encountered in managing these hernias by ETEP approach were difficult RR space creation due to the following reasons:-

1. Adhesion of the PRS to the rectus muscle due to previous mesh which is fixed to PRS using tacks
2. Increased fibrosis in the space
3. Presence of titanium tacks and transfascial (TF) sutures
4. Bowel adhesions to the CM requiring meticulous adhesiolysis with a possibility of increased chances of enterotomy
5. Frequent need for transversus abdominis release (TAR) in view of fibrosed and thickened PRS-peritoneum complex preventing approximation without tension.

In this article, I would like to share technical aspects, challenges faced and tips to overcome these challenges of performing ETEP for RIH following previous IPOM plus repairs.

Thirteen patients (mean age was 64 years, with 9 women and 4 men) underwent laparoscopic ETEP-Rives–Stoppa (RS)/TAR from January 2022 to December 2023 at our centre. Previous patients' records and operative details from other centres were checked from available discharge summary of all 13 patients. Surprisingly, all the RIH were midline recurrences; 3 patients underwent ETEP-RS and 10 patients required TAR. Amongst patients who underwent ETEP-RS, all were W1 hernias. Out of 10 patients who underwent TAR, 6 required right sided and 4 bilateral TAR. The most common reason for performing TAR in these patients was inability to perform tension-free posterior closure in spite of reducing the pressure to 6 mmHg. Of the six patients who required right-sided TAR, four patients had W1 and two had W2 RIH. All four patients who underwent bilateral TAR had W2 defects.

The mean operating time was 125 min for ETEP-RS, 155 min for ETEP-right TAR and 185 min for ETEP-bilateral TAR. There was no conversion to open/hybrid procedure. The duration of stay was 2–3 days. There was no re-recurrence during the follow-up period of 6 months–2 years.

SPACE CREATION AND PORTS

For IPOM plus, the port sites will usually be lateral to linea semilunaris (LS), whereas in ETEP-RS, all the ports will be within LS. The creation of RR space would be challenging in cases where the previous CM was extending till the LS or crossing LS. This is due to fused planes between rectus abdominus (RA) muscle and PRS caused by fibrosis secondary to previous mesh fixation to PRS with tacks and TF sutures. This can be overcome by entry through left hypochondrium where intraperitoneal mesh may not usually extend. A 10 mm blunt trocar was inserted in RR space and used as camera port (CP) and the RR space was created. The 1st 10-mm secondary port (SP) was placed 8 cm below the CP and 2nd 5-mm SP was placed at the left lumbar region within LS [Figure 1a and b]. After cross over, another 5-mm SP was placed in the right RR space [Figure 1c]. This was followed for M2-M5 hernias. In case of M1 hernias, the initial ports were the same on the left side. After cross-over, another 10-mm port was placed at the umbilicus and an additional 5-mm SP was placed in the right RR space for performing bilateral TAR [Figure 1d].

CROSS-OVER

The challenges faced during cross-over are to define the exact seam of PRS and LA, early pneumoperitoneum due to short falciparum ligament (FL) if it had been dissected during primary surgery for adequate mesh coverage, thickened fibrosed PRS due to previous mesh and fixation, increased chances of LA breach as it becomes difficulty to identify the junction of LA and PRS.

During cross-over, the CP was shifted to middle 10-mm port. The PRS was incised 5 mm from its insertion to LA [Figure 1e]. It is difficult to identify the exact junction of right PRS to LA due to the presence of previous mesh. Any attempt at incising the assumed PRS/LA junction may result in LA breach as the previous mesh would have covered the LA also [Figure 1f]. In such cases, the FL was lifted meticulously, incised with cold scissors or harmonic shears to have an intraperitoneal entry. This technique enables to identify the right-sided PRS by intraperitoneal view [Figure 1g]. The technique of applying bursts of monopolar diathermy over the assumed PRS and to look for twitching of the underlying RA muscle may not be successful in all the cases in the presence of previous mesh. Having an intraperitoneal view, identifying and incising the

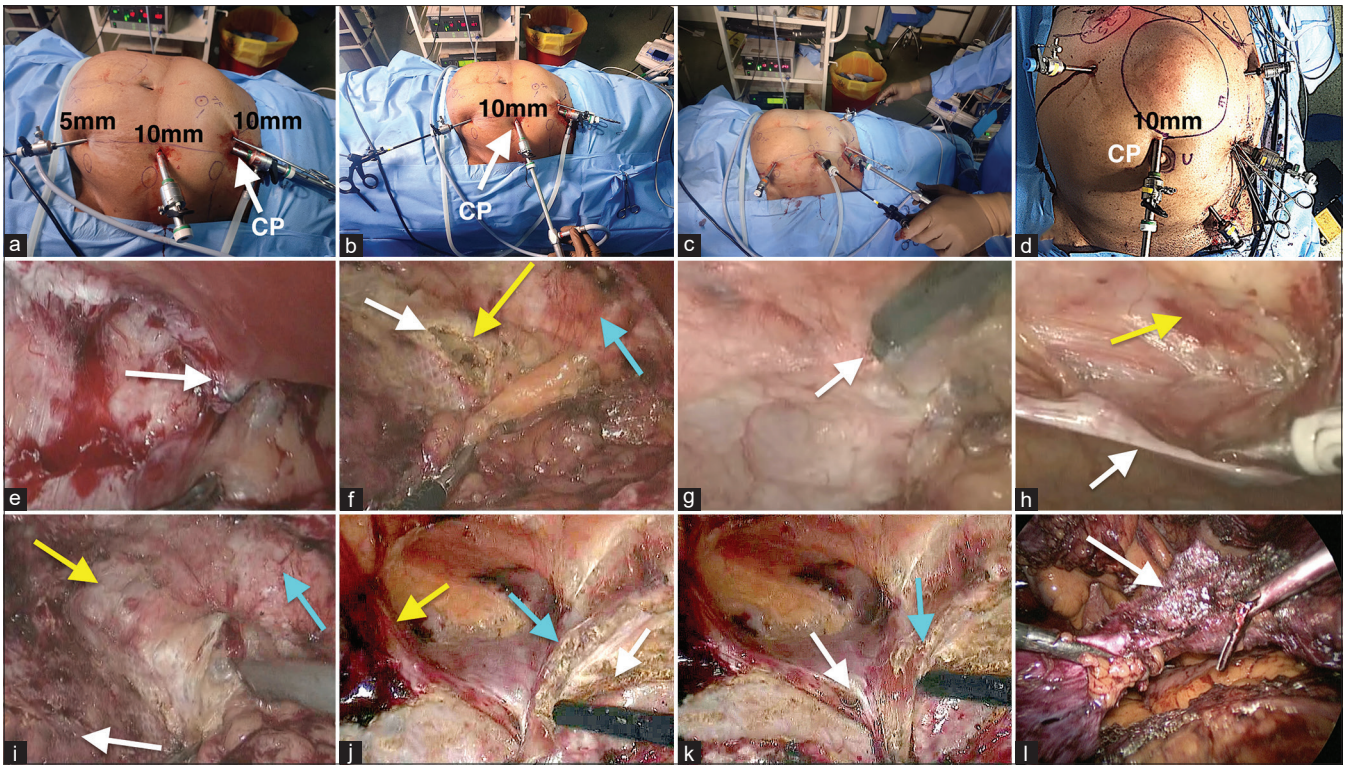

Figure 1: (a) Primary port/Camera port in left hypochondrium (white arrow: Camera port [CP]), (b) Ports during midline cross-over in M2–M5 hernias (Note the change in CP being shifted, white arrow - CP), (c) Ports placements for ETEP-RS/Right sided TAR for M2-M5 hernias, (d) Ports placements for M1 hernias after cross over to perform bilateral TAR (CP), (e) posterior rectus sheath incised 5 mm from its insertion to LA (white arrow: metal tack), (f) LA and previous composite mesh (blue arrow: Linea alba, white arrow: previous composite mesh, yellow arrow: Linea alba breach), (g) Identification the right sided PRS by intra-peritoneal view (white arrow: Right PRS). (h) Incision of Right PRS and identifying right rectus muscle (white arrow: Right PRS, yellow arrow: Right rectus muscle). (i) Incision of right PRS extended proximally to define the right retro-rectus space (white arrow: Right PRS, yellow arrow: Right retro-rectus space, blue arrow: Linea alba). (j) Fibrosed PRS-peritoneal complex (yellow arrow: neuro-vascular bundle, white arrow: Previous mesh with fibrosed PRS, blue arrow: Transversus abdominis muscle). (k) Previous tacks over the transversus abdominis muscle (white arrow: previous metal tack, blue arrow: transversus abdominis muscle). (l) Fibrosed PRS of both sides (white arrow: PRS). CP: Camera port

right PRS and then extending the RR space proximally towards xiphoid is safer [Figure 1h and i]. In this technique, the breach of LA due to misidentification can be avoided. In case of short FL, when early pneumoperitoneum is encountered, it is advisable to continue to incise the left PRS so that the gas diffuses more into the peritoneal cavity and will not hamper the pre-peritoneal space. Extended space creation was the technique followed in case of ETEP approach for difficult IHs and the insertion of Veress needle to regain the space was not required.

POSTERIOR CLOSURE

The PRS-peritoneal complex will be fibrosed and thickened preventing tension-free closure [Figure 1j]. No attempt should be made to remove the previously placed CM from PRS-peritoneal complex. Any attempt to remove would result in multiple defects in the PRS/peritoneum which would be difficult to close. The ability to perform tension-free PRS approximation should be assessed after reducing the pressure to 6 mmHg. In cases, where there is difficulty in tension-free approximation, the following manoeuvres are advised to increase the peritoneal purchase before deciding on TAR: Dissection of space of Bogros, adhesiolysis under the PRS-peritoneal-mesh complex and division of round ligaments close to peritoneal reflection in females. If tension-free approximation could not be achieved through the above manoeuvres, then a down to up TAR to be performed. In cases when we felt the posterior closure was still under tension, a decision was taken to perform complete right-sided/bilateral TAR. The presence of previous mesh, tacks and fibrosis does pose challenge [Figure 1k and l]. It is advisable to start TAR at a point where there is less/no fibrosis [Figure 2a and b] and the same plane to be maintained upwards and downwards. The PRS-peritoneal mesh complex was closed in a continuous manner in the direction of least tension [Figure 2c].

SPECIAL SITUATIONS

1. In one case of W2 hernia, in spite of bilateral TAR, the PRS approximation was under tension in

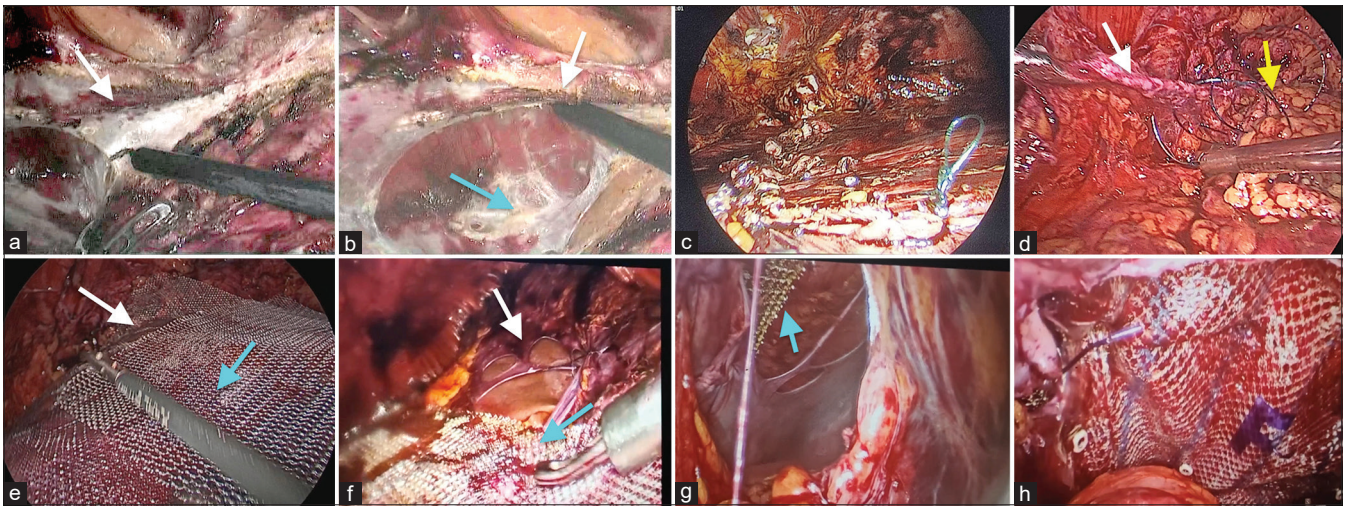

Figure 2: (a) Transversus abdominis release (TAR) started at an area of less fibrosis (white arrow: TA muscle), (b) Right sided TAR (white arrow: TA muscle, blue arrow: pretransversalis plane), (c) Posterior closure, (d) Omentum sutured to the edge of PRS-mesh complex (yellow arrow: omentum, white arrow: PRS-mesh complex), (e) TiMESH overlapped with polypropylene mesh (white arrows: TiMESH, blue arrow: PP mesh), (f) Multiple peritoneal rents after TAR (white arrow: peritoneal rents, blue arrow: PP mesh), (g) Intraperitoneal view: note the peritoneal rent, (h) IPOM repair with composite mesh

spite of decreasing the intra-abdominal pressure to 6 mmHg. In this case, the omentum was used to help in posterior reconstruction along with the PRS-mesh complex [Figure 2d]. The omentum was brought down and was sutured to the edges of the PRS mesh complex as a bridge/plug to cover the gap between the two edges of PRS-mesh complex. In this case, I used a 20 cm × 15 cm TiMESH (titanium coated-PP mesh, Healthium Medtech Ltd., Bengaluru) in the pre-peritoneal space where omentum was used as plug and 20 cm × 22 cm PP mesh overlapping it and to cover the rest of the dissected space [Figure 2e]

2. In another case of W2 hernia, after bilateral TAR, there were rents in the peritoneum near subcostal region. That could not be closed due to very thin peritoneum and the omentum was also deficient to reach that space [Figure 2f]. This was a situation where there were multiple small peritoneal rents near the subcostal region where the transversus abdominis muscle is usually densely adherent to the peritoneum. Near this area while performing TAR, peritoneal rents are common. The peritoneum was very thin in this patient and was not holding sutures in spite of decreasing the intra-abdominal pressure to 6 mmHg. If I had left the peritoneal rents without closure or any form of bridging, the rents would have enlarged due to any increase in intra-abdominal pressure in the post-operative period and would have resulted in increased risk of bowel herniation and obstruction through this peritoneal defect or rents (similar to PRS rupture). It would have also exposed the PP mesh through the rents and have resulted in increased risk of bowel adhesions to the exposed PP mesh through these rents. Omentum bridging is one of the techniques mentioned to bridge these defects. However, in this patient, the omentum was deficient and could not reach the subcostal space. It would have been also difficult to suture the omentum to the edges of very thin peritoneum as the peritoneum would not have held sutures as it was very thin. In order to avoid these increased risk of bowel adhesions/obstruction due to herniation through this peritoneal rents in the post-operative period, I went intraperitoneally and placed a 15-cm circular CM and fixed with tacks to cover the peritoneal rents [Figure 2g and h].

For complex abdominal wall hernias, the perforator-sparing, endoscopic and posterior component separation techniques (TAR) are recommended.[3] RIH after previous mesh repair meets the criteria for complex abdominal wall hernias. This shows that in these cases, based on my experience that TAR was required not only based on the defect size, but more importantly for tension-free posterior closure. This is due to thickened, fibrosed PRS-peritoneal complex preventing medialisation and tension-free closure without TAR.

In our series, in one patient, there was initial entry into the peritoneal cavity as the entry was lateral to LS. The peritoneum was closed, and new RR space was created medial to the LS. Breach of LA during cross over, bleeding from inferior epigastric vessel (IEV), LS injury during dissection was encountered in one patient each. Seroma

was seen in one patient with M3 hernia which resolved in 4 weeks.

The disadvantages of ETEP approach in managing these hernias are requirement of superior skill set, need for TAR sometimes even for W1 hernia and lack of availability of long-term data. It has now been proved without doubt that ETEP-RS in addition of being a minimally invasive procedure has several advantageous compared to other alternative approaches mentioned such as better mesh integration from both sides, less pain, fewer chances of bowel adhesions, less chances for recurrence and also being economical due to the placement of less expensive mesh and less need for fixation. In ETEP-RS/TAR, a larger area was dissected so bigger mesh can be placed with no/less obstructive bowel complications as the mesh was placed in the RR space. In case of subcutaneous onlay mesh,[4] even though it is minimally invasive, performed at virgin subcutaneous plane with no need of intraperitoneal entry and adhesiolysis, it is effective only in cases of small recurrences, need for drain placement and increased risk of seroma due to larger dissection. It also does not contribute to reconstruct the abdominal wall or restore its function. The ETEP-RS approach, according to Pascal's law, provides a plane for reinforcement of the abdominal wall[5] unlike other alternative procedures described.

The high variability in recurrence rates described in the literature is due to inadequate patient standardisation and short follow-up periods. Nardi *et al*.[6] in their study described the main causes of RIH is defect size >5 cm, W2 of EHS classification, overlap <5 cm, body mass index >30 kg/m^2 and presence of significant comorbidities. Christoffersen *et al*.[7] in their study noted recurrence rate of 28.5% and 18% when an absorbable or non-absorbable tacker was used, respectively, in IPOM repair. Recent data suggest that a minimum overlap of 5 cm is necessary and that as the defect diameter increases, the extent of overlap becomes more important.[8] In our study, the common cause for recurrences was thought to be smaller size mesh for a larger defect, IPOM performed for defects more than 6 cm, insufficient mesh overlap from margins of defect, inadequate centralisation of mesh, incomplete coverage of entire scar area by mesh, unrepaired divarication of recti, weight gain, mesh contraction and TF sutures. Amongst 13 patients, 7 patients had fixation with non-absorbable and 6 with absorbable tacks.

Ferrari *et al*.[9] in their case series of 69 cases of RIH treated by laparoscopic IPOM repair using expanded polytetrafluoroethylene mesh noted 5 intraoperative complications (7.2%) -3 bowel injuries treated by laparoscopic sutures, 1 omentum bleeding and 1 IEV bleed. Overall morbidity was 13% with seroma lasting over 8 weeks in 8.7% and recurrence rate was 5.7% during a mean follow-up of 41 months. In our case series of 13 patients who underwent ETEP-RS/TAR, there was no enterotomy, 1 patient each had IEV bleed, LA breech and LS injury. Seroma was seen in 1 patient which resolved in 4 weeks. There was no conversion to open/hybrid repair and there were no recurrences in the follow-up period of 24 months.

After extensive literature search, we could find only one article by Shakya *et al*.[10] who performed ETEP-RS in three patients of RIH, 1 after an open onlay repair, another after an onlay mesh repair of a subcostal incision for open cholecystectomy followed by an IPOM repair and another after IPOM repair of epigastric hernia. There was no mention about the challenges faced during this approach in RIH. In our study, we have excluded the RIH cases following open repair as it did not pose extrachallenge in managing by ETEP approach as the previous onlay PP mesh placed did not interfere with the planes of our dissection. We believe, this is the first original article which address about the challenges and technical aspects and tips to overcome the difficulties in performing ETEP RS/TAR in case of RIH following previous IPOM repairs. The limitations of our study were a small sample size, need for TAR for W1 defects, no lateral RIH and short follow-up period.

Based on my short-term experience, I would like to propose that laparoscopic ETEP for the management RIH following previous IPOM plus repairs is not an easy option, but it is safe, effective and one of the best available option in experienced hands. The benefits of performing the ETEP approach in such cases outweigh the challenges. Larger studies and long-term follow-up are required to have an evidence-based answer.

Financial support and sponsorship

Nil.

Conflict of interest

There are no conflicts of interest.

REFERENCES

1. Slater NJ, Montgomery A, Berrevoet F, Carbonell AM, Chang A, Franklin M, *et al*. Criteria for definition of a complex abdominal wall hernia. Hernia 2014;18:7-17.
2. Silecchia G, Campanile FC, Sanchez L, Ceccarelli G, Antinori A, Ansloni L, *et al*. Laparoscopic ventral/incisional hernia repair: Updated guidelines from the EAES and EHS endorsed consensus development conference. Surg Endosc 2015;29:2463-584.

3. Liang MK, Holihan JL, Itani K, Alawadi ZM, Gonzalez JR, Askenasy EP, *et al*. Ventral hernia management: Expert consensus guided by systematic review. Ann Surg 2017;265:80-9.
4. Makam R, Chamany T, Nagur B, Bilchod SS, Kulkarni A. Laparoscopic subcutaneous onlay mesh repair for ventral hernia: Our early experience. J Minim Access Surg 2023;19:223-6.
5. Balachandran P, Tirunelveli Sivagnanam S, Swathika VC. Hernia sac preservation for prevention of transversus abdominis release in laparoscopic extended-totally extra peritoneal repair of ventral hernia: A minimalistic solution for a formidable challenge. J Abdom Wall Surg 2022;1:10634.
6. Nardi M Jr., Millo P, Brachet Contul R, Lorusso R, Usai A, Grivon M, *et al*. Laparoscopic ventral hernia repair with composite mesh: Analysis of risk factors for recurrence in 185 patients with 5 years follow-up. Int J Surg 2017;40:38-44.
7. Christoffersen MW, Brandt E, Helgstrand F, Westen M, Rosenberg J, Kehlet H, *et al*. Recurrence rate after absorbable tack fixation of mesh in laparoscopic incisional hernia repair. Br J Surg 2015;102:541-7.
8. LeBlanc K. Proper mesh overlap is a key determinant in hernia recurrence following laparoscopic ventral and incisional hernia repair. Hernia 2016;20:85-99.
9. Ferrari G, Bertoglio C, Magistro C, Girardi V, Mazzola M, Di Lernia S, *et al*. Laparoscopic repair for recurrent incisional hernias: A single institute experience of 10 years. Hernia 2013;17:573-80.
10. Shakya VC, Byanjankar B, Pandit R, Pangeni A, Shrestha AR. e-TEP retromuscular repair for recurrent incisional hernias: Report of three cases. Cas Rep Surg 2019;2019:1-6.