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Case Report

Radiology Section

CT Imaging of Left Renal Vein Anomaly-Circumaortic Variant

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ABSTRACT

Renal vascular anatomy can be of various variants. These variants are rare and are of clinical importance predominantly in abdominal and retroperitoneal surgeries. Imaging plays an important role in diagnosis of these variants aiding in surgeries. We report a case of 27-year-old male patient with vague abdominal pain, referred for a contrast enhanced MDCT where incidentally two renal veins draining the left kidney into the inferior vena cava was found on contrast study suggesting a circumaortic left renal vein. It is of clinical significance, mainly during retroperitoneal surgeries, renal transplantations and intra caval interventions.

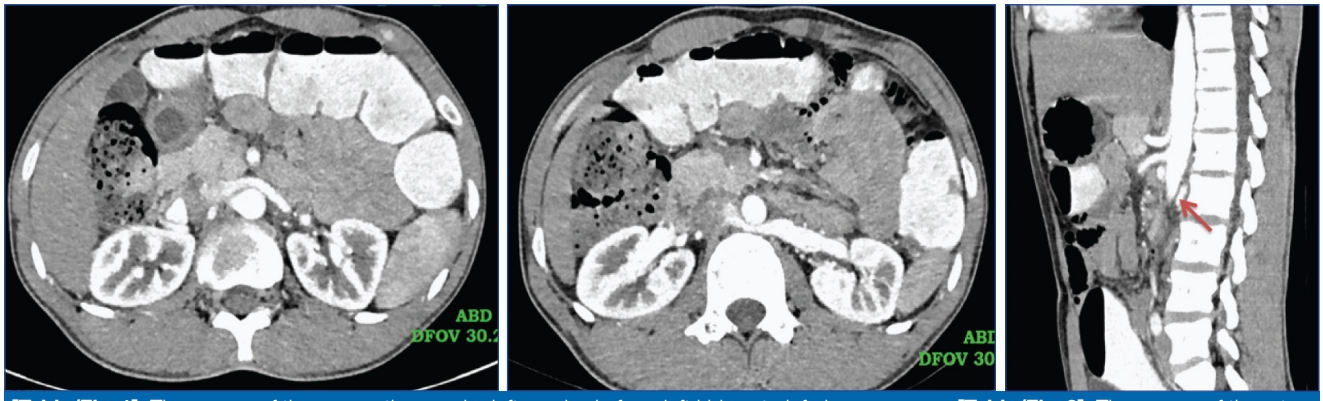
We present this case since it is a relatively rare condition which can result in Left Renal Vein Hypertension (LRVH) syndrome.

Keywords: LRVH syndrome, Posterior nutcracker syndrome, Retro-aortic vein, Venous anomalies

CASE REPORT

A 27-year-old male presented to our Radiology Department for a CECT abdomen with complaints of vague abdominal pain since two months. Pain was intermittent and non radiating in nature, predominantly in the epigastric region with no aggravating or relieving factors. Patient gave history of similar episodes of pain with lower severity in the past, which was relieved on medication. No other relevant medical or surgical history was reported. On physical examination patient was stable and his vitals were within normal range.

Further, with a written consent, a contrast enhanced abdominal MDCT scan was performed using 32 slice MDCT. It showed no significant pathology other than the incidental finding of two renal veins draining the left kidney into the inferior vena cava. They were seen ventral and dorsal to the abdominal aorta forming a collar pattern around it just inferior to the celiac artery [Table/Fig-1,2]. The ventral vein passes in front of the aorta at the level of L1 vertebral body, the dorsal vein runs downward and medially behind the aorta at the level of L1-2 [Table/Fig-3]. The diameter of ventral renal vein was found to be smaller than the dorsal vein. The dorsal branch was seen indented by the aorta. Complete filling of both the renal veins was seen during the venous phase of study. No other vascular anomalies were noted. On imaging it was confirmed with diagnosis of circumaortic left renal vein.



[Table/Fig-1]: The course of the pre-aortic superior left renal vein from left kidney to inferior vena cava. **[Table/Fig-2]:** The course of the retro-aortic left renal vein from left kidney to inferior vena cava. **[Table/Fig-3]:** Retro-aortic left renal vein (arrow). (left to right)

Patient was conservatively managed and was suggested for another scan if symptoms worsen in the form of haematuria and recurrent left flank pain which might indicate atypical form of Nutcracker syndrome due to increased venous pressure leading to venous hypertension [1] which then requires surgical intervention. Since, in our case as there was no such evidence neither clinically nor on imaging patient was discharged after managing conservatively. The prognosis was good in our case at current state and patient was kept under regular follow-up.

DISCUSSION

Embryology: Venous anomalies, mainly results from the errors of the embryological development. The development of the renal veins is a part of developmental process of inferior vena cava. The process starts from the fourth week of intrauterine life and ends at the eighth week [2].

These are in the order of appearance; the posterior cardinal veins, the subcardinal veins (by 5th week) and the supracardinal veins. The subcardinal veins are noted ventral to the aorta where as supracardinal veins are noted dorsally. These veins form a venous collar around the aorta through interconnecting veins [3].

By regression and persistence of these veins, the four segments of the inferior vena cava [4] are formed:

Hepatic part: from hepatic vein and hepatic sinusoids,

Prerenal part: from right subcardinal vein,

Renal part: from anastomosis between subcardinal and supracardinal veins.

Postrenal part: from right subcardinal vein.

From the anastomosis of these subcardinal and supracardinal veins two veins are formed,one ventrally and other dorsally. Of these the dorsal vein degenerates usually and the ventral vein persists and forms the renal vein [5].

Both circumaortic and retroaortic left renal veins are the result of persistence of the dorsal limb of the embryonic left renal vein and of the dorsal arch of the renal collar. However, in retroaortic left renal vein the ventral arch regresses so that a single renal vein passes posterior to the aorta.

Retroaortic renal vein is noted to be of two types- Type I develop from the persistence of the left supracardinal anastomosis, the intersupracardinal anastomosis, and the dorsal left renal vein, with degeneration of the ventral renal vein. Type II is formed by the persistence of the left subsupracardinal anastomosis and the left supracardinal vein.

Clinical importance: The venous drainage of retroperitoneal region is of particular importance mainly in surgeries, lymphadenectomy, placement of IVC filters, tumour staging and vascular extensions of tumours in the retroperitoneal region. Improper knowledge, unawareness of venous anatomy and its anomalies during retroperitoneal surgery may injury the veins and can lead to complications like severe bleeding, at times nephrectomy and death. Compared to the patients with IVC anomaly the risk of injury is higher in patients with circumaortic renal collar. Hence, diagnosis of any venous anomalies is of utmost importance prior to retroperitoneal surgeries [6].

Easy surgical manipulation owing to the larger length of the left renal vein, infrequent incidence of additional left renal veins which when encountered are of small caliber and can be ligated easily. Hence knowing the left renal course is important prior to surgeries [7,8].

Role of imaging: Imaging plays a crucial role in diagnosis of renal vein anomalies. Various modalities that can be used include ultrasound with doppler study, CECT, CT-angiography, DSA and MRI contrast which helps in confirming the diagnosis.

CECT helps in better identification and tracking of vascular course in various phases. It also helps in identification of other significant pathologies with enhancement patterns and extensions. It is rapid procedure. However, contrast allergies, renal failure, pregnancy and excessive radiation are few disadvantages.

CT-angiography may give more precise anatomical detail than MRI, particularly in small blood vessels using special software and reviewed in different planes and projections with 3D reconstructed images. Invasive nature and cost makes this modality less approachable.

DSA helps in segmental approach, better distinguishable contrast flow, can be performed outpatient basis. However, the limitations hold the same as of CECT [9-12].

MRI contrast been a non-radiation scan helps in delineation of vascular pathology with better soft tissue resolution. However, contrast allergies, long scan duration time and cost are the major limitations.

In our case where the patient was referred for CECT and incidentally circumaortic left renal vein was found with no necessity of further evaluation using other modalities.

CONCLUSION

Detailed knowledge about congenital anomalies of the left renal vein is important to make distinctive diagnosis of renal vascular pathologies and to impede complications which occur during retroperitoneal vascular surgical procedures. Imaging plays a major role in diagnosis of these anomalies. With our case we suggest renal vein anomalies should also be considered as a differential diagnosis in patient with vague abdominal pain when no other significant pathology is found. Ultrasound with Doppler study should be the first modality of choice in suspected cases followed by contrast enhanced MDCT for confirming the diagnosis as in this case.

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