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## A fenestrated portal vein

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To the Editor:

It was a pleasure to read the article by Balradja et al. [1], titled "Portal vein fenestration: a case report of an unusual portal vein developmental anomaly," published in your journal. The authors have described a rare anatomic variation of the portal vein (PV) and have rightly pointed out the potentially catastrophic consequences of failure to identify such a variation. We report a similar variant and believe that this anatomical configuration deserves further discussion.

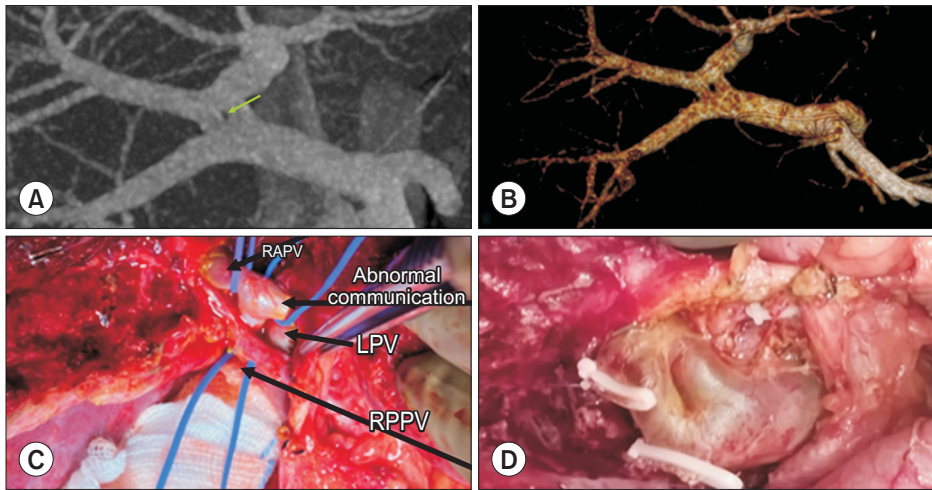
After appropriate informed consent, we report a similar case of PV fenestration and believe that the anatomical configuration deserves further discussion. We present the case of a 35-year-old woman who was a medically suitable live donor for her husband's liver transplant. Triphasic computed tomography (CT) showed Nakamura type C PV on maximum intensity projections (MIP). High-resolution (0.6–1.0 mm) reconstruction revealed PV fenestration (Figs. 1A, B, and 2A). The hepatic arterial and venous anatomy were standard and magnetic resonance cholangiography revealed a Huang type IIIB biliary anatomy.

During surgery, the right anterior PV (RAPV) and posterior PV (RPPV) were looped separately (Fig. 1C). A trial

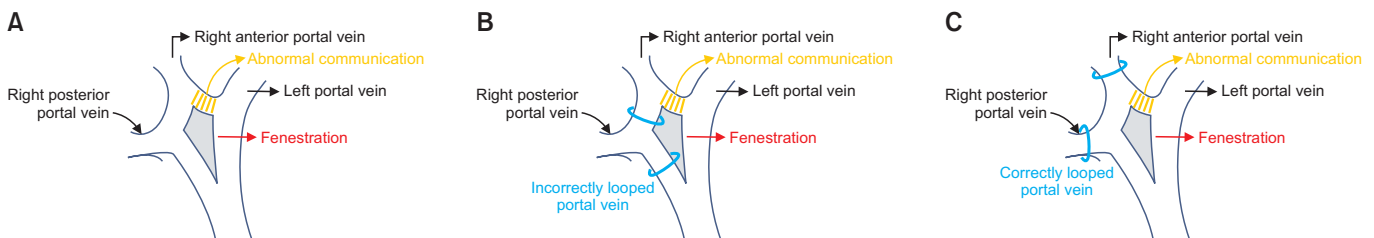
clamp on the proximal RAPV (Fig. 2B) yielded an ischemic plane between the right anterior and posterior sectors, confirming ongoing portal flow into the anterior sector. Therefore, we clamped the main PV in addition to the right hepatic artery to identify the ischemic line. Subsequent trial clamping of RAPV distal to the fenestration along with RPPV yielded the correct transection plane (Fig. 2C). The RAPV and RPPV were divided separately during graft retrieval (Fig. 1D). Both the donor and recipient had an uneventful recovery.

The PV system is formed by the development of the paired vitelline veins and three bridging anastomoses between them. Hemodynamic principles favoring the shortest path following duodenal rotation lead to regression of the caudal ventral anastomosis and the proximal part of the right vitelline vein. The proximal left vitelline vein, the dorsal anastomoses, and the distal right vitelline vein form the main PV. The cranial ventral anastomosis forms the left portal vein. Any deviations from this complex embryonic process lead to the development of PV anomalies such as PV fenestrations [2-4].

We believe that such an anatomy can be erroneously reported as a type C PV on preoperative imaging. Even



**Fig. 1.** (A) High-resolution computed tomography scan showing the fenestrated portal vein (arrow). (B) Intraoperative picture depicting the fenestration before portal vein transection. (C) Intraoperative picture after transection of the right anterior and right posterior portal vein distal to the abnormal communication. (D) Intraoperative picture after clipping the right anterior portal vein and posterior portal vein separately. RAPV, right anterior portal vein; LPV, left portal vein; RPPV, posterior portal vein.



**Fig. 2.** (A) Schematic diagram showing the fenestrated portal vein. (B) Incorrectly looped portal vein leading to persistent flow in the anterior sector. (C) Correctly looped portal vein.

MIP images can miss a small fenestration, and we would like to emphasize the importance of high-resolution reconstructed images for the evaluation of all liver donors.

When not detected preoperatively, the RPV may be incorrectly looped and because of the ongoing portal flow to the anterior sector, the ischemic line may come between the right anterior-posterior sector. The fenestration may be injured during hilar dissection, PV looping, or parenchymal transection. Since we detected the anomaly preoperatively, we were able to safeguard the communication during hilar dissection and avoid a potential back bleed as a result of a wrongly looped PV.

In this rare case, preoperative identification of PV fenestration allowed us to perform hilar dissection and parenchymal transection safely. Knowledge of these variations is crucial in the proper planning of surgical resection, especially in living donor liver transplantation.

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### Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Conceptualization: AB, RM. Formal analysis: PR, RM. Writing—original draft: AB, KG. Writing—review & editing: KG, RM, PR. All authors read and approved the final manuscript.

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