



Contents lists available at ScienceDirect

International Journal of Surgery Case Reports

journal homepage: www.casereports.com

Single-incision laparoscopic appendectomy for treating appendicitis in a patient with gastrointestinal malrotation



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ARTICLE INFO

Article history:

Received 3 April 2014

Received in revised form 19 June 2014

Accepted 21 June 2014

Available online 30 June 2014

Keywords:

Single-incision

Laparoscopy

Transumbilical

Appendectomy

Appendicitis

Malrotation

ABSTRACT

INTRODUCTION: Intestinal malrotation is a rare congenital anomaly, and acute appendicitis associated with intestinal malrotation is extremely rare.

PRESENTATION OF CASE We report a rare case of a 47-year-old Japanese woman diagnosed with barium-related perforated appendicitis associated with intestinal malrotation. We used a transumbilical single-incision laparoscopic approach to resect the appendix, and the procedure was completed successfully without perioperative complications.

DISCUSSION: To our knowledge, single-incision laparoscopic surgery for appendicitis associated with intestinal malrotation has not been reported yet. In cases with mobile cecum such as this one, mobilization from inflammatory adhesion of the surrounding structures is easy.

CONCLUSION: We conclude that transumbilical single-incision laparoscopic appendectomy is a simple and less invasive method for treating appendicitis associated with intestinal malrotation.

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1. Introduction

Intestinal malrotation is a rare congenital anomaly, and the classification of this abnormality includes various subtypes based on the stage of midgut rotation.¹ However, from a practical viewpoint, we found it useful to apply a simplified categorization, including nonrotation, incomplete rotation, and reverse rotation. Most cases of malrotation are discovered in childhood, and the diagnosis is mostly incidental in adults.² Further, in cases with indefinite symptoms, it is sometimes difficult to diagnose this pathology correctly.

Acute appendicitis is one of the most common conditions requiring emergency surgery. However, acute appendicitis associated with intestinal malrotation is extremely rare. Some case reports and reviews³ have referred to atypical symptoms such as left lower quadrant pain⁴ and ileus.⁵

The treatment for this condition is appendectomy. In recent years, laparoscopic appendectomy has gained popularity, but there are limited reports of single-incision appendectomies. Herein, we report a case of a patient with intestinal malrotation who

presented with appendicitis, which we treated by a transumbilical single-incision laparoscopic appendectomy approach.

2. Case report

A 47-year-old woman with a 2-day history of epigastric pain was admitted to a local hospital. She had undergone double-contrast barium examination of her stomach 1 month earlier as a periodic checkup for gastric cancer. She had been using analgesic drugs for the treatment of colitis-like symptoms. Her symptoms did not improve, and she was transferred to the emergency department of our institution. The patient presented pain associated with nausea, low-grade fever (37.6 °C), and several episodes of vomiting. On physical examination, she had pain and defense on deep palpation of the periumbilical and lower abdominal regions. Laboratory tests showed an elevated WBC count (10,100/μL with 90% neutrophils) and a C-reactive protein level of 9.42 mg/dL with normal liver and renal function tests. A plain abdominal radiograph showed a radiopaque area in the center of the lower abdomen (Fig. 1).

Computed tomography (CT) with IV enhancement showed intestinal nonrotation findings, including right-sided small intestines, left-sided colon, and a midline-positioned appendix with barium retention near the cecum (Fig. 2). Nonrotation-type intestinal malrotation with ruptured appendicitis was diagnosed based on these findings. Usually, we performed a conventional three-port technique for standard laparoscopic appendectomy

Abbreviations: WBC, white blood cell; CT, computed tomography.

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<http://dx.doi.org/10.1016/j.ijscr.2014.06.017>

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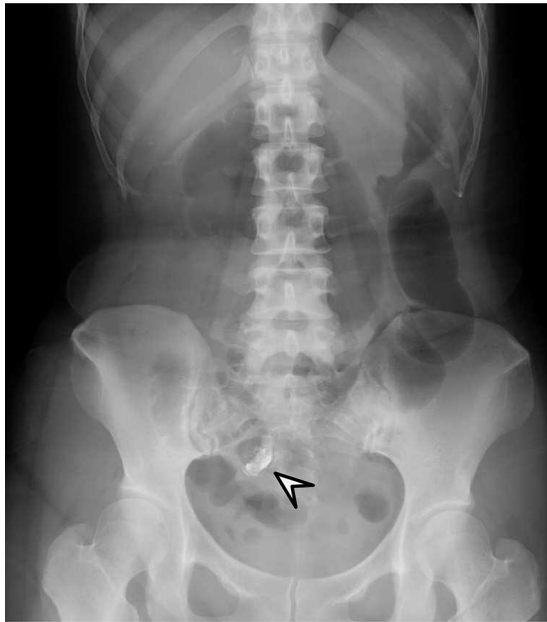


Fig. 1. Radiograph examination. Radiopaque objects in the middle lower abdomen (arrowhead).

to facilitate the separation of the inflammatory adhesions of the appendix and mobilization of the ileocecal region. The appendix was dissected extracorporeally. However, we selected a single-incisional laparoscopic approach owing to the preoperative diagnosis of intestinal malrotation and because this approach required less ileocecal mobilization. The patient was transferred to the operating room for single-incisional laparoscopic appendectomy. For the single-incision laparoscopic surgery technique, the anesthetized patient was placed in the standard supine, crucifix, reverse-Trendelenburg position, with the surgeon on the patient's right side. A 2-cm vertical transumbilical incision was made, and an E•Z Access device designed exclusively for use with the LAP PROTECTOR™ mini-type (Hakko Co. Ltd., Tokyo, Japan) was used.⁶ A 10-mm 30° endoscope (Olympus, Tokyo, Japan) was used for intra-abdominal visualization. Another two 5-mm trocars were inserted through the umbilicus. We did not find a Ladd's band or any other GI malformation. After aspiration of dirty ascitic fluid, the appendix was detected behind the uterus. Blunt dissection was performed easily. Subsequently, the appendix was exteriorized and resected extracorporeally. Sufficient peritoneal lavage and drainage catheter insertion were also performed (Fig. 3). We did not perform any surgical intervention, such as Ladd's procedure, to address the malrotation. Pathological examination confirmed the diagnosis of barium appendicitis with perforation (Fig. 4). The patient was discharged 7 days later without any complications.



Fig. 2. Computed tomography and reconstituted imaging. (a) Radiopaque objects in the deep pelvis (arrowhead). (b) Right-sided small intestines and left-sided colon. (c) Appendix (arrowhead) and cecum (arrow).

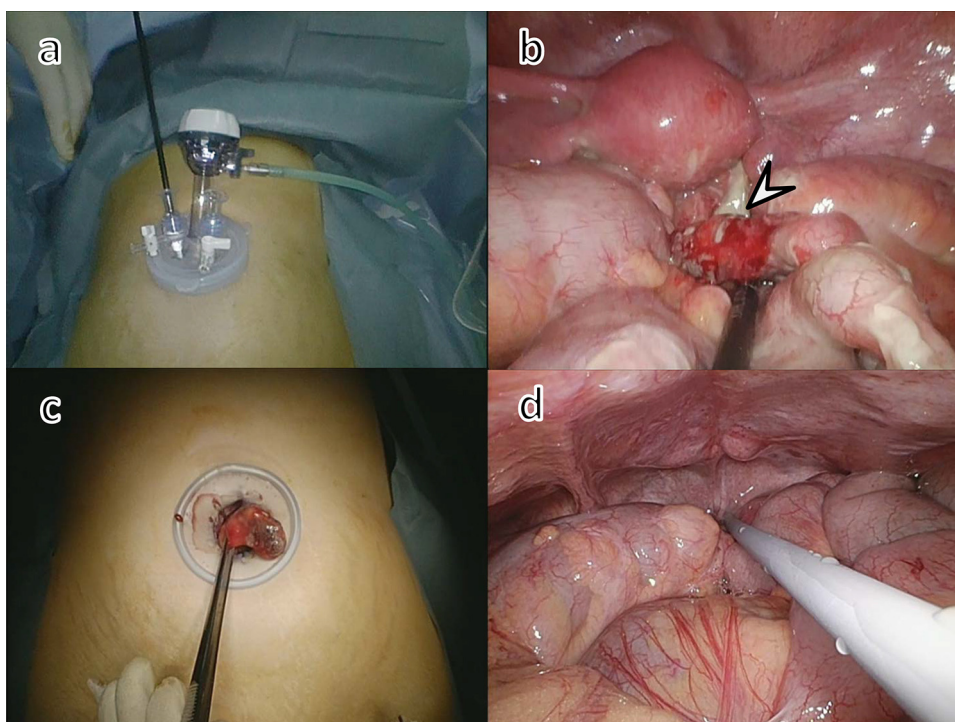


Fig. 3. Representative photograph of surgical findings. (a) Laparoscopic settings. (b) Bluntly dissected appendix (arrowhead). (c) Appendix was removed through the transumbilical incision. (d) Sufficient peritoneal lavage.

3. Discussion

Malrotation occurs in one of every 500 births, and most cases of malrotation are detected by 1 year of age. Because there are many asymptomatic cases in adults, the true incidence of malrotation is unknown. The most extensive study is attributed to Akbulut et al.³ who reviewed 95 cases of left-sided appendicitis and reported 23 cases of appendicitis associated with intestinal malrotation. Reports of 14 cases of laparoscopic surgery for appendicitis associated with intestinal malrotation are reviewed in Table 1.^{7–12}

Intestinal malrotation may present with atypical symptoms in cases of associated appendicitis, making the diagnosis very difficult. A scoring system using characteristic physical findings, such as the Alvarado score, does not provide sufficient sensitivity and specificity for the diagnosis. Exploratory laparoscopy has been used as a diagnostic treatment.¹³ Exploratory laparoscopy is also useful in terms of the transition to surgical treatment. However, CT has

been performed in many cases to date. In many cases, preoperative diagnosis was possible by CT.

Appendectomy is the basic operative procedure for treating appendicitis. On the other hand, the Ladd procedure is the standard surgical treatment for intestinal malrotation. The Ladd procedure requires mobilization of the right colon and cecum by division of Ladd bands, and appendectomy is performed as an additional procedure. Our patient had a perforated appendicitis that required emergency treatment; therefore, appendectomy was the precedent procedure. Since our patient was asymptomatic up to adulthood, the recommendations for Ladd procedure are still controversial. Although, the safety of the laparoscopic Ladd procedure has been reported,^{14–16} the need for the procedure should be determined on a case-by-case basis.

The most significant characteristic of surgery in patients with malrotation is the absence of the appendix in its usual position in the right lower quadrant owing to the mobility of the ileocecal portion. The added difficulty of the surgical approach is attributable to this characteristic. In this case, the approach to the deep pelvis by laparotomy requires a large incision. However, the minimal invasiveness of laparoscopic surgery is advantageous and makes it possible to approach various lesions through a small incision. Furthermore, the appendix can be easily resected extracorporeally if it is identified because of the mobility of the ileocecal region.

In conventional laparoscopic appendectomy, the appendix dissection approach is broadly classified into extracorporeal dissection or intracorporeal dissection. In intracorporeal dissection, an end loop or stapler is used, whereas in extracorporeal dissection and laparotomy, special devices are not required. Alternatively, the mobilization of the ileocecal region is necessary. Single-incision laparoscopic appendectomy has technical limitations associated with the use of a stapler; therefore, mobilization of the ileocecal region and extracorporeal dissection are often performed. Some reports have mentioned that single-incision laparoscopic appendectomy is a useful and cost-effective surgical technique because

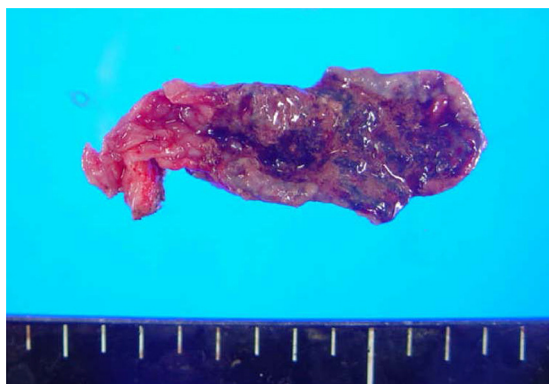


Fig. 4. Macroscopic appearance of the resected specimen. Gangrenous appendix with white deposit (barium)

Table 1
Reported cases of laparoscopic surgery for appendicitis associated with intestinal malrotation.

Year	Author	Age	Gender	Laparoscopic procedure	Diagnostic modality	Ladd procedure	Complication
2001	Nicholas JM	27	M	Exploratory	CT	+	ND
2003	Tsumura H	15	F	ND	CT	+	ND
2007	Welte FJ	46	M	ND	CT	–	–
2007	Palanivelu C	8 cases review	multiport	CT	+	–	–
2008	Schwartz JH	38	M	ND	CT	–	–
2009	Bedoui R	56	M	multiport	CT	ND	–
2012	Chabel M	15	F	multiport	US/CT	–	–

CT, computed tomography; US, ultrasonography; ND, not described.

it requires the use of fewer devices,¹⁷ although there are some opposing views.^{18,19}

However, in cases of mobile cecum such as in the present case, the mobilization of the cecum from the surrounding inflammatory adhesions is easy.

4. Conclusion

In summary, we conclude that transumbilical single-incision laparoscopic appendectomy is a simple and less invasive method for treating appendicitis associated with a mobile cecum as typified by intestinal malrotation.

Conflict of interest

The authors declare that they have no conflicts of interest or competing interests.

Ethical approval

Written consent was obtained from the patient for publication of this case report and the accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Funding

None.

Authors' contributions

TT participated in the treatment of the patient, collected case details, conducted a literature search, and drafted the manuscript. MK and KS helped to draft the manuscript. YH, ST, and KA participated in the treatment of the patient. All authors read and approved the final manuscript.

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