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International Journal of Surgery Case Reports

journal homepage: www.casereports.comSingle-incision laparoscopic ileocecal resection using an organ retractor[☆]

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ARTICLE INFO

Article history:

Received 28 November 2016
Received in revised form 23 February 2017
Accepted 23 February 2017
Available online 27 February 2017

Keywords:

Colectomy
Organ retractor
Single-incision laparoscopic surgery

ABSTRACT

INTRODUCTION: Single-incision laparoscopic surgery has been reported to be a safe and feasible technique for colorectal cancer. However, the technique needs skill due to the limitations of the device. An organ retractor is a new grasp device that has the potential to overcome these limitations.

PRESENTATION OF CASE: A 63-year-old woman with a tumor palpated in the right lower quadrant of the abdomen presented to hospital. Colonoscopy showed a type 2 mass with nearly complete stenosis, and a biopsy specimen showed well-differentiated adenocarcinoma. Single-incision laparoscopic surgery ileocecal resection was performed using an organ retractor. A 3-cm incision was placed in the umbilicus, and three conventional ports were inserted. An organ retractor was used for hepatocolic ligament resection, resection of the ileocolic vessels, and resection of the insertion of the mesentery proper. For each resection, the trailer line's tension was adjusted to provide a good operative view. The patient's postoperative course was good, and she was discharged 7 days after surgery.

DISCUSSION: An organ retractor was effective for single-incision laparoscopic surgery technique not only to maintain a good operative view, but also to change trailer line tension, which enabled safe dissection.

CONCLUSION: An organ retractor could facilitate single-incision laparoscopic surgery.

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1. Introduction

In 1991, Jacobs et al. reported the first laparoscopic colectomy (LAC) [1]. Since then, minimally invasive surgery, including scarless surgery and reduced port surgery, has continued to spread to improve cosmesis or reduce surgery-related pain. Single-incision laparoscopic surgery (SILS) is one of the approaches to scarless surgery, which was first reported in the treatment of appendicitis [2]. In colorectal cancer, Remzi et al. first reported right colectomy using SILS technique [3]. They reported that SILS technique was safe and feasible, and since that time, SILS is regarded as the

major advance in minimally invasive surgery. However, there are some limitations to this technique. First, SILS technique is not easy because of the restricted movement of the surgical device compared to conventional laparoscopic surgery [4]. In particular, when working in parallel, there can be collisions between the camera port and the working port due to limited space. Second, SILS does not include a port for an assistant, and SILS has the potential for unexpected injury because of its inadequate operative field [5]. For the same reason, it is difficult to apply SILS for advanced cancer or obese patients [6]. Third, SILS is a relatively new and unfamiliar technique, its learning curve is long, and training is difficult. An organ retractor[®] (B. Brown, Tokyo, Japan) is a surgical device applying safe and gentle traction to organs in the field of laparoscopic surgery that has the potential to overcome the weak points of SILS. In the present case, SILS ileocecal resection using an organ retractor that overcame the restricted operative field and has the potential to improve the SILS learning curve is described. The work has been reported in line with the SCARE criteria [7].

Abbreviations: LAC, laparoscopic colectomy; SILS, single incision laparoscopic surgery.

[☆] The subject gave informed consent, and patient anonymity has been preserved.

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<http://dx.doi.org/10.1016/j.ijscr.2017.02.046>

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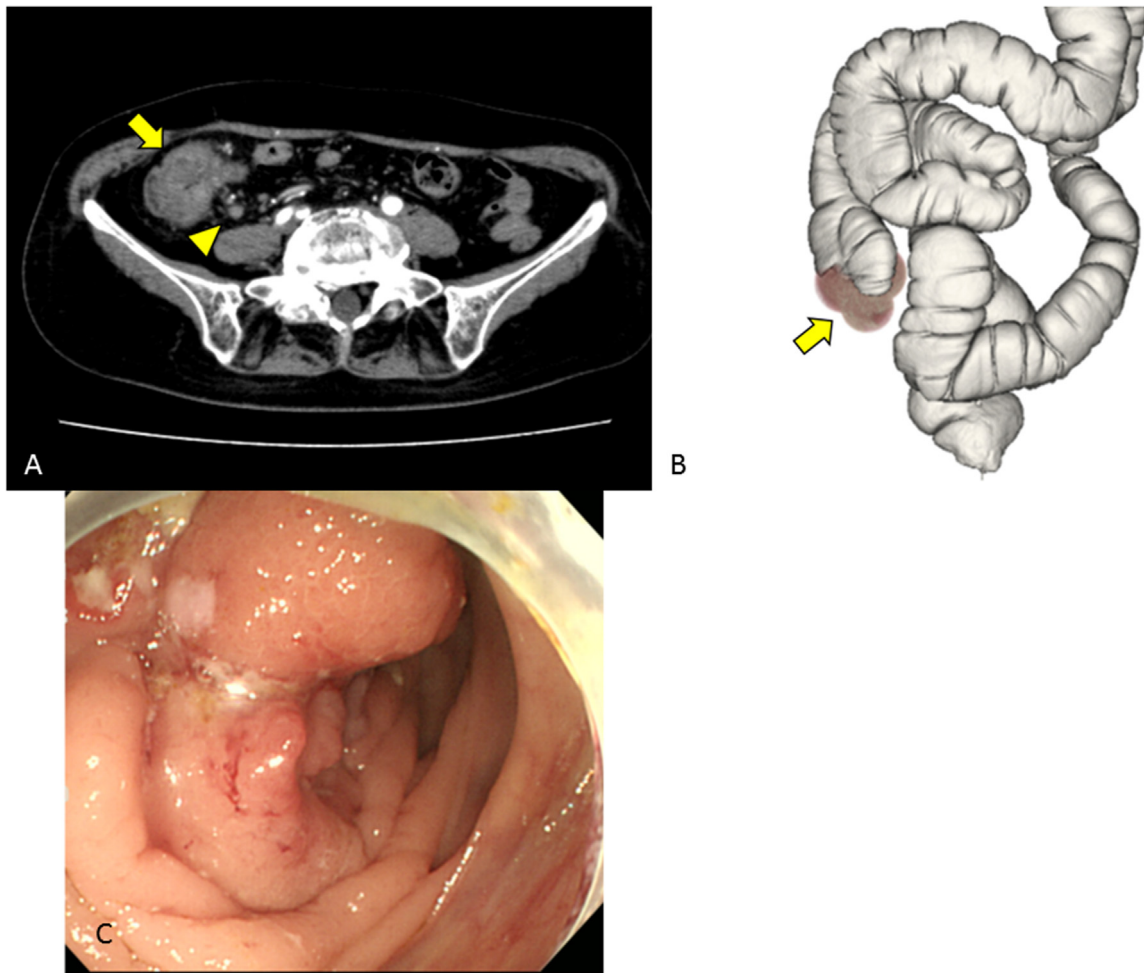


Fig. 1. (a) Abdominal enhanced CT shows wall thickness in the ascending colon (arrow), and several swollen lymph nodes (arrow head), (b) CT colonography shows a defect in the ascending colon (arrow), and (c) colonoscopy shows a type 2 tumor.

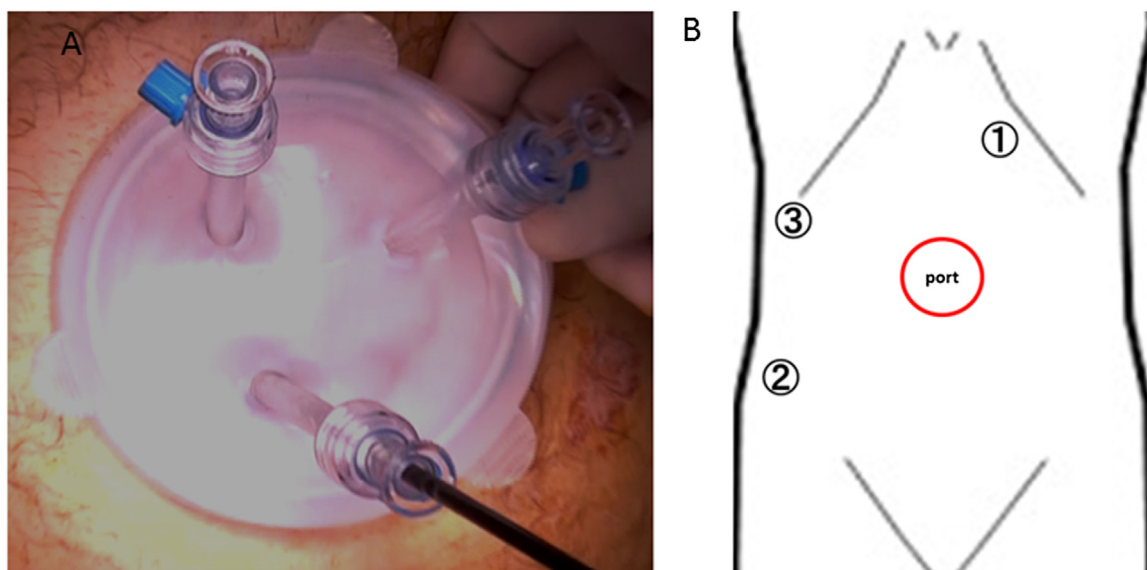


Fig. 2. Intraoperative findings. (a) A 3-cm incision is made in the umbilicus, and EZ access® (Hakko-medical, Tokyo, Japan) is inserted. Three ports are used, one for the scope and two for handling forceps. (b) The schema of the trail positions from outside of the body with Asflex® (Crownjun, Chiba, Japan). (1: trail for the posterior wall of stomach, 2: trail for the mesentery of the transverse colon, 3: trail for the ileocecal vessels and mesentery proper).

2. Presentation of case

A 63-year-old woman with a tumor palpated in the right lower quadrant of the abdomen presented to hospital. Laboratory data showed severe anemia. Abdominal enhanced CT showed wall thickness with enhancement in the ascending colon and several swollen lymph nodes (Fig. 1a). CT colonography showed a defect in the ileocecal area (Fig. 1b). Colonoscopy showed a type 2 mass with nearly complete stenosis (Fig. 1c). A biopsy specimen showed well differentiated adenocarcinoma. The patient was finally diagnosed with ascending colon cancer, and ileocecal resection using SILS technique was performed.

A 3-cm zig-zag incision was placed in the umbilicus. Then, EZ access® (Hakko-medical, Tokyo, Japan) was inserted through the wound. Three ports were used, one for the scope and two for the handling forceps (Fig. 2a). First, the whole abdomen was observed, and there was no ascites. Next, the hepatocolic ligament was resected. To maintain a good view of the hepatic flexure, two organ retractors were used, one to grasp the posterior wall of the stomach (Figs. 2 b, 3 a) and the other to grasp the mesentery of the

transverse colon (Fig. 3b). The two organ retractors were trailed by Asflex® (Crownjun, Chiba, Japan), which was inserted extracorporeally (Fig. 2b). After resection of the hepatocolic flexure, the pedicle of the ileocecal artery and vein was grasped by the organ retractor (Fig. 3c). Then, the regional lymph node was dissected, and the vessels were resected. To mobilize the intestine, the mesentery proper was grasped, and the insertion of the mesentery proper was cut (Fig. 3d, e). For each resection, the trailer line's tension was adjusted to provide a good operative view. To remove the lesion from the body, the wound was dilated to 5 cm. The tumor was then resected by Endo GIA purple 60® (Covidien, MA, USA). A functional end-to-end anastomosis was made. The patient's postoperative course was good, and she seldom felt wound pain. She was discharged 8 days after surgery.

3. Discussion

In the present case, the effectiveness of an organ retractor for SILS ileocecal resection in maintaining an adequate operative field was demonstrated. Furthermore, the device has the potential to

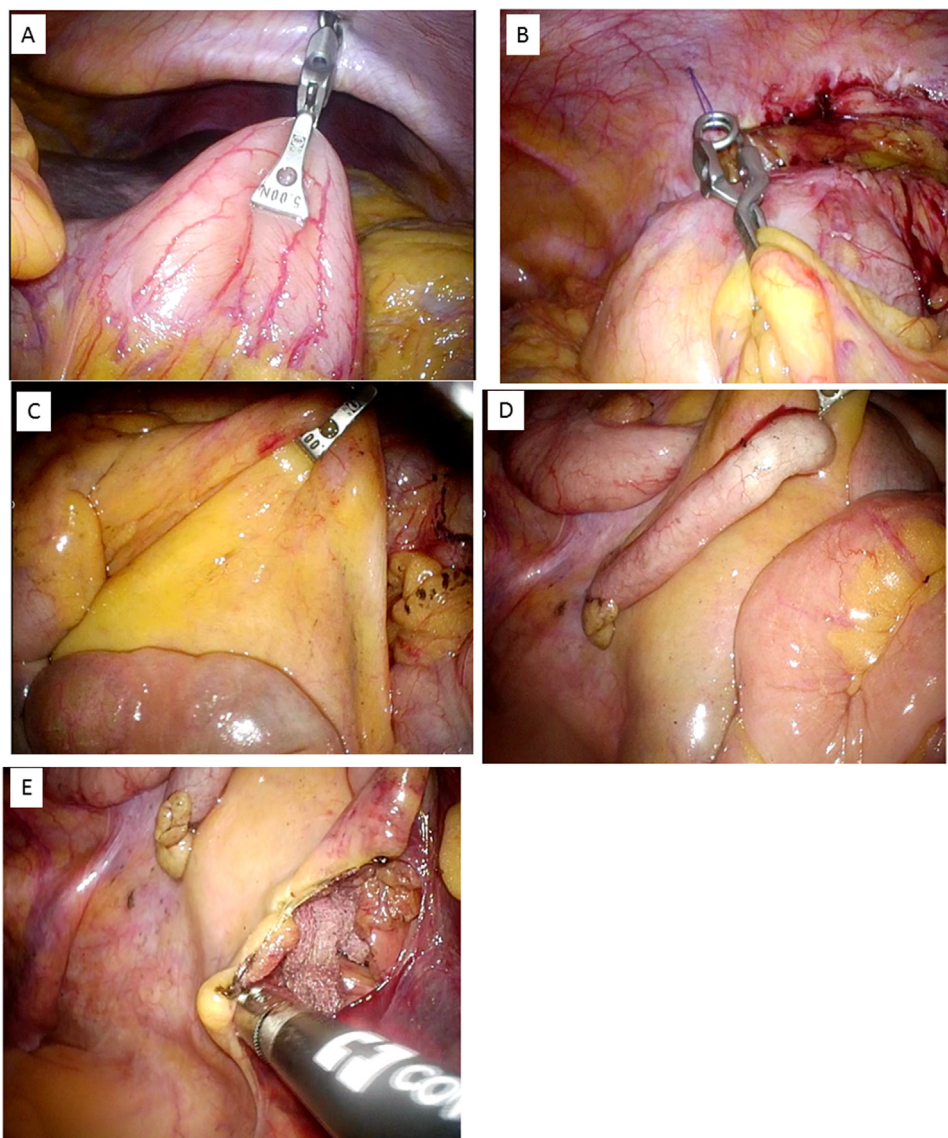


Fig. 3. Intra-abdominal findings (a, b). To provide a view of the hepatic flexure, the posterior wall of the stomach is grasped, while the mesentery of the transverse colon is also grasped. (c) The pedicle of the ileocecal artery and vein is grasped by the organ retractor, and the regional lymph node is dissected. (d, e) To mobilize the intestine, the mesentery proper is grasped, and the insertion of the mesentery proper is cut.

be applied to more advanced, difficult cases and to improve the learning curve of SILS technique.

Since the SILS technique for colorectal cancer was first reported, several trials compared SILS and conventional laparoscopic surgery [8]. These reports showed that SILS reduces postoperative pain, shortens hospital stays, reduces postoperative complications, and provides good cosmesis [9]. Furthermore, with SILS, adequate lymph node dissection can be achieved, with a prognosis no worse than that of conventional technique [10].

However, SILS has some problems. Because of the single port, the proximity of the forceps at a fixed position restricts freedom, especially for parallel movements [11]. In addition to this restriction, there is no assist port, which makes it difficult to maintain an adequate operative field. Finally, SILS has the potential to result in inadequate dissection and unexpected injury [12].

Recent studies reported that SILS requires more operation time than traditional laparoscopic surgery [13]. Another report showed that the operation time could be decreased with more experience with SILS, with the learning curve defined as requiring 30–36 cases [14]. In order to overcome these limitations of SILS, several techniques have been developed. A curved or articulating instrument could help reduce interference between the camera and forceps [15].

An organ retractor is a clothes peg-like device developed for grasping tissue or organs gently and softly. It can be de-installed using a remover that is used generically for intestinal grasp forceps. It is re-usable, so it also has the advantage of low cost. In the SILS procedure, when we continue cutting the tissue, it is difficult to maintain adequate tension with retraction in the same manner. An organ retractor could be removed and adapted to change the retraction as the operation progresses. To control the traction, we use Asflex[®], which enables traction from outside the body. The line is not sutured and is held by the grasping device. It was possible to change the tissue tension by adjusting the traction of the extra-corporeal line. In the present case, we planned to use the organ retractor for the resection of the hepatocolic ligament, the resection of the ileocecal vessels, and the resection of the insertion of the mesentery proper. By selecting the appropriate tension, it was possible to maintain a good view during the operation (Fig. 2B).

Previous studies showed that oncogenic outcomes with SILS, including RO resection, and lymph node dissection were comparable to those of conventional laparoscopic surgery [10,13,16,17]. However, increased operation time was reported with SILS technique because of some technical difficulties [13]. In the present case, complete mesenteric excision and the planned lymph node dissection could be performed. Operation time was 185 min, and blood loss was 15 cc, which were reasonable compared to previous reports [12,13]. Despite the evidence for its safety and feasibility, use of SILS is not yet widespread [18]. One of the reasons is that it requires advanced skills and much experience [18,19]. To overcome these limitations, SILS+1 technique was reported to overcome device interference or help maintain the field, though one additional port was required [12]. We think that an organ retractor has the potential to provide the same advantage as SILS+1 technique without the additional wound. Furthermore, the organ retractor could grasp and release in several positions in order to provide an adequate view, which could be very instructive for younger surgeons when considering how to create a good operative view.

4. Conclusion

A case of single-incision laparoscopic surgery using an organ retractor was reported. An organ retractor is effective and helpful for SILS not only to maintain a good operative view, but also to shorten the learning curve.

Conflict of interest statement

None.

Funding

This study was not supported by any grant.

Ethical approval

Not applicable.

Consent

Written and signed consent from the patient to publish a case report has been obtained.

Author contributions

Tetsuro Tominaga and Takashi Nonaka developed the study concept. Kouki Wakata, Masaki Kunizaki, Shuichi Tobinaga, Yori-hisa Sumida, and Shigekazu Hidaka collaborated in the patient's care. Terumitsu Sawai and Takeshi Nagayasu provided input on the manuscript.

Registration of research studies

Researchregistry1025.

Guarantor

Tetsuro Tominaga.

References

- [1] M. Jacobs, J.C. Verdeja, H.S. Goldstein, Minimally invasive colon resection (laparoscopic colectomy), *Surg. Laparosc. Endosc.* 24 (1991) 754–758.
- [2] M.A. Pelosi, M.A. Pelosi 3rd, Laparoscopic appendectomy using a single umbilical puncture (minilaparoscopy), *J. Reprod. Med.* 37 (1992) 588–594.
- [3] F.H. Ramzi, H.T. Kirat, J.H. Kaouk, et al., Single-port laparoscopy in colorectal surgery, *Colorectal Dis.* 10 (2008) 823–826.
- [4] P.P. Rao, P.P. Rao, S. Bhagwat, Single-incision laparoscopic surgery-current status and controversies, *J. Minim. Access Surg.* 7 (2011) 6–16.
- [5] S. Gaujoux, F. Bretagnol, M. Ferron, et al., Single-incision laparoscopic colonic surgery, *Colorectal Dis.* 13 (2011) 1066–1071.
- [6] S. Miller, M.W. Causey, A. Damle, et al., Single-incision laparoscopic colectomy: training the next generation, *Surg. Endosc.* 27 (2013) 1784–1790.
- [7] R.A. Agha, A.J. Fowler, A. Saetta, et al., The SCARE Statement: consensus-based surgical case report guidelines, *Int. J. Surg.* 34 (2016) 180–186.
- [8] V. Vasilakis, C.E. Clark, L. Liasis, et al., Noncosmetic benefits of single-incision laparoscopic sigmoid colectomy for diverticular disease: a case-matched comparison with multiport laparoscopic technique, *J. Surg. Res.* 180 (2013) 201–207.
- [9] W.M. Chambers, M. Bicsak, M. Lamparelli, et al., Single-incision laparoscopic surgery (SILS) in complex colorectal surgery: a technique offering potential and not just cosmesis, *Colorectal Dis.* 13 (2011) 393–398.
- [10] Y.M. Zhou, L.P. Wu, Y.F. Zhao, et al., Single-incision versus conventional laparoscopy for colorectal disease: a meta-analysis, *Dig. Dis. Sci.* 57 (2012) 2103–2112.
- [11] A.M. Merchant, M.W. Cook, B.C. White, et al., Transumbilical Gelpport access technique for performing single incision laparoscopic surgery (SILS), *J. Gastrointest. Surg.* 13 (2009) 159–162.
- [12] M. Ragupathi, D.I. Ramos-Valades, M.D. Yaakovian, et al., Single-incision laparoscopic colectomy: a novel approach through a Pfannenstiel incision, *Tech. Coloproctol.* 15 (2011) 61–65.
- [13] R. Daher, E. Chouillard, Y. Panis, New trends in colorectal surgery: single port and natural orifice techniques, *World J. Gastroenterol.* 20 (2014) 18104–18120.
- [14] E.M. Haas, J. Nieto, M. Ragupathi, et al., Critical appraisal of learning curve for single incision laparoscopic right colectomy, *Surg. Endosc.* 27 (2013) 4499–4503.
- [15] A.K. Fung, E.H. Aly, Systemic review of single-incision laparoscopic colonic surgery, *Br. J. Surg.* 99 (2012) 1353–1364.
- [16] M.H. Chew, M.H. Chang, W.S. Tan, et al., Conventional laparoscopic versus single-incision laparoscopic right hemicolectomy: a case cohort comparison

- of short-term outcomes in 144 consecutive cases, *Surg. Endosc.* 27 (2013) 471–477.
- [17] S. Fuji, K. Watanabe, M. Ota, et al., Single-incision laparoscopic surgery using colon lifting technique for colorectal cancer: a matched case control comparison with standard multiport laparoscopic surgery in terms of short-term results and access instrument cost, *Surg. Endosc.* 26 (2012) 1403–1411.
- [18] F. Cianchi, F. Staderini, B. Badii, Single-incision laparoscopic colorectal surgery for cancer: state of art, *World J. Gastroenterol.* 20 (2014) 6073–6080.
- [19] P.W. Dhumane, M. Diana, J. Leroy, et al., Minimally invasive single-site surgery for digestive system: a technique review, *J. Minim. Access Surg.* 7 (2011) 40–51.

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