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Onlay Repair Using Self-Gripping Mesh for Lateral Trocar Site Hernia After Laparoscopic Incisional Hernia Repair: A Case Report With Short- and Mid-Term Outcomes

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Introduction: Trocar site hernia (TSH) is an uncommon complication after laparoscopic surgery, but it may potentially require surgical intervention. The available data have shown the importance of prediction and prevention; the optimal surgical approach for TSH remains unclear, and its long-term outcome is scarcely available. Here, we present a case of a lateral TSH after laparoscopic incisional hernia repair, which was successfully repaired using the onlay technique with a self-gripping mesh.

Case presentation: A 74-year-old woman presented with an abdominal incisional hernia at the midline after an open cholecystectomy. She underwent laparoscopic surgery for incisional hernia with intraperitoneal onlay mesh repair. Fascial closure was performed for trocar sites. After 12 months, she noticed a painful bulge in the left upper quadrant suggestive of TSH. At the time of diagnosis, her body mass index was 32 kg/m^2. TSH repair was performed under general anesthesia. A 3×3 cm defect was identified, and the hernial content was found to be the omentum. Defect closure was performed using interrupted sutures followed by placement of a self-gripping mesh (11×11 cm in size, obtaining a 4-cm overlap for the defect). The operative time was 80 minutes. The postoperative course was uneventful except for a spontaneously resolved seroma. Computed tomography scan at the 1-year follow-up and physical examination at the 2-year visit showed no recurrence.

Conclusion: Our proposed onlay repair using self-gripping mesh may be considered as the treatment of choice for cases of lateral TSH after laparoscopic incisional hernia repair.

Key words: Trocar site hernia – Onlay technique – Self-gripping mesh

Trocar site hernia (TSH) is an uncommon complication after laparoscopic surgery but potentially requires emergent surgery because of hernial incarceration through small fascial defects.[1,2] The incidence of TSH is generally 0 to 5.2%.[1,3–8] whereas a wide variety of incidences (0.7%–22%) has also

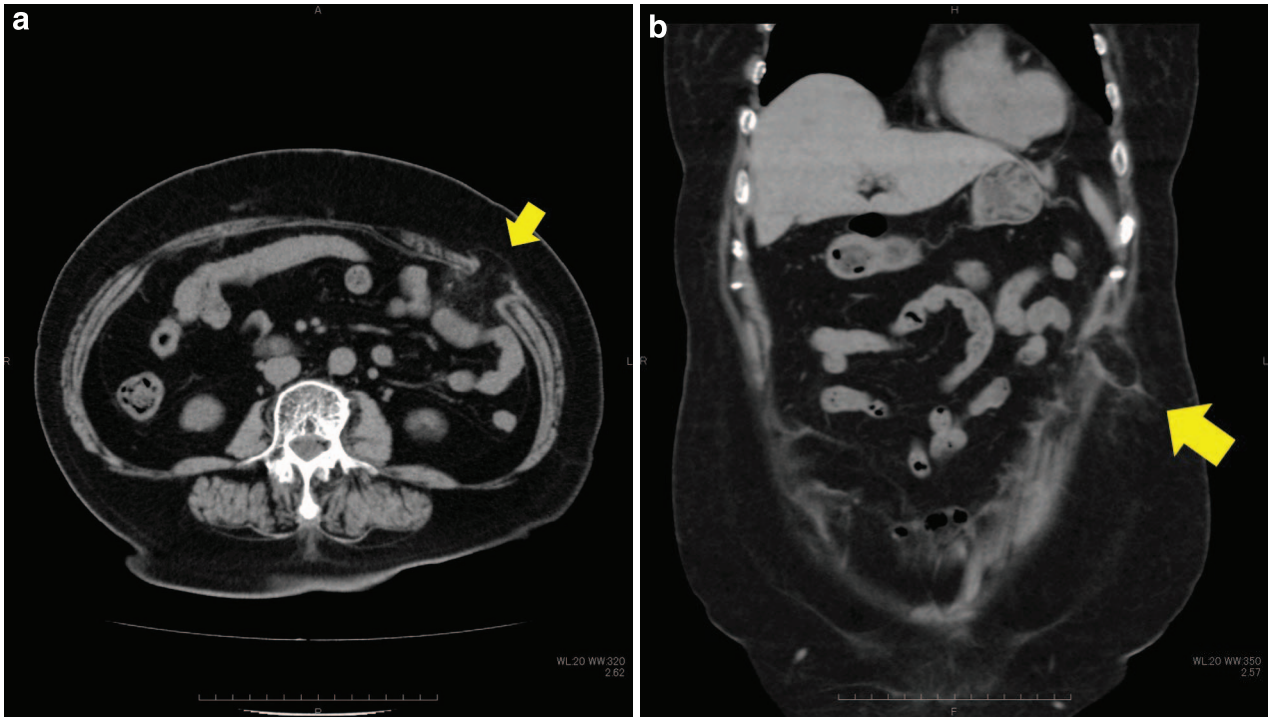

Fig. 1 Diagnosis of a trocar site hernia on CT. The arrow indicates the defect. (a) Axial section. (b) Coronal section.

been reported in patients who underwent laparoscopic ventral hernia repair.[3,9,10] The risk factors of TSH included higher body mass index, female sex, older age, wound infection, longer operative time, trocar location, larger trocar or mesh size, lack of fascial closure, and stretching of the trocar site during surgery.[2,4–6,8,9] Preventive measures against TSH are represented by fascial closure for trocar sites $\geq$10 mm,[3–5,8,10–12] whereas some specific devices reportedly have been effective.[13–15] Although the available data have shown the importance of prediction and prevention, the optimal surgical approach for TSH remains unclear, and its long-term outcome is scarcely available.[2]

Here, we present a case of lateral TSH after laparoscopic incisional hernia repair, which was successfully repaired using the onlay technique using a self-gripping mesh.

Case Presentation

History of illness

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A 74-year-old woman presented with an abdominal incisional hernia at the midline after open cholecystectomy. She underwent laparoscopic incisional hernia repair with a three-port setting (12 mm at the Palmer point,[16] 12-mm trocar in the left lateral, and 5 mm in the left lower quadrant). A 12-mm trocar was inserted using the open Hassan technique. A 25 $\times$ 20 cm multifilament polyester mesh (Symbotex composite mesh, Medtronic Plc, Dublin, Ireland) was placed for the defect. Fascial closure with purse-string suture was performed for the 12-mm trocar sites using absorbable material (2-0 Vicryl, Ethicon Inc, Cincinnati, Ohio). There were no postoperative complications. After 12 months, she noticed a painful bulge in the left upper quadrant. Physical examination suggested TSH at the Palmer point and computed tomography (CT) confirmed the diagnosis (Fig. 1). Thus, the location of TSH was categorized as L1 according to the classification of the European Hernia Society.[17] Because of persistent pain and anxiety associated with the risk of incarceration, we decided to perform an elective surgery for TSH repair. At the time of TSH diagnosis, she was 150 cm in height and 72 kg in weight, with a body mass index of 32 kg/m^2.

Surgical technique

Under general anesthesia, surgery was performed in the supine position. A 4-cm transverse skin incision was made at the TSH site, and the subcutaneous tissue was dissected. A 3 × 3 cm defect was identified, and the hernia sac was circumferentially exposed (Fig. 2a). The hernia sac was opened, and adhesiolysis was performed. The hernial content was found to be the omentum (Fig. 2b). The hernia sac was ligated and the defect was closed by interrupted sutures using nonabsorbable suture (1-nylon) with tissue bits of 1 cm and intersuture spacing of 5 mm (Fig. 2, c and d). Subsequently, a self-gripping mesh (Progrip, Medtronic) was trimmed to 11 × 11 cm in size, obtaining a 4-cm overlap for the defect. The mesh was placed over the closed defect and secured to the fascia in 4 quadrants using absorbable sutures (3-0 Maxon, Medtronic; Fig. 2e). The estimated blood loss was 10 mL, and the operative time was 80 minutes.

Postoperative course and follow-up

The immediate postoperative course was uneventful, and the patient was discharged on the fourth day after the surgery. She received daily oral analgesics for 2 weeks. There was no wound infection or septic complications. She developed a radiographically confirmed seroma with minimal feeling of bulge, which spontaneously resolved within 3 months. CT was performed 1 year after the TSH repair and there was no hernia recurrence, seroma, or hematoma (Fig. 3). At the 2-year visit after TSH repair, no hernia recurrence was found on physical examination.

Discussion

In this report, TSH repair of the lateral side was successfully performed by the onlay technique using a self-gripping mesh, and there was no hernia recurrence at midterm follow-up. As shown in the literature,[4–6,8,9] this case had multiple risks of TSH at the time of laparoscopic incisional hernia repair, such as higher body mass index, female sex, older age, larger trocar, and larger mesh size. Most TSH occurs at the umbilical site,[4,5,12] whereas TSH can be found at the lateral side in patients who underwent laparoscopic ventral hernia repair.[2,3,9] This patient developed TSH in the left upper quadrant (Palmer point[16]), and the trocar size was 12 mm. Although the patient's characteristics and operative settings were unavoidable at the time of laparoscopic surgery, attempts to prevent TSH may be considered in terms of the following points.

First, the method of trocar insertion and closure can be modified. The trocar was inserted under direct vision and closed by purse-string suture using absorbable material. Sikar *et al*[3] showed that trocar insertion with sharp dissection and closure with continuous suture significantly decreased TSH occurrence on the lateral side, compared with blunt dissection and z-shaped closure (18.2% versus 0.8%). Therefore, continuous suture would be preferable to purse-string sutures. Second, a prophylactic mesh may be used at the time of laparoscopic surgery for high-risk patients. Armanazas *et al*[15] showed that the prophylactic mesh for fascial closure of the umbilical trocar site significantly reduced the incidence of TSH (4.4%) compared with suture alone (31.9%), up to 1-year follow-up. In that study, high-risk patients were defined as those 65 years and older, with diabetes mellitus, chronic pulmonary disease, and obesity (body mass index $\geq$30 kg/m^2). As the European Hernia Society guideline commented,[11] larger studies are needed to apply this technique with stronger recommendations. Third, the use of new devices may be considered for fascial closure. In general, the fascial defect of trocar sites $\geq$10 mm is closed either manually or using fascial closure (suture passing) devices.[3–5,8,10–12] Recently, a randomized controlled trial showed that a novel anchor-based system (neoClose device, Neosurgical, Newton, Massachusetts) decreased closure time, pain, and needle depth compared with standard suture passer.[13] In that study, there was no TSH at the 1-year follow-up in either the new device group or the control group. A larger cohort with long-term follow-up is necessary to elucidate its significance in reducing the incidence of TSH.

In this case, we selected the onlay technique for TSH repair. The main reasons for selecting this technique were the obesity of the patient and TSH secondary to laparoscopic incisional hernia repair. Given the higher incidence of TSH after laparoscopic ventral hernia repair,[3,9,10] we excluded laparoscopic repair, considering the potential risk of TSH at new trocar sites. For the anterior approach, sublay repair would be optional. Nevertheless, the nonmidline location of TSH (L1) made it difficult to decide whether the onlay or sublay approach was suitable in this case. Onlay technique is supposed to be easier and quicker to perform, whereas hernia recurrence and surgical site infection favor the sublay tech-

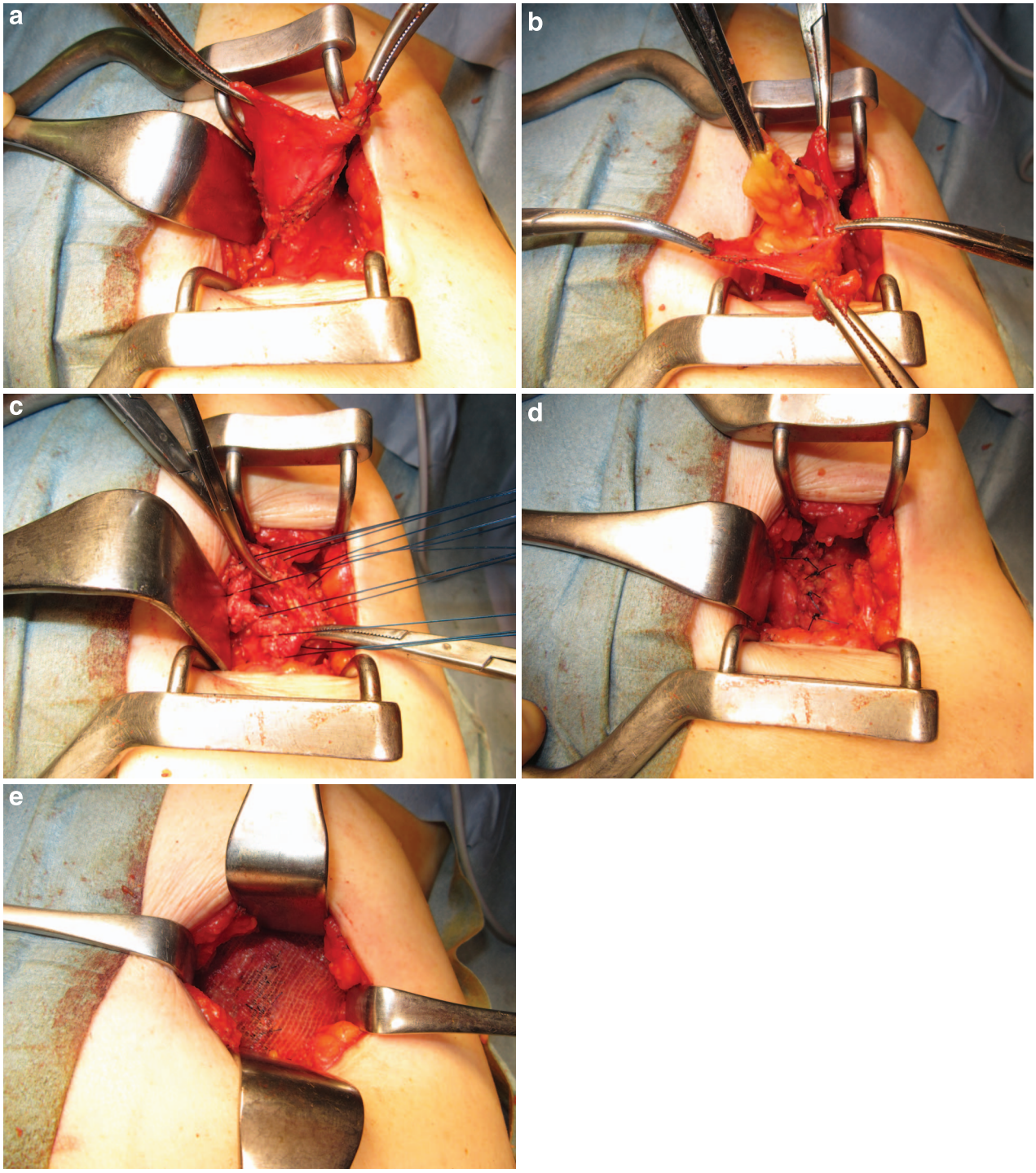

Fig. 2 Surgical technique. (a) Hernia sac. (b) Hernia content (omentum). (c) Defect closure with interrupted suture using nonabsorbable material. (d) Completion of the defect closure. (e) Self-gripping mesh placement over closed defect.

nique.[18] The sublay technique can be performed for lateral incisional hernia[19]; however, dissection through several muscle layers may be complex in cases of previous infection and adhesions.[18]

In addition, we used a commercially available self-gripping mesh along with the onlay technique. Self-gripping mesh allows enhanced tissue adhesion, minimal suture fixation, minimal mesh fixation

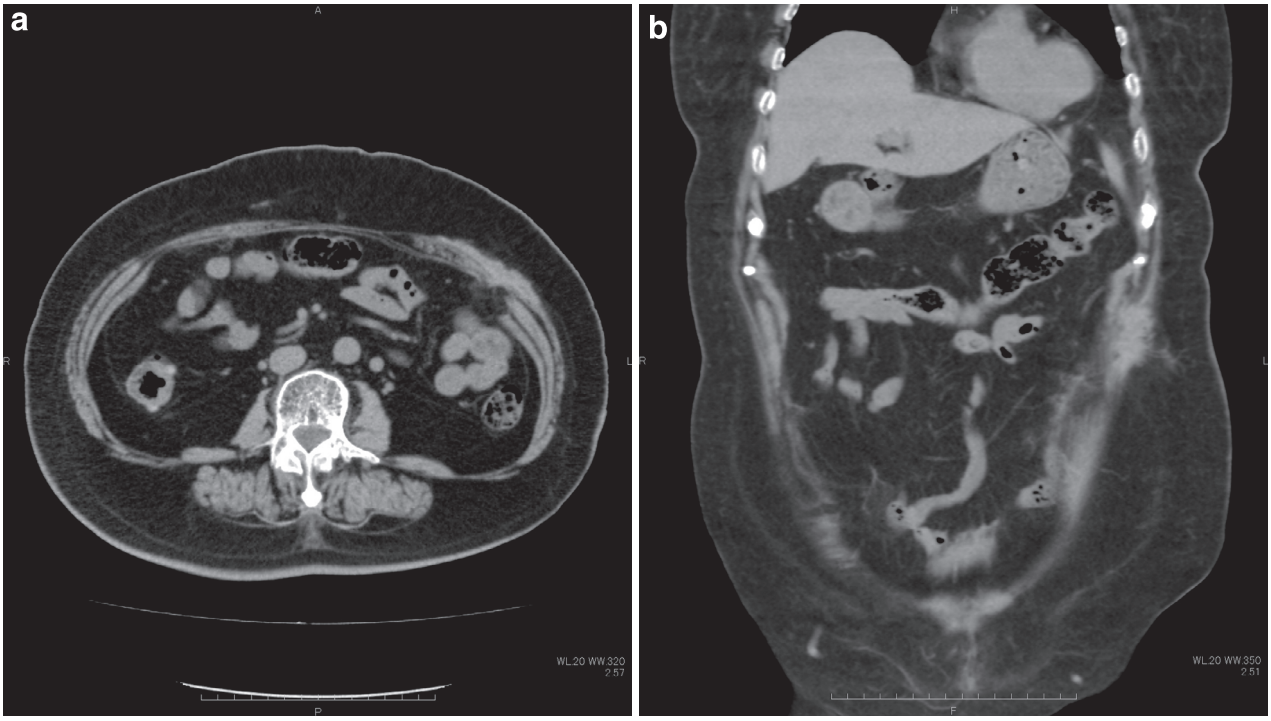

Fig. 3 Findings of CT at postoperative 1-year follow-up. (a) Axial section. (b) Coronal section.

time, reduced risk of migration, and decreased chronic pain.[20] Hopson and Miller[21] demonstrated that onlay repair using self-gripping mesh was a viable treatment for large ventral hernia, with no recurrence at 2 years. Moreover, we previously reported the effectiveness of a self-gripping mesh with an anterior component separation technique in a case series.[22] Therefore, we applied a self-gripping mesh with the onlay technique in this case. The surgical procedure was technically simple and did not cause any major postoperative complications, except for seroma.

However, the long-term outcomes of this technique remain unknown. Kwon *et al*[2] reported a 29.4% recurrence rate after TSH repair, and the mean duration between TSH repair and hernia recurrence was 32 months (range, 20–49 months). In that study, mesh reinforcement was applied to 58.8% of the patients at TSH repair, suggesting that mesh did not efficiently preclude hernia recurrence. We will continue to follow up with the patient to assess long-term complications, durability of the mesh, and hernia recurrence. In conclusion, our proposed onlay repair using self-gripping mesh may be considered as the treatment of choice for a case of lateral TSH after laparoscopic incisional hernia repair.

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References

1. Helgstrand F, Rosenberg J, Kehlet H, Bisgaard T. Low risk of trocar site hernia repair 12 years after primary laparoscopic surgery. *Surg Endosc* 2011;**25**(11):3678–3682
2. Kwon YH, Choe EK, Ryoo SB, Kim JK, Park KJ. Long-term surgical outcome of trocar site hernia repair. *Am Surg* 2017; **83**(2):176–182
3. Sikar HE, Çetin K, Eyvaz K, Altin Ö, Kaya S, Gökçeimam M *et al*. Lateral sided trocar site hernia following laparoscopic hernia repair: results of a long-term follow-up. *Hernia* 2019; **23**(1):101–106
4. Swank HA, Mulder IM, la Chapelle CF, Reitsma JB, Lange JF, Bemelman WA. Systematic review of trocar-site hernia. *Br J Surg* 2012;**99**(3):315–323
5. Helgstrand F, Rosenberg J, Bisgaard T. Trocar site hernia after laparoscopic surgery: a qualitative systematic review. *Hernia* 2011;**15**(2):113–121
6. Nofal MN, Yousef AJ, Hamdan FF, Oudat AH. Characteristics of trocar site hernia after laparoscopic cholecystectomy. *Sci Rep* 2020;**10**(1):2868

7. Zhu YP, Liang S, Zhu L, Sun ZJ, Lang JH. Trocar-site hernia after gynecological laparoscopic surgery: a 20-year, single-center experience. *Chin Med J (Engl)* 2019;**132**(22):2677–2683
8. Tonouchi H, Ohmori Y, Kobayashi M, Kusunoki M. Trocar site hernia. *Arch Surg* 2004;**139**(11):1248–1256
9. Boldó E, Perez de Lucia G, Aracil JP, Martin F, Escrig J, Martinez D *et al*. Trocar site hernia after laparoscopic ventral hernia repair. *Surg Endosc* 2007;**21**(5):798–800
10. Liot E, Bréguet R, Piguet V, Ris F, Volonté F, Morel P. Evaluation of port site hernias, chronic pain and recurrence rates after laparoscopic ventral hernia repair: a monocentric long-term study. *Hernia* 2017;**21**(6):917–923
11. Muysoms FE, Antoniou SA, Bury K, Campanelli G, Conze J, Cuccurullo D *et al*. European Hernia Society guidelines on the closure of abdominal wall incisions. *Hernia* 2015;**19**(1):1–24
12. Wells A, Germanos GJ, Salemi JL, Mikhail E. Laparoscopic surgeons' perspectives on risk factors for and prophylaxis of trocar site hernias: a multispecialty national survey. *JSLS* 2019; **23**(2):e2019.00013
13. Iranmanesh P, Rivera AR, Bajwa KS, Alibhai M, Snyder BE, Wilson TD *et al*. Trocar site closure with a novel anchor-based (neoClose(®)) system versus standard suture closure: a prospective randomized controlled trial. *Surg Endosc* 2020; **34**(3):1270–1276
14. Moreno-Sanz C, Picazo-Yeste JS, Manzanera-Díaz M, Herrero-Bogajo ML, Cortina-Oliva J, Tadeo-Ruiz G. Prevention of trocar site hernias: description of the safe port plug technique and preliminary results. *Surg Innov* 2008;**15**(2):100–104
15. Armañanzas L, Ruiz-Tovar J, Arroyo A, García-Peche P, Armañanzas E, Diez M *et al*. Prophylactic mesh vs suture in the closure of the umbilical trocar site after laparoscopic cholecystectomy in high-risk patients for incisional hernia: a randomized clinical trial. *J Am Coll Surg* 2014;**218**(5):960–968
16. Palmer R. Safety in laparoscopy. *J Reprod Med* 1974;**13**(1):1–5
17. Muysoms FE, Miserez M, Berrevoet F, Campanelli G, Champault GG, Chelala E *et al*. Classification of primary and incisional abdominal wall hernias. *Hernia* 2009;**13**(4):407–414
18. Timmermans L, de Goede B, van Dijk SM, Kleinrensink GJ, Jeekel J, Lange JF. Meta-analysis of sublay versus onlay mesh repair in incisional hernia surgery. *Am J Surg* 2014;**207**(6):980–988
19. Veyrie N, Poghosyan T, Corigliano N, Canard G, Servajean S, Bouillot JL. Lateral incisional hernia repair by the retromuscular approach with polyester standard mesh: topographic considerations and long-term follow-up of 61 consecutive patients. *World J Surg* 2013;**37**(3):538–544
20. Kapischke M, Schulze H, Caliebe A. Self-fixating mesh for the Lichtenstein procedure–a prestudy. *Langenbecks Arch Surg* 2010;**395**(4):317–322
21. Hopson SB, Miller LE. Open ventral hernia repair using ProGrip self-gripping mesh. *Int J Surg* 2015;**23**(pt A):137–140
22. Fukuda R, Tsujinaka S, Maemoto R, Takenami T, Toyama N, Rikiyama T. The use of self-gripping mesh with anterior component separation technique in incisional hernia repair: a case series. *Int J Surg Case Rep* 2019;**60**:148–151