Case 2858
Left inferior vena cava with azygos continuation: association of congenital vascular anomalies in the same patient

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Section: Cardiovascular
Published: 2003, Dec. 19
Patient: 68 year(s), male

Clinical Summary

A male patient performed an abdomino-pelvic CT and several vascular anomalies were evident...

Clinical History and Imaging Procedures

This patient complained of recurrent left lower back pain and a stone was diagnosed in the left ureter. It was necessary to place a double J ureteral stent to relieve the urinary obstruction. An abdomino-pelvic computerized tomography (CT) was performed and a congenital anomaly of the inferior vena cava (IVC) was evident. In this case there was more than one anomaly present in the same patient. Firstly, there was a left inferior vena cava (Fig. 1). This vein joined the left renal vein, which crossed posterior to the aorta (Figs. 2-4) to join the renal artery instead of anterior, the normal fashion. Then we could notice an absence of the hepatic segment of the inferior vena cava with azygos continuation (Figs. 5 and 6). These congenital anomalies had been clinically silent until then.

Discussion

Anomalies of the IVC and its tributaries have been known for more than two centuries. The normal IVC is composed of four segments in a cranio-caudal direction: hepatic, suprarenal, renal and infrarenal. The embryogenesis of the IVC is complex and involves the formation, regression and fusion of three paired embryonic veins (postcardinal, subcardinal and supracardinal). Due to this complexity, the IVC may undergo a very large number of different congenital anomalies. From animal studies it seems that 15 variants of this major vessel are possible but not all of them have been found in humans. All of these anomalies appear during venous development between the sixth and eighth week of fetal life. The

commonest reported anomalies are duplication of the IVC and left sided IVC. However anatomical variations are relatively rare. CT is an effective technique for the diagnosis of diseases of the retroperitoneal space and especially for the detection of anomalies of the main vessels, such as the aorta and the IVC. Although these congenital variations were previously regarded as being usually associated to serious cardiac and other conditions, with the widespread use of CT they have been progressively recognized in asymptomatic patients. It is very important to recognize these situations for correct interpretation of cross-sectional images in order to avoid erroneous diagnosis of retroperitoneal and mediastinal masses, like right-sided paratracheal masses or retrocrural adenopathy and to alert the surgeon and interventional radiologist of potential sources of complications. Lately anomalies of the IVC have been found to be a potential risk factor for deep venous thrombosis, particularly in young adults. In this case there were different anomalies combined in the same patient: left inferior vena cava and retroartic left renal vein with azygos continuation of the inferior vena cava. A left inferior vena cava results from regression of the right supacardinal vein with persistence of the left supracardinal vein. The prevalence of this single anomaly is 0,2-0,5%. Typically the left IVC joins the left renal vein which crosses anterior to the aorta in the normal fashion joining the right renal vein. The major clinical significance of this anomaly is the potential for misdiagnosis of left-sided paraaortic adenopathy. On the other hand, azygos continuation of the IVC has a prevalence of 0,6% and has also been termed absence of the hepatic segment of the IVC with azygos continuation. It is due to atresia of IVC in the retrohepatic segment. The renal portion of the IVC receives blood return from both kidneys and passes posteriorly to the diaphragmatic crura to enter the thorax as the azygos vein. This one joins the superior vena cava (SVC) at the normal location at the right paratracheal space. Because of this, the enlarged azygos vein at the confluence of the SVC should be correctly interpreted otherwise it can be wrongly taken as a right sided paratracheal mass and submitted to further invasive investigation like unnecessary thoracotomy. Also, preoperatively knowledge of the anatomy may be important for cardiopulmonary bypass and to avoid problems when trying to catheterize the heart. Contrast enhanced CT-scans can in most cases easily identify vascular structures but if for atopic reasons intravenous contrast is contra-indicated, MR imaging may be useful due to the presence of flow voids or flow-related enhancement in the absent venous structures.

Final Diagnosis

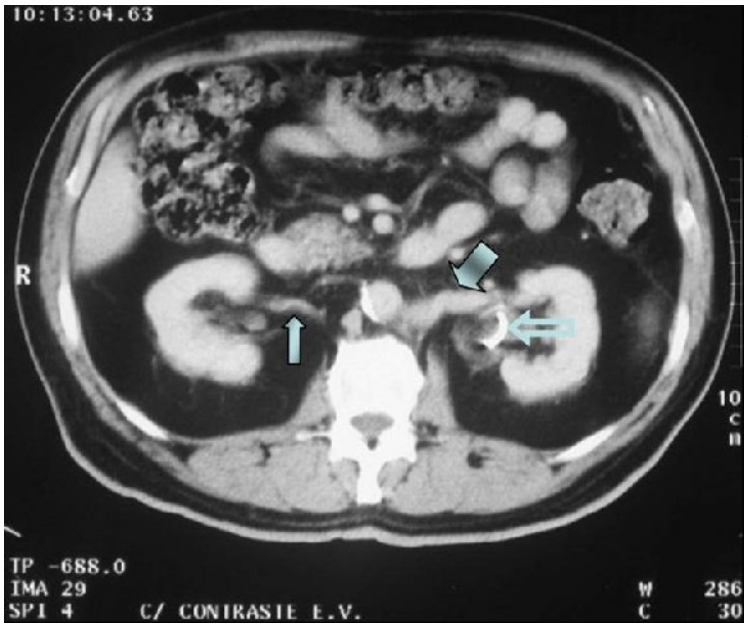
Left inferior vena cava with azygos continuation

Figures

Figure 1 contrast-enhanced abdominal CT

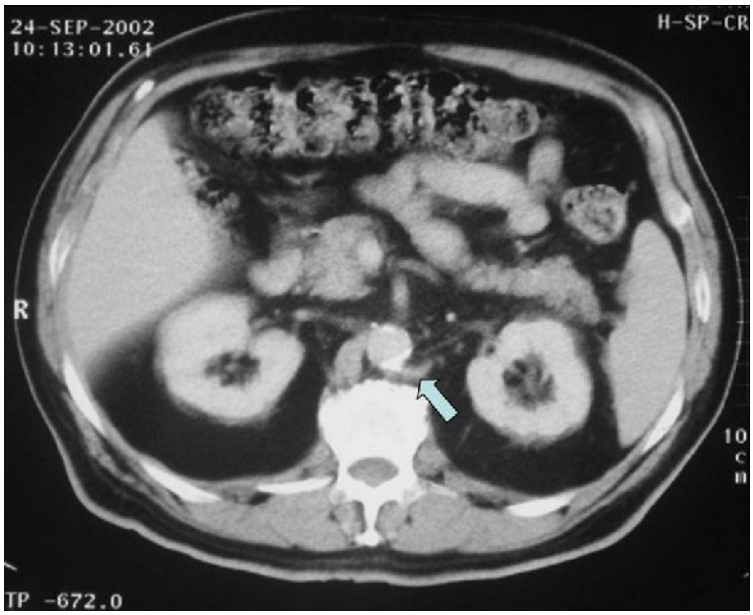
Abdominal CT scan showing an inferior vena cava located on the left side of the aorta (arrow).

Figure 2 contrast-enhanced abdominal CT



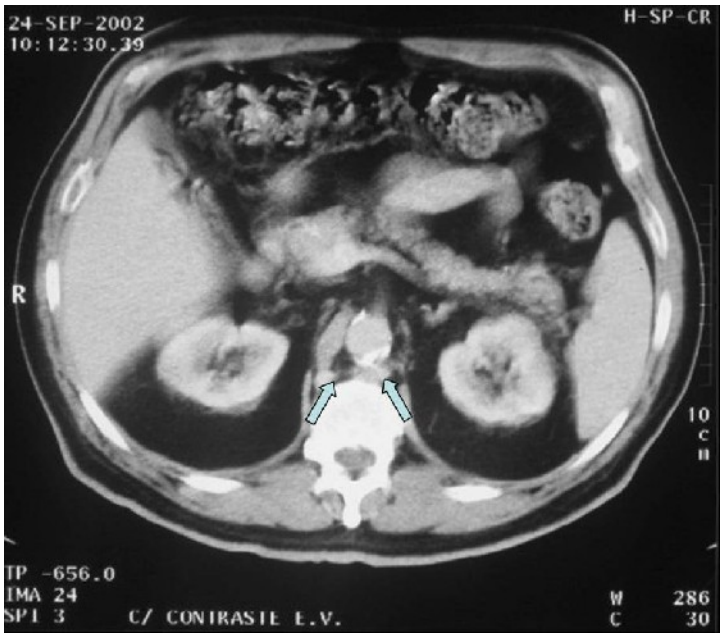
CT-scan shows a left renal vein (thick arrow) crossing posterior to the aorta to join superiorly the right renal vein (thin arrow). The ureteral stent is also evident on the left side (open arrow).

Figure 3 contrast-enhanced abdominal CT



CT scan showing the left renal vein crossing posterior to the calcified aorta (arrow).

Figure 4 contrast-enhanced abdominal CT

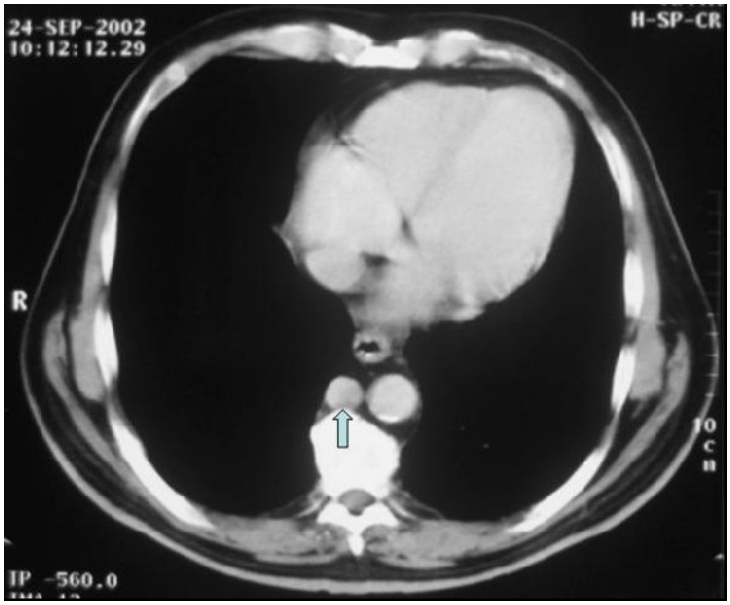


CT scan showing both renal arteries posterior to the aorta (arrows).

Figure 5 contrast-enhanced abdominal CT

CT scan obtained at the level of the diaphragmatic crus. The vessel parallel to the aorta is the azygos vein (arrow).

Figure 6 contrast-enhanced thoracic CT



CT scan obtained at an upper level, showing an enlarged azygos vein (arrow).

MeSH

Vena Cava, Inferior [A07.231.908.949.648]

The venous trunk which receives blood from the lower extremities and from the pelvic and abdominal organs.

Cardiovascular Abnormalities [C14.240]

Congenital structural abnormalities of the cardiovascular system.

References

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Citation

Penedo JP, Bexiga A, Oliveira C, Cunha TM (2003, Dec. 19)
Left inferior vena cava with azygos continuation: association of congenital vascular anomalies in the same patient {Online}
URL: http://www.eurorad.org/case.php?id=2858