

## Oncology

# Intestinal malrotation in a patient who underwent radical cystectomy and ileal conduit construction: A case report



Fumito Yamabe<sup>\*</sup>, Hiroshi Aoki, Remi Iwamoto, Yozo Mitsui, Hideyuki Kobayashi, Koichi Nakajima

Department of Urology, Toho University Omori Medical Center, Department of Urology, Faculty of Medicine, Toho University, 6-11-1, Omori-Nishi, Ota-ku, Tokyo, 143-8541, Japan

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## ABSTRACT

A 74-year-old male underwent laparoscopic radical cystectomy for invasive bladder cancer with open surgery for lymph node dissection and urinary diversion (ileal conduit). During the surgery, intestinal malrotation was diagnosed and Ladd procedure was performed. Ileal conduit was performed on the left side after considering the course of mesentery. Although a final diagnosis was reached during the surgery in this case, the presence of intestinal malrotation can be suspected based on the findings of contrast-enhanced computed tomography images obtained before the surgery. Images should be carefully inspected to detect intestinal malrotation when planning urinary diversion involving the intestinal tract.

## Introduction

Intestinal malrotation, a rare cause of intestinal obstruction, is mostly diagnosed and treated during neonatal or early childhood stage; it occurs in nearly 1 in 6000 patients.<sup>1</sup> The onset of this condition is rare in adults; however, it is often accidentally detected during tests or surgical procedures for other diseases. Herein, we report the case of a patient with intestinal malrotation that was accidentally detected and diagnosed during radical cystectomy.

## Case presentation

A patient was a 74-year-old male (height, 156 cm; weight, 43 kg) complaining mainly of dysuria. There was no history of intestinal obstruction or previous abdominal surgeries. Invasive bladder cancer was suggested based on the findings of contrast-enhanced computed tomography (CT) images; no signs of metastases were observed in the patient. The transurethral resection of the bladder tumor revealed muscle-invasive urothelial carcinoma. The disease was diagnosed as high grade (PT2 or higher). The patient received two courses of neoadjuvant chemotherapy (gemcitabine and cisplatin) followed by laparoscopic radical cystectomy and ileal conduit construction.

The cystectomy was laparoscopically performed; subsequently, pelvic lymph node dissection and urinary diversion were performed using laparotomy. The inspection of the intestinal tract to free the ileum revealed that the duodenum was not turned to the left to form the ligament of Treitz (Fig. 1). Instead, it had descended to the right, and the ascending colon was not fixed to the retroperitoneum. Additional anomalies in the placement of the transverse colon, such as circling from the dorsal side to the left side of the small intestine, were observed (Fig. 1).

A gastroenterological surgeon diagnosed the patient with non-rotation type intestinal malrotation and performed the Ladd procedure (discussed later). The ileal conduit was performed on the left side of the patient based on the direction and course of the intestinal tract and mesentery (Fig. 2). The duration of the surgery was 463 min, whereas that of insufflation was 98 min (blood loss, 320 ml).

Specimens obtained during radical cystectomy revealed high grade invasive urothelial carcinoma with squamous differentiation. The patient was diagnosed with advanced (pT3b) cancer. Surgical margins were negative, but metastases were identified in one of the 34 extracted lymph nodes, which led to the diagnosis of pN1 disease. Although the postoperative intestinal obstruction was slightly prolonged, the condition improved with conservative management and intestinal obstruction

Abbreviations: CT, Computed tomography; SMA, Superior mesenteric artery; SMV, Superior mesenteric vein.

<sup>\*</sup> Corresponding author.

E-mail addresses: [koolmilds4569@hotmail.co.jp](mailto:koolmilds4569@hotmail.co.jp) (F. Yamabe), [hiroshi.aoki@med.toho-u.ac.jp](mailto:hiroshi.aoki@med.toho-u.ac.jp) (H. Aoki), [reimi.kawashima@med.toho-u.ac.jp](mailto:reimi.kawashima@med.toho-u.ac.jp) (R. Iwamoto), [yozo.mitsui@med.toho-u.ac.jp](mailto:yozo.mitsui@med.toho-u.ac.jp) (Y. Mitsui), [hideyukk@med.toho-u.ac.jp](mailto:hideyukk@med.toho-u.ac.jp) (H. Kobayashi), [koichin@med.toho-u.ac.jp](mailto:koichin@med.toho-u.ac.jp) (K. Nakajima).

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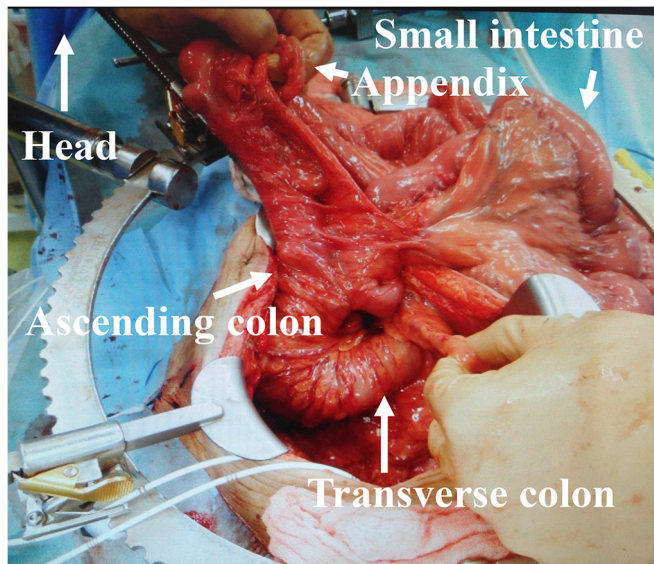
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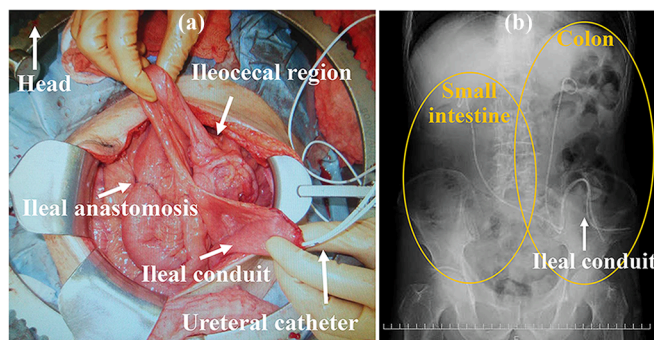
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**Fig. 1.** Intestinal findings at the time of abdominal surgery. The ascending colon is not fixed to the retroperitoneum, and the transverse colon circles from the dorsal side to the left side of the small intestine.



**Fig. 2.** Left side ileal conduit and placement of the small and large intestines. (a) The ileal conduit prepared on the left side after performing the Ladd procedure. (b) A postoperative abdominal radiograph showing the small intestine and large intestine placed in the right and left side, respectively, and the ileal conduit constructed in the left side.

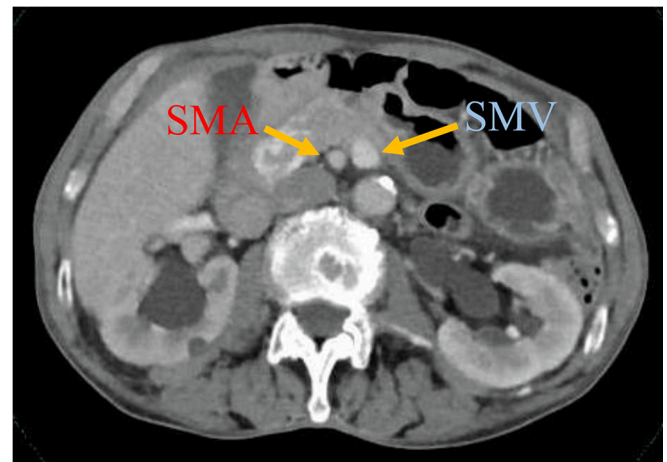
was not observed thereafter. Furthermore, the ileal conduit performed in the lower left quadrant did not pose any particular issues.

New liver and bone metastases were noted 5 months after the surgery, and the patient was initiated on additional chemotherapy and radiotherapy for bone metastases. However, the disease progressed, and the patient died 10 months after the surgery.

**Discussion**

Intestinal malrotation is a congenital disease caused by anomalies in the rotation and fixation of the intestinal tract during this stage. It is classified into four types according to its form.<sup>2</sup>

The Ladd procedure<sup>3</sup> is performed in children with intestinal malrotation, which is detected on the basis of obstruction caused by the midgut volvulus. This procedure mainly involves the following steps: 1) the freeing of the midgut volvulus, 2) resection of the Ladd band, 3) the adhesiolysis and unraveling of the bends in the duodenum, 4) opening of the mesenteric base around the superior mesenteric artery to place the small intestine on the right side (in the abdominal cavity) and the colon on the left side, and 5) prophylactic appendectomy. The Ladd band is a fibrous membrane-like structure formed from the cecum-ascending



**Fig. 3.** SMV rotation sign of this case. A preoperative contrast-enhanced computed tomography (CT) image of the present case showing the superior mesenteric vein (SMV) rotation sign, i.e., locations of the SMV and the SMA are interconverted.

colon region to the upper right retroperitoneum. In intestinal malrotation, the Ladd band covers and exerts extrinsic pressure on the duodenum, causing obstruction in some cases. Moreover, the Ladd band moves the duodenum and ascending colon close to each other and narrows the mesentery, thereby creating a pedicle and making it easier for the volvulus to develop.

In the current report, the diagnosis of a non-rotation type intestinal malrotation was made during laparotomy, and the Ladd procedure was performed. Some researchers believe that it is unnecessary to surgically treat the asymptomatic intestinal malrotation if it is accidentally detected. However, we performed the Ladd procedure in this patient for two reasons. First, urinary diversions can alter the positional relationship of the intestinal tract in the abdominal cavity and facilitate the development of intestinal obstruction by the volvulus. Second, it is difficult to treat an intestinal obstruction if it develops after the surgical procedure. During the Ladd procedure, the small and large intestines are positioned on right and left side, respectively, whereas the ileocecal region is positioned in the lower left abdomen. Because the ileum near the ileocecal region and the mesentery ran opposite to its usual course (from right to left) in this patient, the ileal conduit was performed in the lower left abdomen.

Asymptomatic intestinal malrotation can be diagnosed using imaging tests. Abnormal intestinal placement and the superior mesenteric vein (SMV) rotation sign (the SMV running on the left side of the superior mesenteric artery), as observed on gastrointestinal contrast radiography and contrast CT, are helpful for diagnosing this condition.<sup>4</sup> The preoperative contrast-enhanced CT images obtained for this patient revealed the SMV rotation sign (Fig. 3). Appropriately planned surgeries could be performed if these SMV signs were noticed and the intestinal malrotation were suspected preoperatively.

It is difficult to observe the entire intestinal tract while performing robot-assisted surgeries for intracorporeal urinary diversion, which are being increasingly performed recently. Thus, it is critical to check for the presence of abnormalities in the placement of the intestinal tract in advance using preoperative imaging.

**Conclusion**

To our knowledge, this is the first report of a patient with an intestinal malrotation diagnosed during radical cystectomy. Contrast-enhanced CT should be performed before performing a radical cystectomy to check for the SMV rotation signs and confirm the presence of intestinal malrotation. The existence of an intestinal malrotation should

not be ruled out unless imaging findings indicate otherwise. In patients with intestinal malrotation, it is important to monitor the placement and direction of the intestinal tract while considering a urinary diversion.

#### Consent for publication

Informed consent was obtained from the patient for this publication.

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#### Declaration of competing interest

None.

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#### References

1. Kotze PG, Martins JF, Rocha JG, Freitas CD, Steckert JS, Fugita E. Ladd procedure for adult intestinal malrotation: case report. [Article in Portuguese]. *Arq Bras Cir Dig.* 2011;24:89–91.
2. Wang CA, Welch CE. Anomalies of intestinal rotation in adolescents and adults. *Surgery.* 1963;54:839–855.
3. Ladd WE. Surgical diseases of the alimentary tract in infants. *N Engl J Med.* 1936;215:705–708.
4. Zengin A, Uçar Bİ, Düzgün ŞA, et al. Adult midgut malrotation presented with acute bowel obstruction and ischemia. *Int J Surg Case Rep.* 2016;22:5–7.