



Case Series

Reduced-port endo-laparoscopic surgery using umbilical zigzag incision for concomitant operations: A case series



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ABSTRACT

INTRODUCTION: Recently, use of reduced-port surgery has become widespread; however, it is a difficult operation. Hachisuka et al. developed a method called the umbilical zigzag incision, which enlarges the fascial incision using only an umbilical skin incision. We believe this method will be feasible for concomitant laparoscopic surgery. We report our surgical techniques for concomitant laparoscopic surgery using an umbilical zigzag incision.

METHODS: The patient who should receive more than 2 places of abdominal operation were indicated this procedure. In all cases, we made the zigzag incision in the umbilical region. After the linea alba and peritoneum were incised, the wound retractor was inserted through the incision, which enlarges the fascial opening. GelPoint was attached to the wound retractor and the operation was started.

RESULTS: We could create a fascial opening of up to 6 cm with the umbilical zigzag incision, which improves the triangulation of forceps and reduces interference among the trocars. The trocars in the center of the abdomen could be utilized for almost all intraperitoneal operations. This procedure was especially useful in cases that included lymph node dissection because dissection of a malignant tumor is a delicate procedure. Furthermore, extraction of specimens and anastomosis went very smoothly because the fascial incision was large enough such that no extension of the incision was needed. No early or late postoperative complications occurred in any case. Postoperative wounds were clear and therefore patient satisfaction levels were high.

CONCLUSION: Umbilical zigzag incision may be feasible especially in concomitant laparoscopic surgery.

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1. Introduction

Recently, the use of reduced-port surgery (RPS) has become widespread in many fields of laparoscopic surgery [1–3]. However, RPS is a difficult operation owing to issues such as loss of triangulation and extraction of a specimen. Hachisuka et al. developed a novel method to solve these problems, the umbilical zigzag skin incision, which enlarges the fascial and peritoneal incisions to at most 6 cm with only an umbilical incision [4]. We believe that this method would be feasible and beneficial for concomitant laparoscopic surgery because the enlarged umbilical skin incision will be utilized for anywhere in the abdominal cavity. Here we report the

surgical techniques of concomitant laparoscopic surgery using this method.

2. Patients and methods

This study is a single center retrospective consecutive case series. Ethical approval was not needed because this study was retrospective case series. Between 2013 July and 2016 May the patient who should receive more than 2 places of abdominal operation were indicated this procedure. Written informed consent was obtained from all of the patients mentioned in this case series. In all cases, we made the zigzag incision in the umbilical region along a marked line (Fig. 1A, B). After the linea alba and peritoneum were incised, the wound retractor was inserted through the incision, which enlarges the fascial opening (Fig. 2). GelPoint (Applied Medical, Rancho Santa Margarita, USA) with trocars was attached to the wound retractor and the operation was started. The work has been reported in line with the PROCESS criteria [5].

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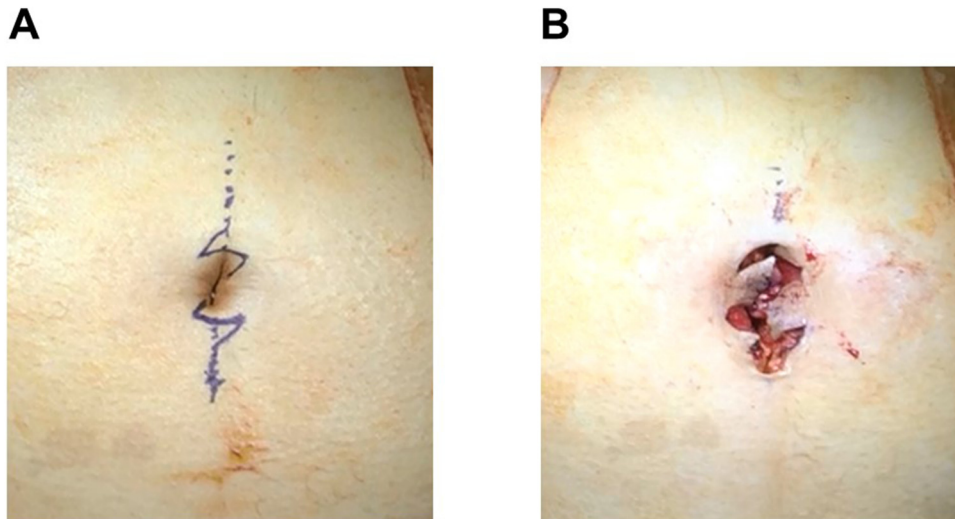


Fig. 1. (A) Zigzag skin marking on umbilical skin. (B) Incision in umbilical region along the marked line.

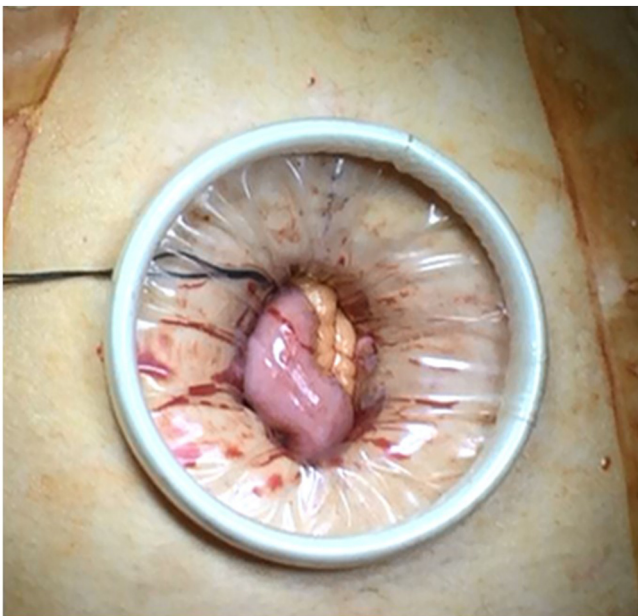


Fig. 2. Wound retractor expanded the fascial and peritoneal incisions to 6 cm with only an umbilical incision.

3. Results

We performed 6 concomitant laparoscopic surgeries using an umbilical zigzag incision and detail of patients and procedure were listed in [Table 1](#). Linea alba and peritoneal incision was extended to 6 cm by cranio-caudal 3 cm zigzag skin incision. Cases 1 and 2 involved simple resections of two specimens without reconstruction. Cholecystectomy was performed at the first setting with two operator trocars on both sides of the camera port. After the gallbladder was extracted, GelPoint was re-attached to the wound retractor. In case 1 it was turned 90° to the right, which is a suitable setting for partial gastrectomy, and in case 2 it was turned to the left for cecal resection.

Cases 3, 4, and 5 involved cholecystectomies with sigmoidectomy or low anterior resection (LAR) that needed D3 lymph node dissection and double staple technique reconstruction. In these procedures several ports were added. After gallbladder was removed, sigmoidectomy and LAR were performed in the same

manner as conventional multiport surgery. In LAR case, transection of the proximal colon and insertion of the circular stapler anvil were performed extraperitoneally through the umbilical incision. Multi-channel drainages were placed through the additional port sites.

Case 6 was an ileocecal resection and sigmoidectomy that needed D2 lymph node dissections. 5-mm ports were added in the left and right lower quadrant. The colon was extracted through the umbilical incision and resected. Hand-sewn anastomosis was performed.

In all cases, the umbilical incision was utilized for any place of operation. The interference of trocars and camera in umbilical port was less and extraction of specimens and reconstruction were smooth because the umbilical incision was spread enough to perform these procedures.

No intraoperative or postoperative complications occurred in any of the cases. The umbilical wounds were almost invisible a few months after surgery ([Fig. 3](#)).

4. Discussions

Concomitant laparoscopic surgeries have been reported in the past, suggesting that the methods would be feasible and safety [6–8]. However, when we perform two different surgeries, standard port placement may not work, and the number of ports may increase [9]. Therefore, we believe that RPS through an umbilical incision would be especially feasible for concomitant laparoscopic surgery because the ports in the umbilical incision at the center of the abdomen can be utilized during the operative procedures to access almost all intraperitoneal organs. Additionally, this method would be particularly useful for operations that include the retraction of a large specimen and anastomosis of the intestinal tract because the umbilical incision can be used for all of these procedures.

RPS for multiple organ procedures has been previously described in a few reports. Wu et al. reported trans-umbilical single port concomitant surgery for small organ resection that needed no reconstruction and concluded that the method is feasible [10]. Palanivelu et al. reported 27 cases of concomitant single port laparoscopic surgery and concluded that this procedure is feasible [9]. There were no operations that required large specimen extraction or reconstruction of the intestine except for one case of jejunum resection. The port was directly inserted through the fascia and enlargement of the incision was necessary in some cases.

Table 1
Result of 6 concomitant laparoscopic surgeries using umbilical zigzag incision.

	Procedure	Age (years)	Sex	Single port device	Additional ports	Operative time (min)	Blood loss (ml)	Post-operative complications	Hospital stay (days)
Case 1	Partial gastrectomy and cholecystectomy	72	M	GelPoint	None	110	5	None	4
Case 2	Cecal wedge resection and cholecystectomy	55	M	GelPoint	None	112	1	None	4
Case 3	Cholecystectomy, left colectomy and Sigmoidectomy	75	M	GelPoint	12-mm port and two 5-mm ports	337	23	None	10
Case 4	Cholecystectomy and sigmoidectomy	69	F	GelPoint	12-mm port and 5-mm port	350	12	None	10
Case 5	Low anterior resection and cholecystectomy	44	M	GelPoint	12-mm port and 5-mm port	288	60	None	12
Case 6	Right colectomy and sigmoidectomy	76	F	GelPoint	Two 5-mm ports	277	25	None	9

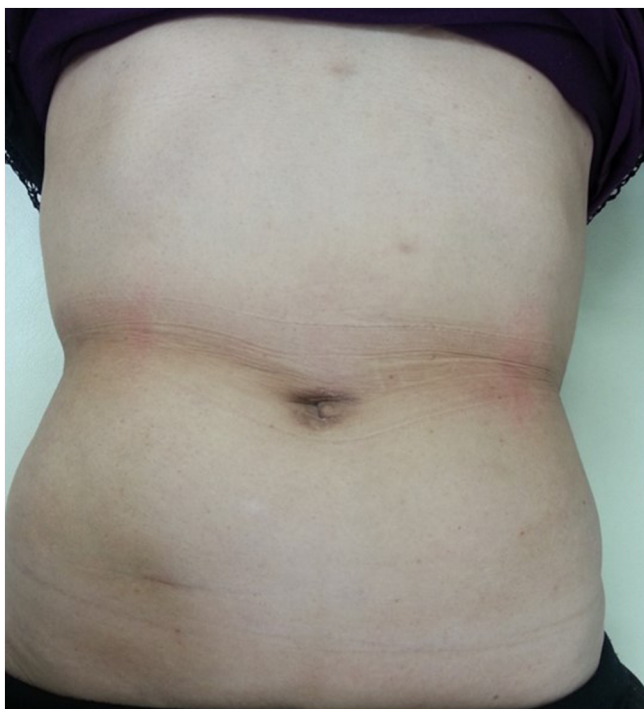


Fig. 3. The post-operative wound of case4 patient. 3 months after surgery, the wound was very clear and almost invisible.

Kim et al. also described 5 cases of single port combined abdominal procedures [11]. One case of a sigmoid cancer resection with an 8 cm liver resection was reported where another 8 cm Pfannenstiel incision was necessary for specimen retrieval and to perform the colorectal anastomosis.

As described above, RPS may potentially include many problems. Loss of instrumental triangulation is unavoidable, and if ports in a single incision were inserted directly through the fascia, it is very difficult to place the ports optimally for a double procedure. We may experience some difficulty when extracting organs that are too large to remove from a single incision. These problems will be solved if we extend the incision or make another incision, but the cosmetic advantage of RPS would then be undermined.

For this reason, we employed the umbilical skin zigzag incision described by Hachisuka et al. in 2012 [4]. The primary benefit of this method is that we can make up to a 6 cm fascial and peritoneal opening using only an umbilical skin incision. This method improves the triangulation of forceps and reduces the interference among the trocars at the umbilical incision. In all 6 operations that we described, this allowed us to perform a smooth opera-

tion. This method was especially useful in cases 3–6 that included lymph node dissection because dissection of a malignant tumor requires a more delicate procedure than simple organ resection. Furthermore, extraction of specimens and anastomosis went very smoothly because the fascial incisions were large enough such that no incision extension or additional incisions were needed.

Adoption of GelPoint as a single incision laparoscopic surgery device also improves the procedure operability. We could insert the ports anywhere through the gel and reinsert as many times as desired. We needed several additional ports in the case of colorectal cancer, however, there were no unnecessary wounds because we utilized the ports for the cholecystectomy, mobilization of splenic flexure, lymph node dissection, and placement of the drainage tube. No perioperative complications occurred in any of the cases. The postoperative wounds were clear and therefore patient satisfaction levels were high. For these reasons, we consider umbilical zigzag incision to be feasible for concomitant laparoscopic surgery.

5. Conclusion

Umbilical zigzag incision may be feasible especially in concomitant laparoscopic surgery.

Conflicts of interest

All authors of this article have no conflicts of interest.

Sources of funding

There is no funding support for this research.

Ethical approval

This study is exempt from ethical approval in my institution.

Consent

I have patient written informed consent from all of the patients mentioned in this case series. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contributions

Umeda and Hachisuka made the and design of the study and wrote the draft of the article. Otsu, Hishida, Nagai, Shimizu, Kobayashi and Nozaki recruited their patients and managed their care. All authors made a draft revision. Umeda made a critical revision of the article for important intellectual content. Umeda had primary responsibility for final approval of the article.

Registration of research studies

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Guarantor

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