Case 2882

A case of abnormal (left-sided) Inferior Vena Cava: a literature review

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Section: Cardiovascular
Imaging Technique: CT

Clinical History:

CT for colan cancer staging 5 months after surgery.

Imaging Findings:

A total body CT was performed 5 months after hemicolectomy for a colon cancer, which showed gallbladder lithiasis (Fig. 1A), diffuse metastasis to the lung and to the liver and, as incidental finding, a left-sided Inferior Vena Cava (IVC) unknown at previous diagnostic examinations (Fig. 1B,C).

Discussion:

The analysis on a number of abnormal CT found that in an adult population, the prevalence of major venous and renal anomalies related to the abdominal aorta and iliac arteries, detected by CT scan was 5.65% being:

1. retroaortic left renal vein,
2. circumaortic left renal vein,
3. left-sided inferior vena cava (IVC) without situs inversus,
4. left-sided IVC with situs inversus,
5. duplicate IVC,
6. preaortic confluence of the iliac veins, or
7. horseshoe kidney [1].

The retroperitoneal venous system develops from three paired fetal veins by a complicated procedure involving development, regression, anastomosis and replacement of three pairs of venous channels: the paired posterior cardinal (postcardinal) veins, the subcardinal veins, the supracardinal veins (Fig. 2A). The inferior vena cava is formed by a complex process of embryogenesis during the sixth to tenth week of gestation [2]. Improper completion of the process of embryogenesis may result in several known anomalies, as mentioned in the literature.

Persistence of the lower left supra-cardinal vein results in a left-sided inferior vena cava (Fig. 2B). This is observed in 0.5% of individuals. In this case, the left-sided inferior vena joins the left renal vein(Fig. 3A,B), then crosses the aorta anteriorly to the right (Fig. 4A,B) to join the normal pre-renal portion of the inferior vena cava (Fig. 5A,B). Occasionally, the left inferior vena cava crosses behind the aorta.

The presence of vascular and renal anatomical anomalies may induce technical problems during abdominal aortic surgery [2,3,4] and may give rise to serious intraoperative complications. Therefore, prior to aortic surgery, preoperative knowledge of the presence of such anomalies helps with operative planning and may reduce the risk of
major venous hemorrhage associated with them [2].
Abdominal CT is the most accurate preoperative investigation to discover such anomalies [3].

**Differential Diagnosis List:** Abnormal, left-sided Inferior Vena Cava (IVC)

**Final Diagnosis:** Abnormal, left-sided Inferior Vena Cava (IVC)

**References:**

Aljabri B, MacDonald PS, Satin R, Stein LS, Obrand DI, Steinmetz OK.

Incidence of major venous and renal anomalies relevant to aortoiliac surgery as demonstrated by computed tomography.


Giordano JM, Trout HH 3rd.

Anomalies of the inferior vena cava.


Nishimoto M, Hasegawa S, Asada K, Furubayashi K, Sasaki S.


Sonneveld DJ, Van Dop HR, Van der Tol A.

Resection of abdominal aortic aneurysm in a patient with left-sided inferior vena cava and horseshoe kidney.

Description: The axial scan shows a stone inside the gallbladder and splenomegaly. Origin:
Description: This second image shows left kidney with its longer axis displaced on a horizontal plane. Left hemicolectomy. Origin:
Description: An abnormal Inferior Vena Cava crosses the Aorta. Origin:
Description: Origin:
Description: The development of retroperitoneal venous system arise from three paired fetal veins.

Origin:
**Description:** In red the Aorta. In blue the persistence of lower left supracardinal vein results in a left-sided IVC anomaly. **Origin:**
Description: Axial plane: left sided inferior vena joins the left renal vein. Origin:
Description: Thick MPR: left sided inferior vena joins the left renal vein. Origin:
Description: Axial plane: left sided inferior vena cava crosses the aorta anteriorly to the right. Origin:
**Description:** Thick MPR: left sided inferior vena cava crosses the aorta anteriorly to the right, to join the normal pre-renal portion of the inferior vena cava **Origin:**
Description: Axial plane: left-sided inferior vena cava joins the normal pre-renal portion of the inferior vena cava. Origin:
**Description:** Thick MPR: left-sided inferior vena cava joins the normal pre-renal portion of the inferior vena cava. **Origin:**