Normal variant of the inferior vena cava

A 37-year-old woman with abdominal pain. She was being examined for bacteraemia without clear focus.

Imaging Findings:

Pelvic CT examination was performed post administration of CIV. Intraabdominal pathology was not visualised. At discovery, double inferior vena cava was visualised to both sides of the aorta [Fig. 1a]. Both veins are anastomosed with a retroaortic branch [Fig.1b] forming a common trunk that continues the hepatic segment and ends up draining into the right atrium [Fig. 2a, b]. The right renal vein joins the right IVC [Fig. 1d]. The left inferior vena cava continuous after right cava vein anastomosis with a segment that ends at the left renal vein [Fig. 1c]. This vein crosses in a retroaortic form to the contralateral side and joins the azygos vein [Fig. 2c, d].

Discussion:

Retroperitoneal vascular anatomy has multiple variants due to its complex embryological development. Between 6-8 weeks of embryonic life, the inferior vena cava (IVC) originates from the development and regression of the cardinal venous system, consisting of three pairs of venous axis, in order of appearance: posterior cardinal veins, subcardinal and supracardinal, which anastomose among themselves, with regression of segments to form the definitive venous system. The normal inferior vena cava is composed of different segments: prerenal segment, renal veins, postrenal segment and intrahepatic segment and ends in the right atrium. [1]

There are several venous anatomic variants described such as: left IVC, double IVC, azygos continuation of the IVC, circumaortic left renal vein, retroaortic left renal vein, double IVC with retroaortic right renal vein and hemiazygous continuation of the IVC, double IVC with retroaortic left renal vein and azygos continuation of the IVC, circumcaval ureter, absent infrarenal IVC with preservation of the suprarenal segment…. [2, 3]

Vascular structures can usually be readily identified on contrast-enhanced CT. Identification of unusual venous arrangements may be difficult in those cases in which intravenous contrast material is contraindicated. In such patients, MR imaging may be used to distinguish aberrant vessels from masses by demonstrating flow voids or flow-related enhancement. [3]

In our case, a double IVC with a retroaortic left renal vein and azygos continuation of the IVC is found. It results from
persistence of the left supracardinal vein and the dorsal limb of the renal collar with regression of the ventral limb. In similar cases, the subcardinal-hepatic anastomosis fails to form, but in our case it doesn’t.

The study of retroperitoneal vascular distribution is important for increasing the safety of surgery, interventional radiology, diagnostic imaging of retroperitoneal masses and for the treatment of thromboembolic disease. [2, 3]

**Differential Diagnosis List:** Double IVC with retroaortic left renal vein and azygos continuation of the IVC., Lymph node syndrome, Vascular anomaly

**Final Diagnosis:** Double IVC with retroaortic left renal vein and azygos continuation of the IVC.

**References:**

Figure 1

a

Description: Double vena cava on both sides of the aorta. **Origin:** Shahin M, Department of Radiology, Hospital Ramon y Cajal, Madrid, Spain

b

Description: Anastomosis between the two vena cava with a retroaortic branch. **Origin:** Shahin M, Department of Radiology, Hospital Ramon y Cajal, Madrid, Spain
Description: Left renal vein joining with the inferior vena cava then crossing retroaortic way to join the azygos vein. Origin: Shahin M, Department of Radiology, Hospital Ramon y Cajal, Madrid, Spain

Description: Right renal vein connecting with the right IVC. Origin: Shahin M, Department of Radiology, Hospital Ramon y Cajal, Madrid, Spain
**Figure 2**

**a**

*Description:* Both inferior vena cava joining with a retroaortic branch. *Origin:* Shahin M, Department of radiology, Hospital Ramon y Cajal, Madrid, Spain

**b**

*Description:* Hepatic segment draining into the right atrium. *Origin:* Shahin M, Department of radiology, Hospital Ramon y Cajal, Madrid, Spain
Description: Azygos vein that extends across the abdomen to join the left IVC. Origin: Shahin M, Department of radiology, Hospital Ramon y Cajal, Madrid, Spain