The Use of the EndoGrab™ Port-Free Endocavity Retractor in Single-Incision Laparoscopic Right Hemicolectomy

Yasumitsu Hirano¹ · Masakazu Hattori¹ · Kenji Douden¹ · Yasuo Hashizume¹

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Abstract The EndoGrab™ Port-Free Endocavity Retractor is an internally anchored retracting device that enables surgeons to reduce not only the number of ports and incisions but also the number of assistant surgeons. Our institution performs single-incision laparoscopic colectomy (SILC) as a routine procedure. Forty-nine patients underwent a single-incision laparoscopic right hemicolectomy. In this procedure, we use this retractor to the mesenteric tissue, including the ileocolic vessels and the mesentery of the transverse colon, and overcame the technical problems related to SILC and showed excellent short-term outcomes. To perform SILC safely while maintaining the minimal invasiveness and the quality, the use of this retractor is essential, especially in difficult situations, such as an unfavorable visual field when performing a lymph node dissection around the middle colic vessels in right hemicolectomy.

Keywords EndoGrab™ Port-Free Endocavity Retractor · Single-incision laparoscopic right hemicolectomy · Single-incision laparoscopic surgery · Colon cancer

Introduction

The EndoGrab™ Port-Free Endocavity Retractor (Virtual Ports, Misgav, Israel) [Fig. 1a] is an internally anchored retracting device that can be introduced into the abdomen

at the outset of an operation through a 5-mm port. This retractor and organ are anchored directly to the endocavity wall, outside of the surgeon's critical view, resulting in enhanced tissue access without cluttering the laparoscopic workspace. This retractor, therefore, enables surgeons to reduce not only the number of ports and incisions but also the number of assistant surgeons needed to hold conventional retraction devices during laparoscopic surgery. The device can be adjusted repeatedly throughout the operation to allow for optimal retraction and is removed at the end of surgery [1].

Our institution performs single-incision laparoscopic colectomy (SILC) as a routine procedure. In single-incision laparoscopic surgery, we often encounter difficulties owing to the unfavorable visual field, the low tension under the tissue to be dissected, and the conflicts among laparoscopic instruments; these circumstances may hinder the safety of the operation itself and the quality of the lymph node dissection.

To perform these procedures safely while maintaining the minimal invasiveness of SILC and the quality of the lymph node dissection, we use this retractor. We report on right hemicolectomy for colon cancer with the new EndoGrab™ Retractor.

Material and Surgical Technique

Forty-nine patients underwent right hemicolectomy for colon cancer with the new EndoGrab™ Retractor. Under general anesthesia, the patients were placed in the modified lithotomy position. First, a Lap protector (LP; Hakkou Shoji, Nagano, Japan) was inserted through a 2.5-cm trans-umbilical incision to protect the wound. Next, an EZ-access (Hakkou Shoji, Nagano, Japan) was mounted onto the LP,

✉ Yasumitsu Hirano
yasumitsu@yahoo.co.jp

¹ Department of Surgery, Fukui Prefectural Hospital, 2-8-1 Yotsui, Fukui 910-8526, Japan

Fig. 1 The EndoGrab™ Retractor (a) and its applicator hand instrument (b)

and three 5-mm ports were placed in the EZ-access. Almost all procedures were performed with standard laparoscopic instruments, and the operative procedures were similar to those employed in standard laparoscopic colectomy procedures.

First, the right colon was mobilized using a modified medial to lateral approach. One of the two grasping ends of the EndoGrab™ Retractor was attached to the mesenteric tissue, including the ileocolic vessels [Fig. 2a], while the other was anchored to the abdominal wall [Fig. 2b]. Thus, the mesenteric tissue, including the ileocolic vessels, was retracted [Fig. 2c], which enabled the surgeon to freely use both hands [Fig. 2d]. The superior mesenteric vein was exposed, and the ileocolic vein was divided at its base [Fig. 3a]. The ileocolic artery was divided at its origin [Fig. 3b], and all of the soft

tissue anterior to the superior mesenteric vein was removed. Next, the mesentery of the transverse colon was anchored directly to the endocavity wall with this retractor [Fig. 3c]. Consequently, the middle colic artery was exposed, and all of the soft tissue around the middle colic artery was also removed (D3 lymph node dissection). The right branch of the middle colic artery was divided at its origin [Fig. 3d], and the middle colic vein and the accessory right colic vein were also divided at their bases. After mobilizing the colon, the specimen was extracted through the small incision. Resection was achieved following extracorporealization, and the anastomosis was performed extracorporeally using staplers.

The mean skin incision was 2.62 cm. The mean operative time and blood loss were 191.2 min and 59.6 ml, respectively.

Fig. 2 The EndoGrab™ Retractor and organ are anchored directly to the endocavity wall (a, b). The mesenteric tissue, including the ileocolic vessels, was retracted by this retractor (c), which enabled the surgeon to freely use both hands (d)

Fig. 3 The superior mesenteric vein was exposed, and the ileocolic vein was divided at its origin (a). The ileocolic artery was divided at its roots (b). The mesentery of the transverse colon was anchored directly to the endocavity wall with the EndoGrab™ Retractor (c). The right branch of the middle colic artery was divided at their roots (d)

The mean number of harvested lymph nodes was 35.3. Postoperative complications occurred in two patients. The patients were discharged on 11.3 postoperative days (Table 1).

Discussion

Single-incision laparoscopic colectomy (SILC) for colon cancer has been preliminary described by Remizi et al. and Bucher P et al. in 2008 [2, 3], and our institution began performing SILC for colon cancer in August 2010. Our initial experiences with about 200 cases showed that SILC can be applied to colon cancer at any location with preferable short-term outcomes. Recently, Takemasa et al. revealed in their prospective case–control

study that SILC with complete mesocolic excision (CME) for colon cancer is feasible and safe when performed by experienced surgeons for selected patients [4]. This procedure provides improved cosmesis and possibly reduces postoperative pain with acceptable short-term outcomes and certain oncologic clearance. However, there are some limitations including technical problems in SILC, such as instrument crowding, in-line viewing, insufficient countertraction, somewhat narrow patient applicability, and that make this procedure difficult and somewhat dangerous.

The EndoGrab™ Retractor is the only device designed to be used as an existing port to retract organs entirely from within the body cavity, which enables surgeons to reduce the number of ports, incisions, and personnel needed during laparoscopic surgery. An applier hand instrument [Fig. 1b], used to deploy and position this retractor, is removed once the organ is retracted, leaving the port open for other uses. With the use of this retractor, our procedure of single-incision laparoscopic right hemicolectomy for colon malignancy has overcome the technical problems related to SILC and showed excellent short-term outcomes.

To complete the SILC procedure, the use of this EndoGrab™ Retractor is essential to maintain the minimal invasiveness and the oncological safety, especially in difficult situations such as an unfavorable visual field when performing a lymph node dissection around the middle colic vessels.

Table 1 Intra- and perioperative outcomes and postoperative complications

Intra- and perioperative outcomes	
Skin incision	2.62 cm
Operative time	191.2 min
Estimated blood loss	59.6 ml
Harvested lymph nodes	35.3
Hospital stay	11.3 days
Postoperative complications	
Incisional hernia	1
Intra-peritoneal bleeding	1

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

References

1. Schlager A, Khalaileh A, Shussman N et al (2010) Providing more through less: current methods of retraction in SIMIS and NOTES cholecystectomy. *Surg Endosc* 24:1542–1546
2. Remzi FH, Kirat HT, Kaouk JH, Geisler DP (2008) Single-port laparoscopy in colorectal surgery. *Color Dis* 10:823–826
3. Bucher P, Pugin F, Morel P (2008) Single port access laparoscopic right hemicolectomy. *Int J Color Dis* 23:1013–1016
4. Takemasa I, Uemura M, Nishimura J, Mizushima T, Yamamoto H, Ikeda M, Sekimoto M, Doki Y, Mori M (2014) Feasibility of single-site laparoscopic colectomy with complete mesocolic excision for colon cancer: a prospective case-control comparison. *Surg Endosc* 28:1110–1118