



Case Report

Usefulness of a Long Forceps Technique in Single-Incision Laparoscopic Surgery for Totally Extraperitoneal Repair of Inguinal Hernia

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Collisions between the laparoscope and the forceps remain a specific problem for single-incision laparoscopic surgery (SILS). We considered that the use of a long forceps would resolve this problem and use the long forceps in SILS for totally extraperitoneal repair (TEP). SILS for TEP (S-TEP) was performed to treat 34 inguinal hernias in 27 patients from November 2013 to February 2015. Among them, unilateral inguinal hernia repair was performed in 5 patients (median age: 71 years; range: 40–88 years) using a laparoscopic coagulating shears (LCS) device and a straight long (43 cm) forceps. A 1-cm umbilical incision was made, a 5-mm flexible laparoscope was moved into the peritoneal cavity, and the type of inguinal hernia was diagnosed. Next, preperitoneal space was made using a finger or gauze. The single-port device was applied at preperitoneal space and insufflation was initiated with CO₂ gas. The preperitoneal space was more easily created using a long straight forceps rather than standard ones. The hernia sac was then freed from the spermatic cord and a mesh was rolled, inserted, and deployed. Absorbable spiral tackers were used for fixation over the Cooper's ligament, lateral to the inferior epigastric vessels. The use of a long forceps was considered to be associated with reduction of the difficulty for dissection in S-TEP. We considered the use of a long forceps to be useful to the S-TEP operation.

Key words: Inguinal hernia – Single-incision laparoscopic surgery – SILS – Totally extraperitoneal repair (TEP) – S-TEP (SILS-TEP)

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Fig. 1 Standard and long forceps. A picture of a standard (36 cm) and a long (43 cm) straight forceps.

Single incision laparoscopic surgery (SILS) was first reported in appendectomy¹ and cholecystectomy² operations in 1992 and 1997, respectively. The first case of SILS for totally extraperitoneal repair (TEP) was reported in 2009.³ In our institution, SILS for TEP (S-TEP) has been used as a standard procedure since December 2013. However, collisions between the laparoscope and the forceps remain a specific problem for the SILS. While the use of a curved forceps is considered to be effective for avoiding this problem, the difficulty involved in its use has prevented its widespread implementation. We consider that the use of a long forceps enables the resolution of this problem.

Patients and Surgical Technique

S-TEP operations were performed for 34 inguinal hernias in 27 patients from November 2013 to February 2015. Among them, unilateral inguinal hernia repair was performed in 20 patients. Among these 20 patients, a straight long (43 cm) dissection and grasping forceps (Karl Storz, Tuttlingen, Germany; Fig. 1) was used for 5 patients in conjunction with the HARMONIC ACE (Ethicon Endo-Surgery, Cincinnati, Ohio). The characteristics of these patients were summarized in Table 1.

Surgical technique

A 1-cm umbilical incision was made, followed by a linear alba incision, and a 5-mm port was inserted. Next, a 5-mm flexible laparoscope was moved into the peritoneal cavity through this port, and the type of inguinal hernia was diagnosed. We also examined whether the opposing side indicated the presence of

Table 1 Patient backgrounds

	Long forceps (n = 5)
Gender	
Male	4
Female	1
Age (years), median (range)	71 (40–88)
Type of hernias	
Indirect	4
Direct	0
Femoral	1
Total	5

an inguinal hernia. A drainage tube was then inserted from the linear alba into the peritoneal cavity and tightened to exhaust any excess carbon dioxide (CO₂) gas. A 1-cm incision over the anterior rectus sheath allowed us to retract the rectus muscle laterally and a preperitoneal space was made by blunt dissection using a finger or gauze. The single-port device was then inserted and insufflation was initiated with CO₂ gas at 8 mmHg. A 5-mm flexible scope was used for better visualization. By using a long, straight forceps and the HARMONIC ACE, the preperitoneal space was created using the landmarks for proper dissection, such as the pubic bone inferiorly and the psoas muscle laterally, so that the whole myopectineal orifice was visualized. The hernia sac was then freed from the spermatic cord using a long, straight forceps, and a 14 × 10 cm mesh was rolled, inserted, and deployed. Absorbable spiral tackers were used for fixation over the Cooper's ligament, lateral to the inferior epigastric vessels.

Result

A long forceps was used in 5 cases (median age: 71 years; range: 40–88 years). The instances of collision between the forceps and the laparoscope were found to dramatically decrease with the use of long forceps because it is capable of widely separating the distance between the bilateral forceps and between the forceps and the laparoscope (Figs. 2, 3). All patients underwent successful S-TEP repair. No complications were detected in the use of long forceps. No cases of recurrence or major complications were observed.

Discussion

Laparoscopic hernia repair has been reported to be superior to conventional inguinal hernia repair

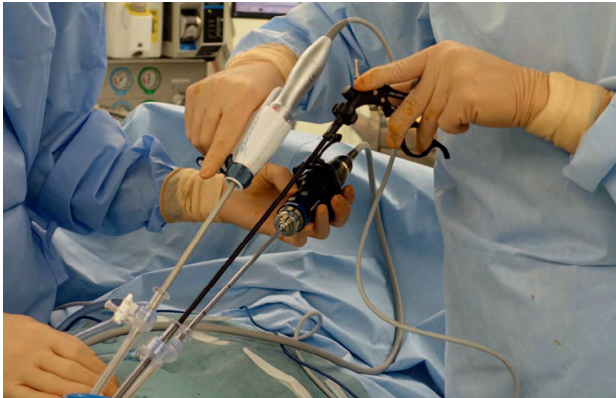


Fig. 2 The long straight forceps procedure. The long forceps widely increases the distance between the bilateral forceps and between the forceps and the laparoscope.

because the procedure reduces postoperative pain, enables an earlier return to work and is associated with a better cosmetic outcome.^{4,5} The 2 common laparoscopic techniques used in the treatment of inguinal hernia are transabdominal preperitoneal repair (TAPP) and TEP repair. No significant differences have been reported between the 2 procedures regarding postoperative complications, recurrence rates, or chronic groin pain. However, the TAPP approach carries the potential risks of visceral injury, intestinal obstruction due to intraabdominal adhesion, and port-site hernia.⁵⁻⁹ One study reported that the risk of intestinal obstruction following the TAPP procedure was 1.14 per 1,000 person-years, while that after the TEP procedure was reported to be 0.28.¹⁰ As laparoscopic incisions or trocars present risks for hemorrhage, organ injury, incisional hernia, and poor cosmetic outcomes, SILS has increasingly been used to treat a variety of conditions. The first case of S-TEP was reported in 2009.³ A relatively small number of reports compare conventional TEP and S-TEP.¹¹⁻¹⁴ These reports have indicated that S-TEP is safe and feasible procedure, and have noted that an umbilical incision provides excellent cosmetic outcomes. For these reasons, S-TEP has been used as standard procedure in our institution since December 2013.

However, the collision of the forceps and a laparoscope remains a specific problem that is associated with SILS. While a curved forceps is considered to be effective for avoiding this problem, the difficulties involved with its use have prevented it from becoming widespread. In contrast, the use of a long forceps does not change the sense of position. We thus think that it would be easier to use a long

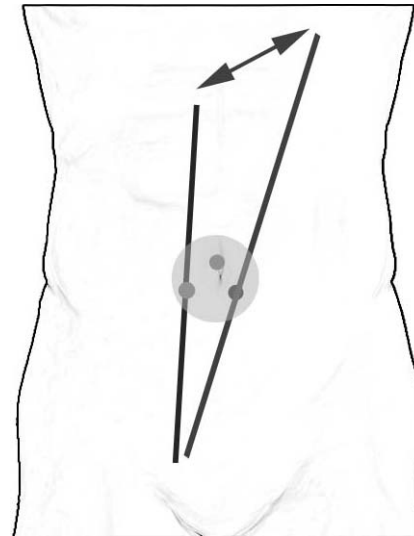


Fig. 3 A schematic drawing of Fig. 2. A long straight forceps separated widely.

forceps than a curved forceps. It is capable of widely separating the distance between the bilateral forceps and between the forceps and the laparoscope (Figs. 2, 3).

Although the accumulation of more cases is necessary, we believe that the present technique enable the ability to reduce the difficulty of S-TEP in using a long forceps.

In conclusion, the use of a long forceps during S-TEP repair may decrease the difficulty for dissection.

Acknowledgments

The authors have no conflicts of interest to declare.

References

1. Pelosi MA, Pelosi MA, 3rd. Laparoscopic appendectomy using a single umbilical puncture (minilaparoscopy). *J Reprod Med* 1992;37(7):588-594
2. Navarra G, Pozza E, Occhionorelli S, Carcoforo P, Donini I. One-wound laparoscopic cholecystectomy. *Br J Surg* 1997; 84(5):695
3. Filipovic-Cugura J, Kirac I, Kulis T, Jankovic J, Bekavac-Beslin M. Single-incision laparoscopic surgery (SILS) for totally extraperitoneal (TEP) inguinal hernia repair: first case. *Surg Endosc* 2009;23(4):920-921
4. Gong K, Zhang N, Lu Y, Zhu B, Zhang Z, Du D *et al.* Comparison of the open tension-free mesh-plug, transabdominal preperitoneal (TAPP), and totally extraperitoneal (TEP)

- laparoscopic techniques for primary unilateral inguinal hernia repair: a prospective randomized controlled trial. *Surg Endosc* 2011;**25**(1):234–239
5. Memon MA, Cooper NJ, Memon B, Memon MI, Abrams KR. Meta-analysis of randomized clinical trials comparing open and laparoscopic inguinal hernia repair. *Br J Surg* 2003; (12): 1479–1492
 6. Goswami R, Babor M, Ojo A. Mesh erosion into caecum following laparoscopic repair of inguinal hernia (TAPP): a case report and literature review. *J Laparoendosc Adv Surg Tech A* 2007;**17**(5):669–672
 7. Lange B, Langer C, Markus PM, Becker H. Mesh penetration of the sigmoid colon following a transabdominal preperitoneal hernia repair. *Surg Endosc* 2003;**17**(1):157
 8. Leibl BJ, Jager C, Kraft B, Kraft K, Schwarz J, Ulrich M *et al*. Laparoscopic hernia repair—TAPP or/and TEP? *Langenbecks Arch Surg* 2005;**390**(2):77–82
 9. McCormack K, Wake BL, Fraser C, Vale L, Perez J, Grant A. Transabdominal pre-peritoneal (TAPP) versus totally extraperitoneal (TEP) laparoscopic techniques for inguinal hernia repair: a systematic review. *Hernia* 2005;**9**(2):109–114
 10. Bringman S, Blomqvist P. Intestinal obstruction after inguinal and femoral hernia repair: a study of 33,275 operations during 1992–2000 in Sweden. *Hernia* 2005;**9**(2):178–183
 11. Kim JH, Lee YS, Kim JJ, Park SM. Single port laparoscopic totally extraperitoneal hernioplasty: a comparative study of short-term outcome with conventional laparoscopic totally extraperitoneal hernioplasty. *World J Surg* 2013;**37**(4):746–751
 12. Tai HC, Lin CD, Chung SD, Chueh SC, Tsai YC, Yang SS. A comparative study of standard versus laparoendoscopic single-site surgery (LESS) totally extraperitoneal (TEP) inguinal hernia repair. *Surg Endosc* 2011;**25**(9):2879–2883
 13. Tsai YC, Ho CH, Tai HC, Chung SD, Chueh SC. Laparoendoscopic single-site versus conventional laparoscopic total extraperitoneal hernia repair: a prospective randomized clinical trial. *Surg Endosc* 2013;**27**(12):4684–4692
 14. Wakasugi M, Masuzawa T, Tei M, Omori T, Ueshima S, Tori M *et al*. Single-incision totally extraperitoneal inguinal hernia repair: our initial 100 cases and comparison with conventional three-port laparoscopic totally extraperitoneal inguinal hernia repair. *Surg Today* 2015;**45**(5): 606–610