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Case Report

Circumaortic right renal vein with multiple vascular anomalies

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ABSTRACT

Circumaortic right renal vein is an extremely rare finding and to our knowledge only 1 case has been reported in the literature so far. Its rareness, in contrast to left renal vein anomalies, is thought to be due to a relatively simple embryologic development of right renal vein compared with left renal vein. On the other hand, association of Circumaortic right renal vein with inferior vena cava agenesis and aortic coarctation is an extremely rare occurrence. Our aim is to introduce a case of Circumaortic right renal vein in a 3-month-old child with inferior vena cava agenesis and aortic coarctation. Discussion on the underlying embryology of Circumaortic right renal vein, its clinical importance and the association with other vascular anomalies, will be on our focus as well. Precise understanding of renal vein anomalies is important when planning retroperitoneal surgery or interventional vascular procedures. Awareness of such anomaly implies crucial knowledge for radiologists who should include it in the medical reports to aid future patient's management.

Case report

A 3-month-old girl, with no clinical symptoms, presented at our Radiology department to perform a chest contrast-enhanced computed tomography (CECT) scan, referred by the cardiac pediatrician.

Previous medical history included the diagnoses of aortic coarctation immediately after birth with a subsequent surgical repair on her sixth day of life.

A detailed evaluation of the thorax great vessels was requested to exclude any possible late complication. The examination was performed through a 4-detector row CT scanner (Siemens Somatom Emotion Duo) with administration of 12 ml contrast medium (ultravist with a concentration of 300 mg/dl) at an injection speed of 2.5 ml/s.

Two-millimeter thick sections and 3-dimensional multiplanar reconstructions were obtained.

Contrast-enhanced CT examination revealed a postductal short stenotic segment of the aorta.

Later cardiac catheterization-confirmed recoarctation with the presence of a residual stenotic segment at the level of anastomosis and subsequent balloon dilatation was performed.

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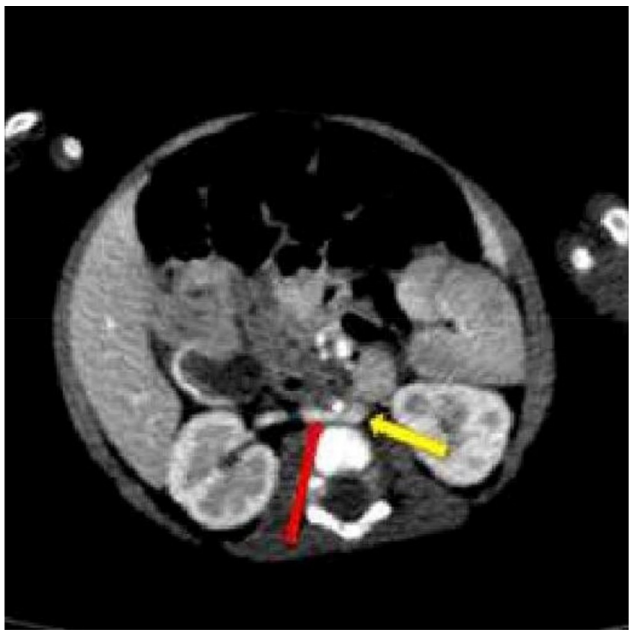

Fig. 1 – Axial computed tomography-image shows retroaortic branch (red arrow) of Circumaortic right renal vein passing posterior to the aorta and draining into hemiazygos vein (yellow arrow). (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

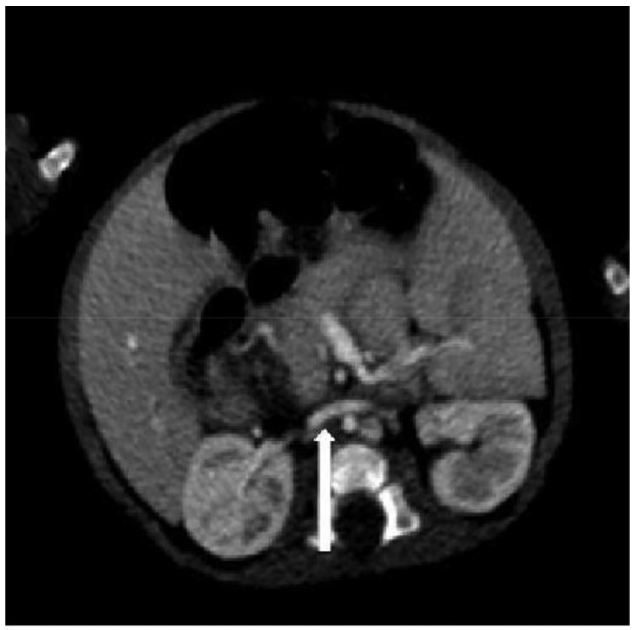

Fig. 2 – Image showing anterior branch of Circumaortic right renal vein passing anterior to the aorta.

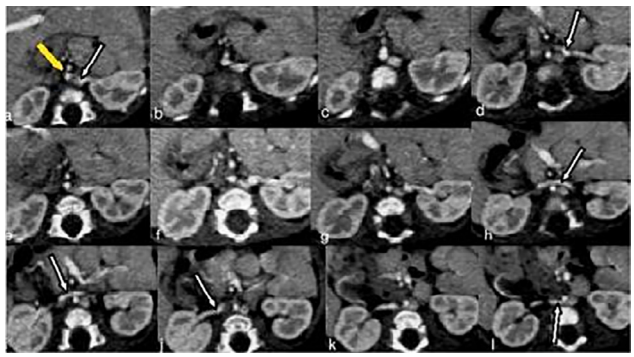

Fig. 3 – Contiguous 2-mm thick computed tomography sections presented from cranial to caudal show the vessels anomaly (j–l). (a) White arrow—hemiazygos vein, orange arrow—aorta, (d) arrow points to the level where the anterior branch of Circumaortic right renal vein joins the left renal vein. (h–l) Contiguous images show the main right renal vein and its anterior and posterior branches composing Circumaortic right renal vein. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

To better evaluate the intraabdominal segment of the aorta, a few slices of the upper abdomen were obtained up to the inferior pole of both kidneys.

Incidental finding of Circumaortic right renal vein (CaRRV) was noted (which had no relation with the previous coarctation treatment or recurrence). On the other hand, a vascular structure positioned on the left of the aorta was observed following its course upward in the thorax cavity and passing on the left of the thorax spine suggesting the presence of a dilated hemiazygos vein (HV) empting into the left brachiocephalic vein, which after receiving the left subclavian and left jugular veins drained into the normal positioned superior vena cava.

The right renal vein (RRV) at the parahilar region was divided into a longer anterior branch, which passed anterior to the aorta and HV, joined the normal left renal vein (LRV) following upward in a short 5 mm common trunk to drain on the lateral aspect of HV. While the posterior branch passed between the aorta and the vertebral body draining into the posterior part of the HV. The anterior branch drained at a more superior level than the posterior branch. Agenesis of the hepatic, suprarenal and renal segments of inferior vena cava (IVC) were also evident, with the suprahepatic veins draining directly into the right atrium. Evaluation through few slices obtained inferiorly to the renal veins showed absence of an infrarenal segment of IVC suggesting an IVC atresia (Figs. 1–3).

Discussion

A number of anomalies relating the IVC and renal veins are well recognized and can only be explained through embryologic basis [2,3]. Coexistence of more than 1 anomaly may appear. Two congenital vein anomalies are observed in our patient: agenesis of IVC and CaRRV.

The embryologic development of renal veins is part of the complex process of IVC embryogenesis, which involves an extensive network of anastomoses between 3 pairs of cardinal veins undergoing a regulated process of appearance and regression until the normal IVC and renal veins are formed [1].