

CASE REPORT

Laparoscopic sigmoidectomy for sigmoid colon cancer with left-sided inferior vena cava and persistent descending mesocolon

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Abstract

Left-sided inferior vena cava (IVC) is a rare congenital malformation, as is persistent descending mesocolon, a developmental anomaly in which the colonic mesentery does not fuse with the dorsal abdominal wall. Although these anomalies are mostly asymptomatic, they should be identified preoperatively to avoid iatrogenic injury. We report a case of sigmoid colon cancer in a patient with both anomalies. The patient was an 80-year-old man whose preoperative computed tomography (CT) scan showed that the IVC ascended vertically along the left side of the abdominal aorta, and the descending colon was at the abdominal midline. Coronal CT was particularly useful for visualizing these anomalies. With this better understanding of the malpositioned anatomy, we successfully performed laparoscopic sigmoidectomy with lymph node dissection. Careful evaluation of preoperative CT imaging based on a clear understanding of such anatomical anomalies is particularly important for performing safe laparoscopic surgery.

INTRODUCTION

Left-sided inferior vena cava (IVC) is a rare congenital anomaly with a reported worldwide incidence of 0.2–0.5% [1]. Although this anomaly is usually found incidentally on imaging studies performed for other reasons, it becomes clinically significant in patients who require retroperitoneal surgery.

Persistent descending mesocolon (PDM), also a rare congenital anomaly, results from failure of fusion between the primitive dorsal mesocolon and parietal peritoneum during the fifth month of gestation [2]. Although it is asymptomatic in most cases, some clinical complications have been associated with PDM (such as, colonic volvulus and intussusception) [3,4]. With respect to abdominal surgery, one must be aware that unusual

mesenteric adhesion or arterial abnormalities have been associated with PDM [5]. Thus, preoperative diagnosis of such anomalies and careful surgical procedures are important. We report a rare case of sigmoid colon cancer in a patient with left-sided IVC and PDM. He was treated with laparoscopic surgery.

CASE REPORT

An 80-year-old Japanese man with no significant medical history presented to another clinic with dizziness. Blood tests revealed severe anemia. Later, at our institution, he underwent intestinal endoscopy, which revealed a mass in the sigmoid colon. Histological findings of the biopsy specimen indicated colon cancer.

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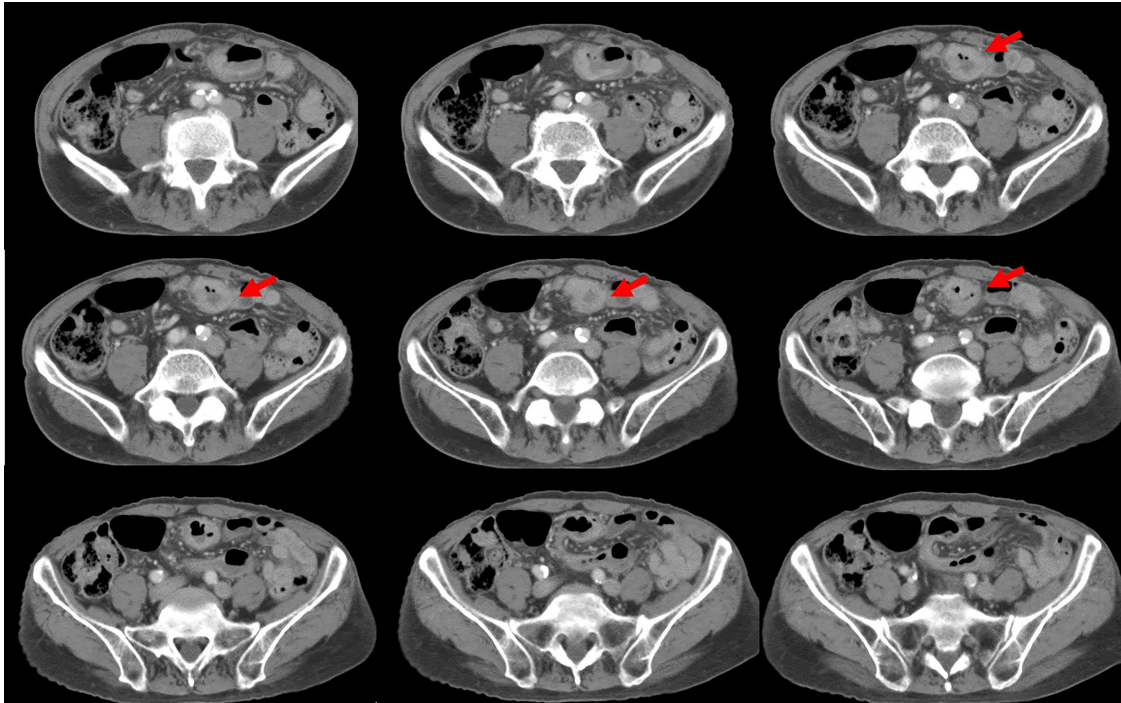


Figure 1: CT shows a tumor (arrows) in the sigmoid colon.

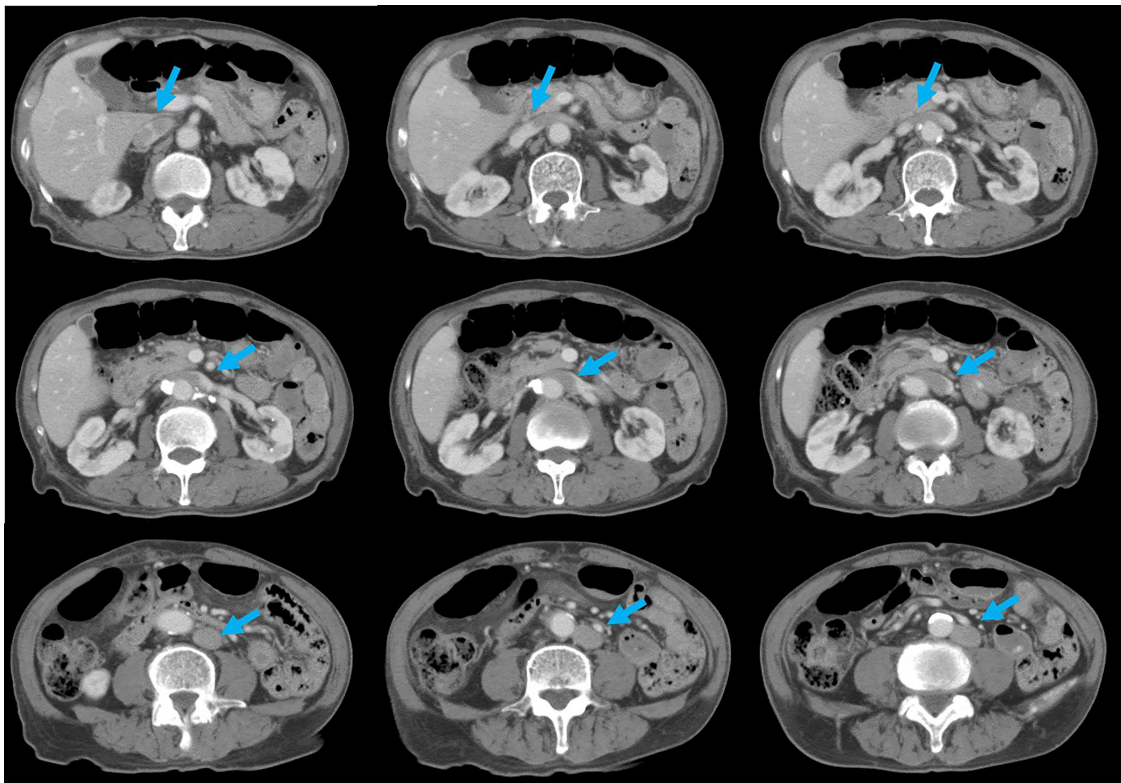


Figure 2: CT shows that, after connecting with the left renal veins, the left-sided IVC (arrows) crosses the abdominal aorta anteriorly to join a normal prehepatic segment of the IVC.

Preoperative computed tomography (CT) revealed a tumor in the sigmoid colon accompanied by some regional lymph node swelling (Fig 1). It also showed that the IVC ascended vertically

along the left side of the abdominal aorta. After connecting with the left renal veins, the left-sided IVC crossed the abdominal aorta anteriorly to join the normal prehepatic segment of the

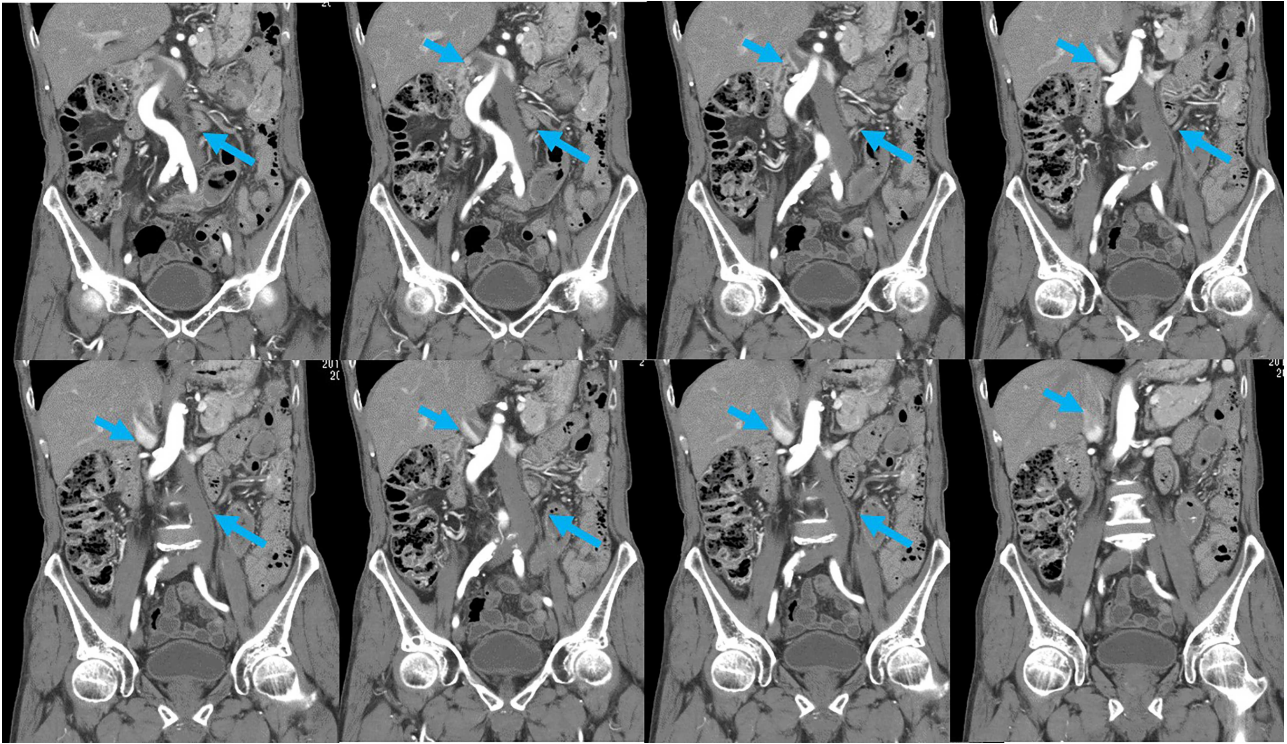


Figure 3: Coronal reformation of the CT image shows precisely how the left-sided IVC (arrows) ascended vertically along the left side of the abdominal aorta and crossed anterior to the aorta.

IVC (Figs 2 and 3). Coronal CT showed that the descending colon misplaced at the abdominal midline and the sigmoid colon in the right upper abdomen (Fig. 4). The preoperative diagnosis was thus sigmoid colon cancer with left-sided IVC and PDM.

Laparoscopic sigmoidectomy with left colic artery-preserving D3 lymph node dissection was performed using a five-port technique. At an early stage of the operation, the sigmoid colon and sigmoid mesocolon were found adherent to the ileum and right side of the abdominal wall. Furthermore, the descending colon was not fixed to the retroperitoneum and had shifted to the midline of the abdomen (Fig. 5a and b). After separating this abnormal adhesion, the sigmoid mesocolon was mobilized in a mediolateral fashion while paying close attention to preserving the peritoneal layer covering the hypogastric nerves (Fig. 5c). Because the left-sided IVC was just below the peritoneum, it could be seen through the thin peritoneal layer together with the retroperitoneal structures (including the left ureter and left gonadal vessels) (Fig. 5d). After resecting the sigmoid colon, a functional end-to-end anastomosis was performed using a linear stapler.

The patient's postoperative course was uneventful, and he was discharged 10 days after the operation.

DISCUSSION

Formation of the IVC is a complex process involving the development, regression, anastomosis and replacement of three pairs of main embryonic veins [6,7]. In the order of their appearance, they are the posterior cardinal, subcardinal and supracardinal veins. The error in the formation process may result in four IVC anomalies: IVC duplication, transposition resulting in a left-sided IVC,

retroaortic left renal vein and circumaortic left renal vein [8]. Left-sided IVC results from regression of the right supracardinal vein with persistence of the left supracardinal vein. Typically, the left-sided IVC ends at the level of the left renal vein, where it crosses anterior to the aorta to form a normal right-sided IVC [1].

Most left-sided IVCs are asymptomatic, although patients with IVC malformations are at significant risk of developing a deep vein thrombosis [9]. When a left-sided IVC is encountered, the patient must be evaluated for a possible thrombosis. The main clinical significance of left-sided IVC is the associated risk of iatrogenic injury during retroperitoneal surgery because it may be diagnosed as para-aortic lymphadenopathy, a tumor or a dilated gonadal vein. Regarding patients undergoing laparoscopic sigmoidectomy, fatal IVC damage is possible if the sigmoid mesocolon is mobilized in the deeper stripping layer. Accurate preoperative evaluation of the retroperitoneal caval system anatomy and meticulous dissection with a correct layer may permit a successful laparoscopic approach.

PDM is a developmental anomaly characterized by failure of the descending mesocolon mesentery to fuse with the posterolateral parietal peritoneum [2]. The non-fused mesentery is then responsible for considerable variations in the position of the descending mesocolon. In our case, the descending colon was at the abdominal midline, and the sigmoid colon was in the right upper abdomen. Coronal reformatted images obtained by multidetector CT (MDCT) proved useful for an accurate preoperative diagnosis of the malpositioned descending colon. It is widely accepted that MDCT is an effective technique for staging colon cancer preoperatively [10]. MDCT also allowed us to generate multiplanar coronal images, which depicted the location of the colon as it would appear during the surgery. Moreover, MDCT

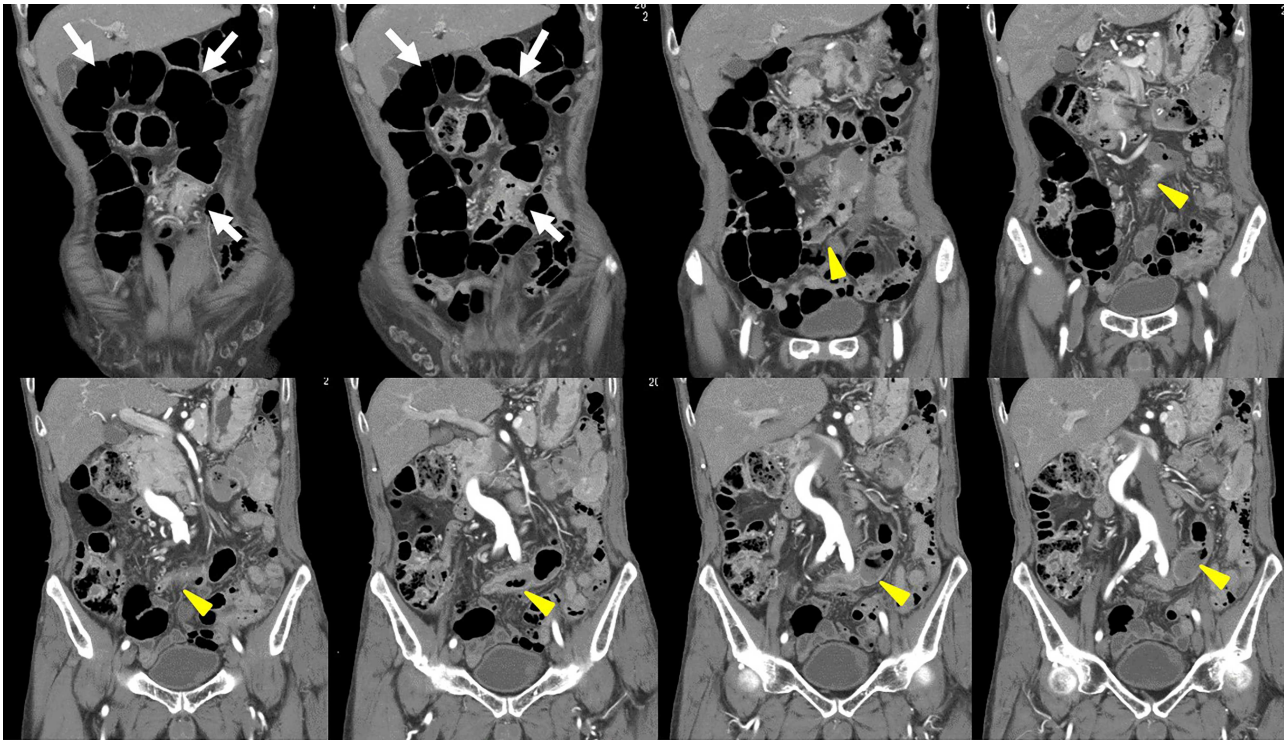


Figure 4: After coronal reformation, the CT images show that the descending colon was at the midline of the abdomen (arrowheads), and the sigmoid colon was in the right upper abdomen (arrows).

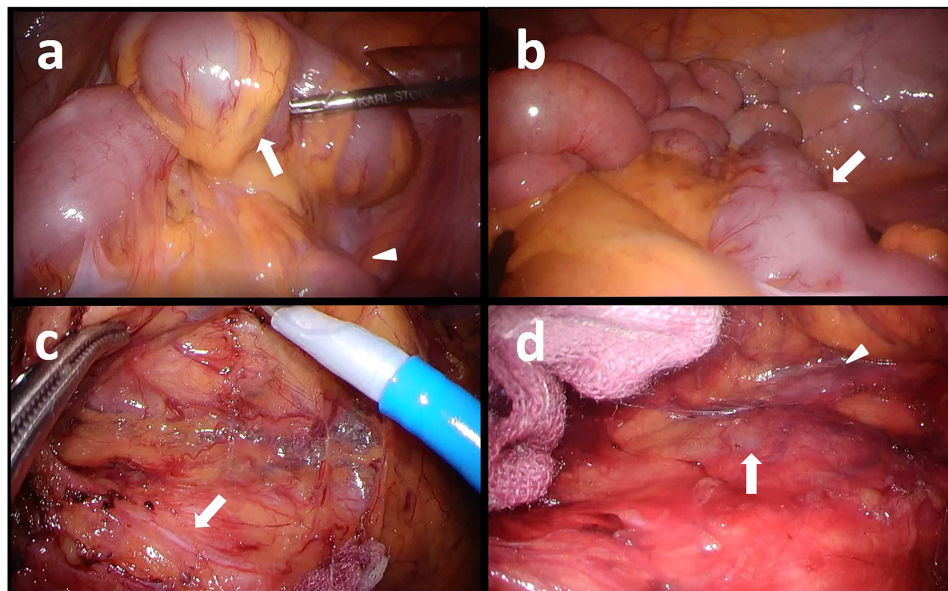


Figure 5: Intraoperative images: (a) Adhesion between the sigmoid colon (arrow) and the ileum (arrowhead), (b) The descending colon (arrow), (c) Dissection plane (hypogastric nerve is shown by the arrow), and (d) The left-sided IVC (arrow) and the left ureter (arrowhead).

angiography can be used to evaluate the running direction of the vessels. Because it has been reported that the left colon and sigmoid colon arteries and the superior rectal artery often branch radially from the inferior mesenteric artery, and that a marginal vessel may run abnormally due to the unusual mesenteric

adhesion [5], accurate evaluation of the arteries is important for safe lymph node dissection.

To the best of our knowledge, there have been no other reports of sigmoid colon cancer coexisting with left-sided IVC and PDM. Careful evaluation using preoperative CT imaging

based on understanding these anatomical anomalies may allow safe performance of laparoscopic surgery.

CONFLICT OF INTEREST STATEMENT

None declared.

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REFERENCES

1. Mathews R, Smith PA, Fishman EK, Marshall FF. Anomalies of the inferior vena cava and renal veins: embryologic and surgical considerations. *Urology* 1999;**53**:873–80.
2. Popky GL, Lapayowker MS. Persistent descending mesocolon. *Radiology* 1966;**86**:327–31.
3. Chen A, Yang FS, Shih SL, Sheu CY. CT diagnosis of volvulus of the descending colon with persistent mesocolon. *Am J Roentgenol* 2003;**180**:1003–6.
4. Ongom PA, Lukande RL, Jombwe J. Anal protrusion of an ileocolic intussusception in an adult with persistent ascending and descending mesocolons: a case report. *BMC Res Notes* 2013;**6**:42.
5. Okada I, Yamaguchi S, Kondo H, Suwa H, Tashiro J, Ishii T. Laparoscopic colectomy for persistent descending mesocolon: an experience of 13 patients. *J Jpn Soc Endosc Surg* 2013;**18**:459–64.
6. Chuang VP, Mena CE, Hoskins PA. Congenital anomalies of the inferior vena cava. Review of embryogenesis and presentation of a simplified classification. *Br J Radiol* 1974;**47**:206–13.
7. Bass JE, Redwine MD, Kramer LA, Huynh PT, Harris JH Jr. Spectrum of congenital anomalies of the inferior vena cava: cross-sectional imaging findings. *Radiographics* 2000;**20**:639–52.
8. Giordano JM, Trout HH 3rd. Anomalies of the inferior vena cava. *J Vasc Surg* 1986;**3**:924–8.
9. Chee YL, Dominic J, Watson CG, Watson HG. Inferior vena cava malformation as a risk factor for deep venous thrombosis in the young. *Br J Haematol* 2001;**114**:878–80.
10. Dighe S, Purkayastha S, Swift I, Tekkis PP, Darzi A, A'Hern R, et al. Diagnostic precision of CT in local staging of colon cancers: a meta-analysis. *Clin Radiol* 2010;**65**:708–19.