



Contents lists available at ScienceDirect

## International Journal of Surgery Case Reports

journal homepage: [www.casereports.com](http://www.casereports.com)

# A rare anomaly of left renal vein drainage into the left common iliac vein: A case report



Kazushige Kawai\*, Toshiaki Tanaka, Toshiaki Watanabe

Department of Surgical Oncology, Faculty of Medicine, The University of Tokyo, Japan

## ARTICLE INFO

### Article history:

Received 1 October 2015

Received in revised form

27 December 2015

Accepted 27 December 2015

Available online 7 January 2016

### Keywords:

Renal vein

Anomaly

Laparoscopic surgery

Colon cancer

## ABSTRACT

**INTRODUCTION:** Herein, we describe a case of sigmoid colon cancer with a rare anomaly of the left renal vein located between the inferior mesenteric artery (IMA) and the left common iliac artery.

**CASE PRESENTATION:** A 57-year-old woman with sigmoid colon cancer underwent three-dimensional computed tomography angiography for a preoperative assessment; the results revealed a rare variant of the left renal vein. There were two left renal veins: one retroaortically drained into the inferior vena cava, and the other was located between the IMA and the left common iliac artery and drained into the left common iliac vein. Laparoscopic sigmoid colectomy was performed safely while carefully avoiding any injury to the left renal vein located posterior to the IMA.

**DISCUSSION:** Several variations of the left renal vein have been reported, such as retroaortic or circumaortic left renal veins. The variants of renal vessels, which are frequently overlooked in the preoperative assessment, is rarely affected in colorectal surgery. However, if the surgeon is unaware of such renal vessel anomalies, an injury can occur, resulting in severe bleeding.

**CONCLUSION:** It is important that surgeons identify retroperitoneal vessel variants before performing colorectal surgery.

© 2016 The Authors. Published by Elsevier Ltd. on behalf of IJS Publishing Group Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## 1. Introduction

With the development of laparoscopic devices and techniques, the indication for and performance of laparoscopic colorectal surgery has broadened in recent years [1]. Consequently, it has become important to preoperatively understand vessel branching and anomalies, because of the limited view during laparoscopic surgery. In the present report, we describe a case of sigmoid colon cancer with a rare anomaly of the left renal vein located between the inferior mesenteric artery (IMA) and the left common iliac artery. By identifying this renal vein variation before surgery using three-dimensional computed tomography angiography (3D-CTA), laparoscopic surgery could be performed safely.

## 2. Case report

A 57-year-old woman was referred to our hospital owing to the diagnosis of sigmoid colon cancer. The cancer was at a clinical depth of T4, and there was no evident lymph node or distant metastasis on computed tomography (CT). Laparoscopic sigmoid colectomy was planned, and 3D-CTA was performed, revealing two left renal

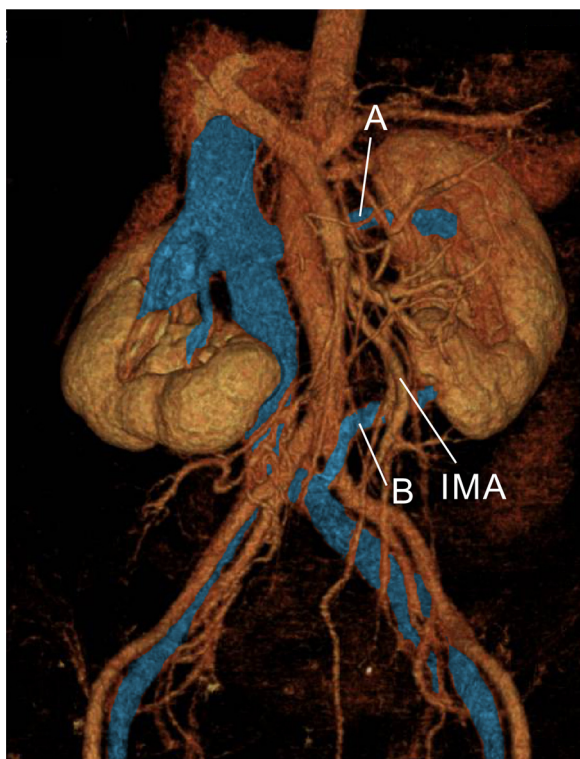
veins (Fig. 1). One retroaortically drained into the inferior vena cava (IVC), and the other was located between the IMA and the left common iliac artery and drained into the left common iliac vein. After written informed consent was obtained from the patient, laparoscopic surgery was performed by mobilizing the sigmoid colon from the right side of the IMA, and separating the mesentery from the retroperitoneal tissue. The procedure was performed safely by carefully avoiding any injury to the left renal vein located posterior to the IMA (Fig. 2). The operation took 132 min, and the amount of blood loss was 3 mL. The postoperative course was uneventful, and the patient was discharged 11 days postoperatively. This report has been described considering the CARE criteria [2].

## 3. Discussion

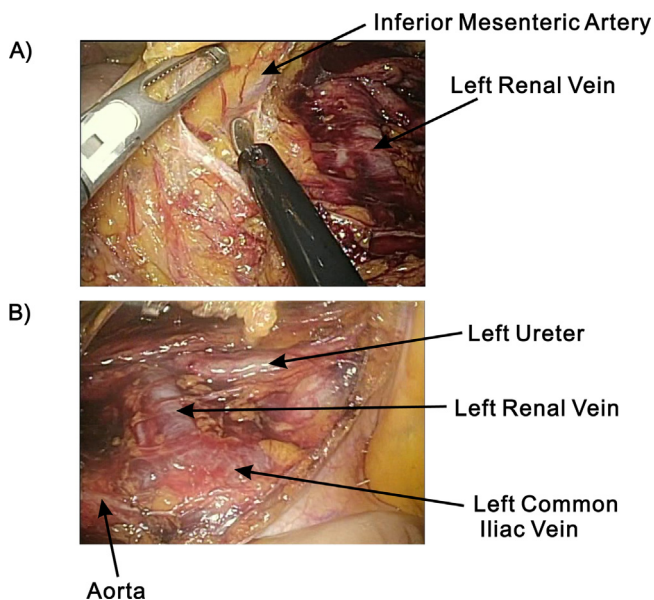
The left renal vein is usually posterior to the superior mesenteric artery, anterior to the aorta, and cranial to the IMA, and drains into the IVC. Several variations of the left renal vein have been reported [3,4]. The incidence of retroaortic left renal vein, which is posterior to the aorta, has been reported to be 0.5–3.1% [5–7]. The circumaortic left renal vein is also a common left renal vein anomaly. In this variant, the left renal vein bifurcates into the ventral and dorsal limbs that encircle the abdominal aorta. Recent anatomical evaluation using magnetic resonance imaging reported a 1.02% incidence of circumaortic left renal vein [6]. In the present case, the cranial left renal vein was retroaortic, and the caudal one was posterior to

\* Corresponding author at: 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan. Fax: +81 3 3811 6822.

E-mail address: [kz-kawai@mvd.biglobe.ne.jp](mailto:kz-kawai@mvd.biglobe.ne.jp) (K. Kawai).



**Fig. 1.** Three-dimensional computed tomography angiography (3D-CTA) showing two left renal veins. The cranial one retroaortically draining into the inferior vena cava (A), and the caudal one between the inferior mesenteric artery and the left common iliac artery and draining into the left common iliac vein (B).



**Fig. 2.** Laparoscopic view of retroperitoneal tissue after separating the sigmoid colon mesenterium. The caudal left renal vein, as predicted by 3D-CTA.

the IMA and anterior to the left common iliac vein before joining the left iliac vein. Although the preaortic and retroaortic left renal veins were similar to the circumaortic left renal vein in this patient, the sites at which the two renal veins joined the IVC were not the same, contrary to that normally observed for the circumaortic left renal vein [3]. We used PubMed to electronically search for publications on the left renal vein joining the left common iliac vein. Our search included all English language entries from inception until

December 2015 and was performed by using the following keywords: “left” “renal” “vein” “iliac” in all fields. Only human studies were eligible for inclusion; editorials; letters; and commentaries were excluded. Although the initial search indicated 270 publications; only two studies described this rare anomaly of the left renal vein; as determined on full text screening. Brancatelli et al., in 2000, reported one case of the retroaortic left renal vein joining the left iliac vein [8], and Karaman et al. reported that only three of 1856 patients had such variations; as determined on CTA [9]. These four cases were all retroaortic; and we could find no other report of a left renal vein variation similar to that in our case in the literature.

The mechanisms underlying left renal vein variations seem to be closely associated with the embryologic development of the abdominal renal vein. During the embryological period, two cardinal veins develop, forming an anastomosis ventral and dorsal to the aorta [10,11]. Usually, during the embryologic development and regression, the distal part of the IVC develops from the right subcardinal vein, and the left renal vein from the transverse ventral anastomosis. In the present case, the cranial retroaortic left renal vein was believed to have developed from the remnant dorsal anastomosis between the cardinal veins, and the caudal one from the remnant left subcardinal vein.

The variant of renal vessels, discovered in 1 of 6 patients, can be a risk factor for great vessel injury in retroperitoneal surgery such as abdominal aortic surgery or para-aortic lymph node dissection in ovarian cancer surgery [12,13]. In colorectal surgery, renal vein variations are rarely involved, and so, they are usually overlooked. However, in cases of retroperitoneal vessel variations, unawareness could result in the injury of the great vessels and subsequent severe bleeding, even during colorectal surgery. In the present case, preoperative assessment and intraoperative awareness of the renal vessel variations was effective for avoiding injury of the left renal vein and for considering the consequent conversion to open surgery, thereby demonstrating the importance of preoperative determination of these anomalies.

**Conflict of interests**

The authors declare that there are no conflict of interests.

**Funding**

No source of funding.

**Ethical approval**

This is not a research study.

**Informed consent**

Written informed consent was obtained from the patient.

**Author contribution**

Kazushige Kawai—diagnosis and treatment of the patient, writing the paper.

Toshiaki Tanaka—diagnosis and treatment of the patient.

Toshiaki Watanabe—diagnosis of the patient and revising the paper.

**Guarantor**

No guarantor.

## References

- [1] W.J. Lee, C.P. Chan, B.Y. Wang, Recent advances in laparoscopic surgery, *Asian J. Endosc. Surg.* 6 (2013) 1–8.
- [2] J.J. Gagnier, G. Kienle, D.G. Altman, D. Moher, H. Sox, D. Riley, The CARE guidelines: consensus-based clinical case report guideline development, *J. Clin. Epidemiol.* 67 (2014) 46–51.
- [3] S. Kumar, Z. Neyaz, A. Gupta, The utility of 64 channel multidetector CT angiography for evaluating the renal vascular anatomy and possible variations: a pictorial essay, *Korean J. Radiol.* 11 (2010) 346–354.
- [4] J. Zhu, L. Zhang, Z. Yang, H. Zhou, G. Tang, Classification of the renal vein variations: a study with multidetector computed tomography, *Surg. Radiol. Anat.* 37 (2015) 667–675.
- [5] K.S. Satyapal, J.M. Kalideen, A.A. Haffejee, B. Singh, J.V. Robbs, Left renal vein variations, *Surg. Radiol. Anat.* 21 (1999) 77–81.
- [6] A. Dilli, U.Y. Ayaz, O.R. Karabacak, I.G. Tatar, B. Hekimoglu, Study of the left renal variations by means of magnetic resonance imaging, *Surg. Radiol. Anat.* 34 (2012) 267–270.
- [7] A. Dilli, U.Y. Ayaz, H. Kaplanoglu, H. Saltas, B. Hekimoglu, Evaluation of the left renal vein variations and inferior vena cava variations by means of helical computed tomography, *Clin. Imaging* 37 (2013) 530–535.
- [8] G. Brancatelli, M. Galia, M. Finazzo, G. Sparacia, S. Pardo, R. Lagalla, Retroaortic left renal vein joining the left common iliac vein, *Eur. Radiol.* 10 (2000) 1724–1725.
- [9] B. Karaman, M. Koplay, E. Ozturk, et al., Retroaortic left renal vein: multidetector computed tomography angiography findings and its clinical importance, *Acta Radiol.* 48 (2007) 355–360.
- [10] D.S. Kyung, J.H. Lee, D.Y. Shin, D.K. Kim, I.J. Choi, The double retro-aortic left renal vein, *Anat. Cell Biol.* 45 (2012) 282–284.
- [11] J.E. Bass, M.D. Redwine, L.A. Kramer, P.T. Huynh, J.H. Harris Jr., Spectrum of congenital anomalies of the inferior vena cava: cross-sectional imaging findings, *Radiographics* 20 (2000) 639–652.
- [12] M.F. Kose, T. Turan, Y. Karasu, B. Gundogdu, N. Boran, G. Tulunay, Anomalies of major retroperitoneal vascular structure, *Int. J. Gynecol. Cancer* 21 (2011) 1312–1319.
- [13] R. Jimenez Gil, F. Morant Gimeno, Major venous anomalies and abdominal aortic surgery, *Interact. Cardiovasc. Thorac. Surg.* 10 (2010) 631–633.

## Open Access

This article is published Open Access at [sciedirect.com](http://sciedirect.com). It is distributed under the [IJSCR Supplemental terms and conditions](#), which permits unrestricted non commercial use, distribution, and reproduction in any medium, provided the original authors and source are credited.