European Review for Medical and Pharmacological Sciences 2021; 25: 5452-5457

Recurrent complex incisional hernia repair by enhanced-view totally extraperitoneal (eTEP) technique

C. BRASSET[1], P. ALLEMANN[2], M.O. SAUVAIN[3]

[1]Division of Visceral Surgery, University Hospitals of Geneva, Geneva, Switzerland
[2]Division of General Surgery, La Source Clinic, Lausanne, Switzerland
[3] Division of General Surgery, Réseau Hospitalier Neuchâtelois, Neuchâtel, Switzerland

Abstract. – OBJECTIVE: Treatment of large recurrent abdominal wall hernias remains a surgical challenge. The enhanced-view totally extraperitoneal (eTEP) approach is an emerging technique used to treat hernias with minimally invasive procedure. This article illustrates a step-by-step eTEP approach, used in a complex recurrent hernia repair.

PATIENTS AND METHODS: A 56-years-old male had a previous epigastric hernia repair with an intraperitoneal onlay mesh (IPOM) technique in 2018. Six months later, he presented a recurrent epigastric protrusion and a new painful ombilical hernia, objectified on the CT-scan.

RESULTS: Four suprapubic trocars were used to dissect the preperitoneal space below the arcuate line and the retromuscular spaces on both sides. On the mid-line, posterior fascia was divided and both hernia sacs were fully dissected. Both anterior and posterior sheats were closed with self-locking non-absorbable threads before placing a Polypropylene self- gripping mesh. The follow-up was uneventful, and the patient was discharged at day 2.

CONCLUSIONS: This case report illustrates that eTEP technique can be used safely and effectively to treat complex recurrent ventral hernias even with a mesh already in place. The potential advantages of the eTEP procedure are multiple, such as improving mobility and esthetic results, reducing pain and shorting hospital length of stay.

Key Words:
Recurrent epigastric hernia, Ombilical hernia, eTEP, Abdominal wall repair.

Introduction

Ventral hernia repair is one of the most common surgical procedures, partially due to the high incidence of incisional hernias after abdominal surgery. Despite a large panel of repair techniques, surgeons are seeking for the best one for years. The aim is to offer a durable repair without recurrence and with low morbidity[1].

Historically, the gold standard procedure was the Rives-Stoppa technique[2]. However, this technique is still associated with a substantial morbidity including pain, site infections and seroma[3]. Since 1993, laparoscopic technique has emerged emerged as an attractive alternative to open procedures. The intraperitoneal onlay mesh hernioplasty (IPOM) was developed to treat small wall defect. The encouraging short-term results and its technical simplicity promoted this technique. However, over time, the IPOM technique showed its limitations and numerous long-term complications were reported[4,5]. The main issue was the intraabdominal position of the mesh with the potential to create enterocutaneous fistulas, adhesive bowel obstruction and mesh erosion, due to its direct contact with the intestines[4]. Moreover, the wall defect is often not closed and, therefore, the normal anatomy not restored[5,6]. To avoid those major complications, Daes and al[7,8] combined the Rives-Stoppa principles (defect closure, approximation of the posterior layer and mesh placement in the retromuscular space) with a laparoscopic approach[7-11]. In 2017, Belyansky et al[12] modified this enhanced-view totally extraperitoneal (eTEP) procedure for ventral hernia repair[9-12]. They showed that the advantages are numerous, including faster recovery and better anatomical and functional restoration of the abdominal wall. Furthermore, the sublay mesh position avoid the presence of an intraperitoneal foreign body, limiting the risk of bowel lesion[9,13]. The possibility to perform component separations of the lateral muscles laparoscopically, such as transversus abdominis release (TAR) open new perspectives to

Corresponding Author: Marc-Olivier Sauvain, MD; e-mail: marc-olivier.sauvain@rhne.ch

treat large wall defects[9,14]. Nevertheless, this eTEP procedure is a challenging laparoscopic intervention with increased operative time even more so in case of large recurrent hernias[13,15].

The aim of this paper is to describe our adaptation of the eTEP technique to repair multiple complex and recurrent ventral hernias.

Patient and Methods

Patient

Our 56-years old obese male patient (BMI 32.4 kg/m²) presented a recurrent epigastric hernia already treated in 2018 with an intraperitoneal onlay mesh (IPOM) repair. He also had a history of bilateral inguinal hernia repair in 2003 and 2012. In June 2019, the patient came with a recurrent epigastric protrusion, without pain, and a newly developed painful umbilical hernia. A CT scan (Figure 1) revealed both recurrent epigastric hernia with mesh protrusion and an umbilical hernia with fatty content. The collar sizes were 40x19 mm and 33x26x29 mm, respectively. The hernia sac measured 54x21x44 mm. We decided to repair these defects by adapting the enhanced-view totally extraperitoneal (eTEP) technique. The patient gave his written informed consent for surgical procedure.

Surgical Technique Description

The patient was in dorsal decubitus, arms alongside his body. The table was slightly flexed at the pelvis (Figure 2). Before the incision, he received 2 g kefazolin i.v. We started by a 10 mm lower umbilical incision. Then, the right anterior fascia of the rectus abdominis was opened. The major steps of the eTEP procedure are:

- Pre-peritoneal dissection;
- Extensive right retrorectus space dissection;
- Hernia release;
- Extensive left retrorectus space dissection;
- Closure of the posterior and anterior layer defects;
- Mesh placement;
- Exsufflation and closure.

Pre-Peritoneal Dissection

The lower umbilical incision allowed us to insert the optic trocar. Pneumoperitoneum was maintained at 12 mmHg pressure during the whole procedure. The right pre-peritoneal space was released using the camera. An additional 10 mm supra-pubic trocar was introduced in the midline, allowing the subsequent placement of the camera.

Extensive Right Retrorectus Space Dissection

Through the umbilical incision, the right retrorectus space could be dissected laterally and the left pre-peritoneal space (Bogros space) was also opened. Then, two 5 mm trocars were inserted at the level of the antero-superior iliac spines, left and right. Figure 3 shows the final trocar positions used to release the right retrorectus space up to the right lower ribs (Figure 4).

Hernia Release

After this extensive dissection, the hernia sac could be easily identified, above the umbilicus. The old mesh and a rectus abdominis diastasis were also visible (Figure 5). The *linea alba* and the umbilicus were cut (Figure 6). The hernia dissection was also used to open the left posterior layer.

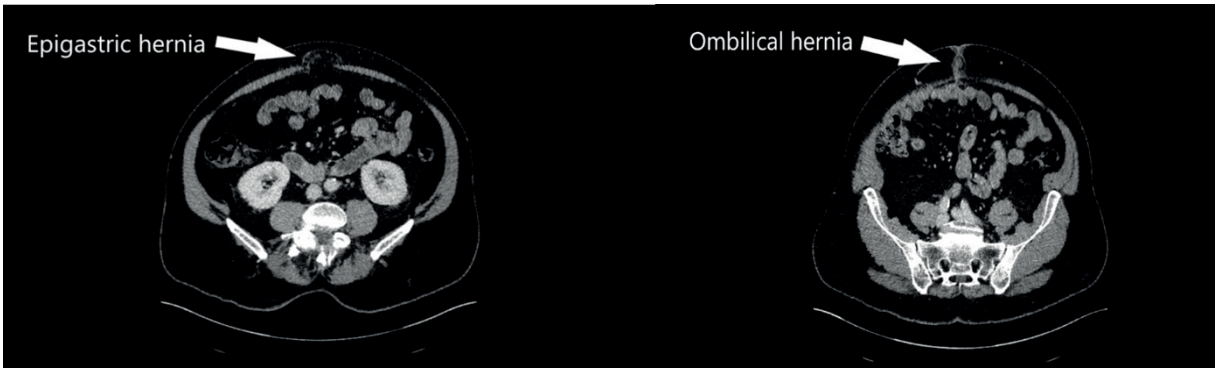

Figure 1. Pre-operative CT scan: the arrows show the recurrent epigastric hernia with mesh protrusion and the ombilical hernia with fatty content.

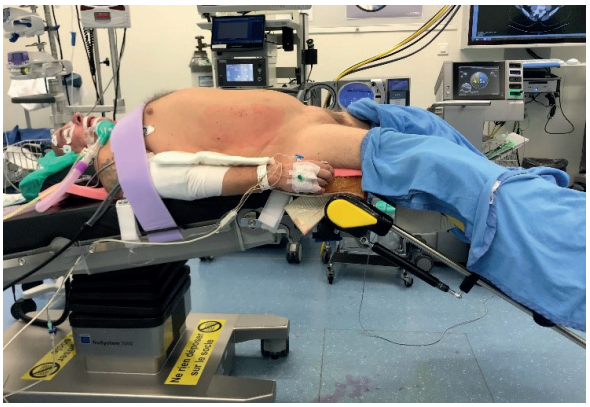

Figure 2. Patient positioning: the patient was in dorsal decubitus, arms alongside his body. The table was flexed at the pelvis.

Extensive Left Retrorectus Space Dissection

The left retrorectus space was then dissected up to the diaphragm, releasing a wide retrorectus space (Figure 7).

Closure of the Posterior and Anterior Layer Defects

The posterior layer defect was closed using two absorbable 2-0 self-locking threads (V-lock®, Medtronic). We sutured the anterior layer with a non-absorbable 0 self-locking suture (V-lock®, Medtronic) in running fashion. Taking the hernia sac into the suture permitted the reinforcement of the repair (Figure 8).

Mesh Placement

When both defects were repaired, the large space created previously was filled with a 15x30 centimeters polypropylene self-gripping mesh (Parietex® Progrip®, Medtronic) (Figure 9). No further fixation was used.

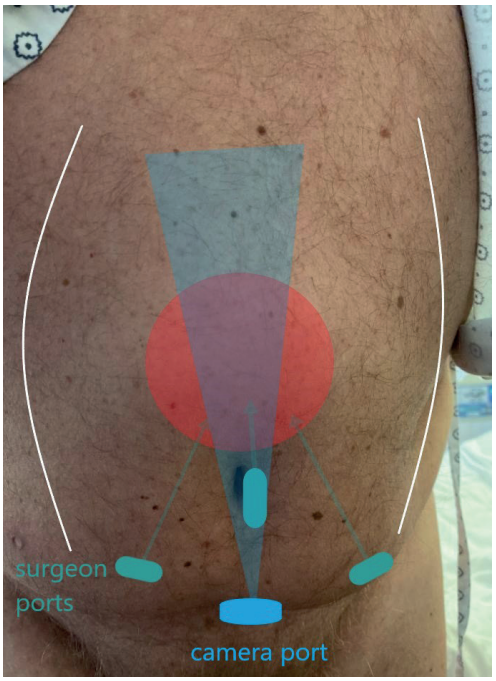

Figure 3. Trocars positioning: the hernia area is designated by the red circle, the camera port by the blue one and the working trocars by the green zones. The white lines represent approximatively the lateral extent of the dissection.

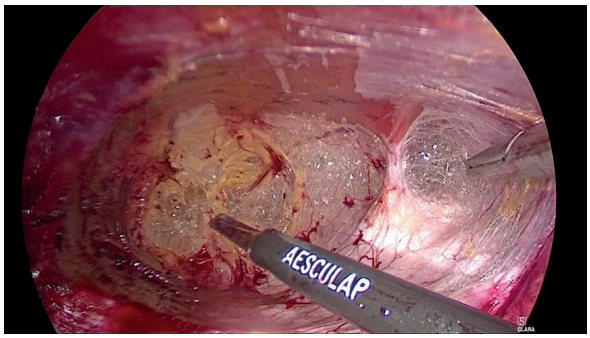

Figure 4. Right retrorectus space: releasing of the right retrorectus space to the linea arcuate on the right side.

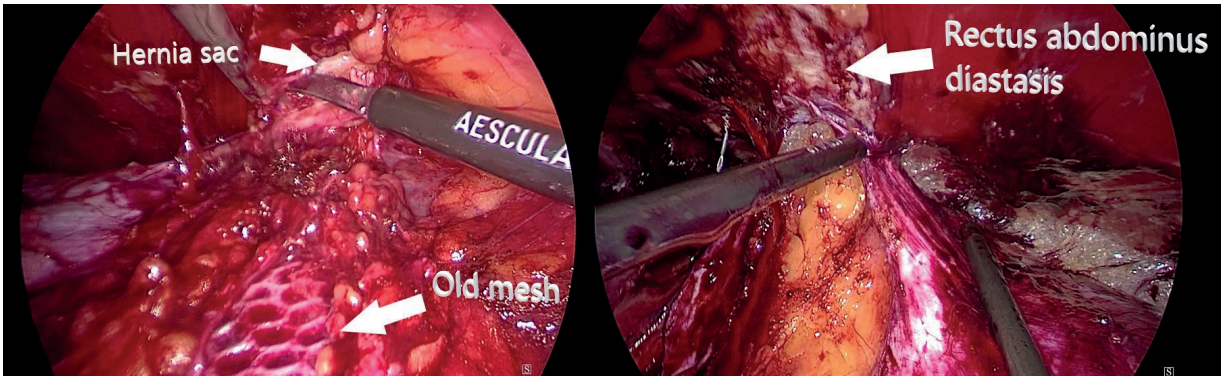

Figure 5. Hernia sac, old mesh and rectus abdominis diastasis: after the large right dissection, we could visualize the umbilical hernia sac with the old mesh and an associated rectus abdominis diastasis (white arrows)

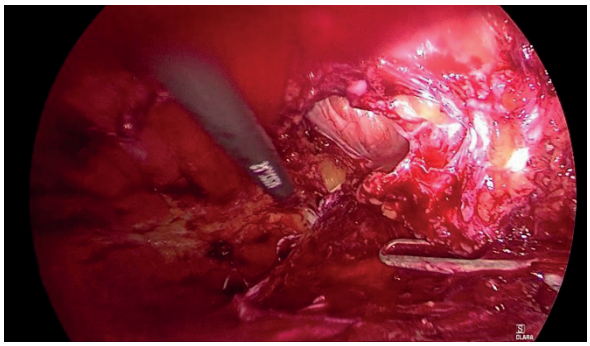

Figure 6. Hernia releasing: dissection of the linea alba and the umbilical hernia sac, to facilitate the left space dissection.

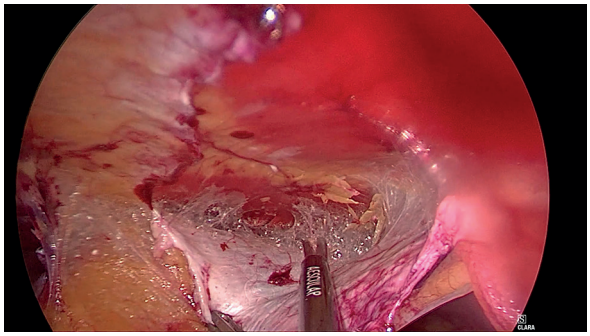

Figure 7. Extensive left retrorectus space dissection: a wide space has been freed, easily dissected after the previous linea alba cutting.

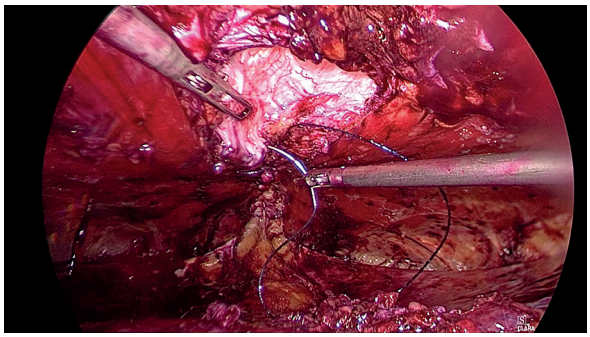

Figure 8. Closing of the anterior defect: the hernia sac was took background into the suture to reinforce the repair.

Exsufflation and Closure

The exsufflation was done under visual control to prevent mesh dislocation (Figure 10). The trocars were removed, and the anterior muscle fascia was closed with a 1 absorbable breaded suture (Vicryl™ UR-6, Ethicon®). The cutaneous suture was done with a 4-0 resorbable overlock (Monocryl™, Ethicon®). We applied topical skin adhesive on the incisions (Dermabond®, Ethicon®).

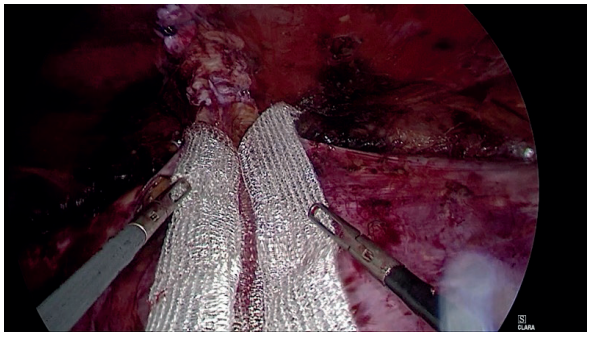

Figure 9. Mesh placement : the mesh was introduced rolled up in the abdominal cavity. It had to be unfolded to cover all the dissected space and not only the hernia orifice.

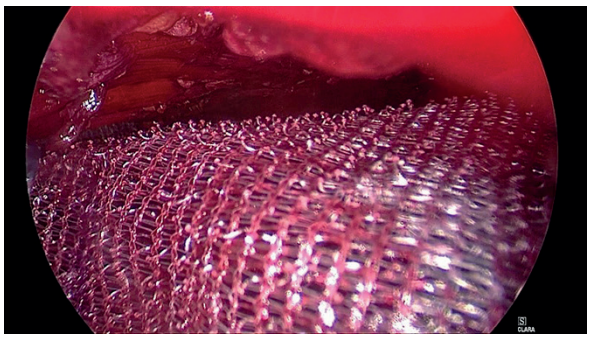

Figure 10. Final mesh position and exuflation: the mesh was not fixed with tacks. For this reason, it was essential to check the final position of the mesh during the exuflation. The adherences are above the mesh, in anterior position.

Results

The follow-up was uneventful. Refeeding and mobilization were possible on the operative day. The patient was discharged at day 2. He did not complain about abdominal pain with simple painkillers medication composed by paracetamol 1 g four times a day and ibuprofen 400 mg three times a day if necessary. We recommend wearing a compression belt (Easybelt®, Cerecare®) 24/7 for one week and then all day until the next clinical control 2 weeks later. The wounds were clear, and no sign of infection was detected. The patient could resume his professional activity full time after 6 weeks of rest. We met the patient for a second follow-up 2 months later. He was pleased with the intervention and had no complain. There was no hernia recurrence.

Discussion

Laparoscopic techniques in ventral hernia repair have become more and more popular in re-

cent years. Nevertheless, surgeons prefer the open approach in case of large defects even if this technique is embedded with increased pain and functional limitation at mid-term[10,16]. Last recommendations from the International Endohernia Society (IEHS) suggest that laparoscopic approach should preferably be reserved for defects sizes smaller than 15 centimeters in diameter. Nevertheless, open techniques are associated with more risks of wound infection and longer length of hospital stay[9-11].

The eTEP procedure for abdominal wall repair combines the advantages of laparoscopy by reducing pain, improving mobility and shortening the length of hospital stay with the same reconstructions and sublay mesh placement as open surgery[9,11,13]. This specific technique is also known to be associated with fewer recurrences and less surgical site infection, avoiding contact between mesh and intraperitoneal organs[9-11,13,14,17]. In case of rectus diastasis, this technique also allows the suture of *linea alba*, restoring function and improving aesthetic[9].

The slight modification of the classical eTEP procedure was due to the position of the hernia sac of the umbilical hernia in the midline. Its dissection first improved the releasing of the left retrorectus space. The hernial sac was incorporated in the suture, which is not systematically done in the classic eTEP procedure, to improve the stability of the abdominal wall.

In our case, the previous IPOM did not impinge on our dissection as the retromuscular space was not previously opened. The combination of a wide retromuscular dissection and the use of a self-adhering mesh has the potential to reduce chronic wall pains substantially[9-11]. Moreover, this laparoscopic procedure reduces the risk of seroma formation, post-operative infections and allows better cosmetic results than the Rives-Stoppa procedure[12,14]. However, this technique has some disadvantages. It is technically challenging and rise the operative time. There are important ergonomic challenges, and the technique requires extensive expertise in minimal invasive surgery[18]. The challenging aspects of the laparoscopic eTEP could be alleviated by the venue of the robot-assisted surgery. It permits more comfortable and ergonomic operating positions, with 3D-videoscopy. Increasing degrees of freedom improves dexterity and novice surgeons learn more quickly and in better conditions[11,18]. It also allows the extending of minimal invasive indications to more complex patients (obese, larger defects, …). But robotic techniques tend to rise operative time and costs[11].

Conclusions

The eTEP technique can be used safely and effectively to treat complex recurrent ventral hernias even with large defects and a mesh already in place. This procedure allows to restore the physiology and functionality of the abdominal wall. It is a minimally invasive technique, associated with shorter length of hospital stay and reduced pain. However, eTEP is technically challenging and more long-term follow-ups are needed to evaluate it efficiency.

Conflict of Interest

Doctors Brasset, Sauvain and Allemann declare that they have no relevant conflicts of interest or financial ties to disclose.

References

1) Ventral Hernia Working Group, Breuing K, Butler CE, Ferzoco S, Franz M, Hultman CS, Kilbridge JF, Rosen M, Silverman RP, Vargo D. Incisional ventral hernias: review of the literature and recommendations regarding the grading and technique of repair. Surgery 2010; 148: 544-558.
2) Cox TC, Pearl JP, Ritter EM. Rives-Stoppa incisional hernia repair combined with laparoscopic separation of abdominal wall components: a novel approach to complex abdominal wall closure. Hernia 2010; 14: 561-567.
3) Sajid MS, Bokhari SA, Mallick AS, Cheek E, Baig MK. Laparoscopic versus open repair of incisional/ventral hernia: a meta-analysis. Am J Surg 2009; 197: 64-72.
4) Robinson TN, Clarke JH, Schoen J, Walsh MD. Major mesh-related complications following hernia repair: events reported to the Food and Drug Administration. Surg Endosc 2005; 19: 1556-1560.
5) Sosin M, Nahabedian MY, Bhanot P. The Perfect Plane: A Systematic Review of Mesh Location and Outcomes, Update 2018. Plast Reconstr Surg 2018; 142: 107S-16S.
6) Criss CN, Petro CC, Krpata DM, Seafler CM, Lai N, Fiutem J, Novitsky YW, Rosen MJ. Functional abdominal wall reconstruction improves core physiology and quality-of-life. Surgery 2014; 156: 176-182.
7) Daes J. The enhanced view-totally extraperitoneal technique for repair of inguinal hernia. Surg Endosc 2012; 26: 1187-1189.
8) Daes J. The Extended-View Totally Extraperitoneal (eTEP) Technique for Inguinal Hernia Repair. Hernia Surgery 2016; 467-472.

9) Bittner R, Bain K, Bansal VK, Berrevoet F, Bingener-Casey J, Chen D, Chen J, Chowbey P, Dietz UA, de Beaux A, Ferzli G, Fortelny R, Hoffmann H, Iskander M, Ji Z, Jorgensen LN, Khullar R, Kirchhoff P, Köckerling F, Kukleta J, LeBlanc K, Li J, Lomanto D, Mayer F, Meytes V, Misra M, Morales-Conde S, Niebuhr H, Radvinsky D, Ramshaw B, Ranev D, Reinpold W, Sharma A, Schrittwieser R, Stechemesser B, Sutedja B, Tang J, Warren J, Weyhe D, Wiegering A, Woeste G, Yao Q. 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.
10) Bittner R, Bain K, Bansal VK, Berrevoet F, Bingener-Casey J, Chen D, Chen J, Chowbey P, Dietz UA, de Beaux A, Ferzli G, Fortelny R, Hoffmann H, Iskander M, Ji Z, Jorgensen LN, Khullar R, Kirchhoff P, Köckerling F, Kukleta J, LeBlanc K, Li J, Lomanto D, Mayer F, Meytes V, Misra M, Morales-Conde S, Niebuhr H, Radvinsky D, Ramshaw B, Ranev D, Reinpold W, Sharma A, Schrittwieser R, Stechemesser B, Sutedja B, Tang J, Warren J, Weyhe D, Wiegering A, Woeste G, Yao Q. Update of Guidelines for laparoscopic treatment of ventral and incisional abdominal wall hernias (International Endohernia Society (IEHS))-Part A. Surg Endosc 2019; 33: 3069-3139.
11) Lu R, Addo A, Ewart Z, Broda A, Parlacoski S, Zahiri HR, Belyansky I. Comparative review of outcomes: laparoscopic and robotic enhanced-view totally extraperitoneal (eTEP) access retrorectus repairs. Surg Endosc 2020; 34: 3597-3605.
12) Belyansky I, Daes J, Radu VG, Balasubramanian R, Reza Zahiri H, Weltz AS, Sibia US, Park A, Novitsky Y. A novel approach using the enhanced-view totally extraperitoneal (eTEP) technique for laparoscopic retromuscular hernia repair. Surg Endosc 2018; 32: 1525-1532.
13) Warren JA, Cobb WS, Ewing JA, Carbonell AM. Standard laparoscopic versus robotic retromuscular ventral hernia repair. Surg Endosc 2017; 31: 324-332.
14) Radu VG, Lica M. The endoscopic retromuscular repair of ventral hernia: the eTEP technique and early results. Hernia 2019; 23: 945-955.
15) Penchev D, Kotashev G, Mutafchiyski V. Endoscopic enhanced-view totally extraperitoneal retromuscular approach for ventral hernia repair. Surg Endosc 2019; 33: 3749-3756.
16) Eker HH, Hansson BM, Buunen M, Janssen IM, Pierik RE, Hop WC, Bonjer HJ, Jeekel J, Lange JF. Laparoscopic vs. open incisional hernia repair: a randomized clinical trial. JAMA Surg 2013; 148: 259-263.
17) Radu VG. Retromuscular Approach in Ventral Hernia Repair - Endoscopic Rives-Stoppa Procedure. Chirurgia (Bucur) 2019; 114: 109-114.
18) Belyansky I, Reza Zahiri H, Sanford Z, Weltz AS, Park A. Early operative outcomes of endoscopic (eTEP access) robotic-assisted retromuscular abdominal wall hernia repair. Hernia 2018; 22: 837-847.