Anomalous left renal vein coursing behind aorta and draining into the left common iliac vein: A rare variant

Chandra Prakash, Sajad Ali, Samina Manzoor Khan

ABSTRACT

Introduction: It is important to know the detailed anatomy and anomalies in the renal veins for various operative as well as venographic procedures. Retroaortic left renal vein joining the left common iliac vein is a rare congenital anomaly of inferior vena caval development. To our knowledge, only two cases have been reported till date.

Case Report: We report a case of this rare anomaly in a 51-year-old male admitted with history of road traffic accident, without any symptoms pertinent to this anomaly.

Conclusion: We highlight the significance of multidetector computed tomography (MDCT) showing a retroaortic left renal vein joining the left common iliac vein.

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CASE REPORT

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Introduction: It is important to know the detailed anatomy and anomalies in the renal veins for various operative as well as venographic procedures. Retroaortic left renal vein joining the left common iliac vein is a rare congenital anomaly of inferior vena caval development. To our knowledge, only two cases have been reported till date. **Case Report:** We report a case of this rare anomaly in a 51-year-old male admitted with history of road traffic accident, without any symptoms pertinent to this anomaly. **Conclusion:** We highlight the significance of multidetector computed tomography (MDCT) showing a retroaortic left renal vein joining the left common iliac vein.

Keywords: Multidetector computed tomography (MDCT), Left renal vein, Common iliac vein, Aorta

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INTRODUCTION

Venous anomalies resulting from errors of embryological development are frequent observations. These vascular anomalies of retroperitoneal region have clinical implications, with respect to patient symptomatology and while considering renal surgery. A left renal vein coursing behind the aorta is termed retroaortic left renal vein (RLRV). This course of the renal vein behind the aorta is uncommon in the development of the inferior vena cava (IVC) and its collateral vessels occurring in 1.8–2.4% of the population [1].

Recent advances in computed tomography (CT) scan have made it possible to provide detailed visualization of the vascular structures.

Anomalous development of the IVC includes duplication of IVC, transposition of IVC, circumaortic (left) renal vein, retroaortic left renal vein [1, 2]. Further left renal vein anomalies are categorized into four types [3, 4].

Type I: left renal vein joining the IVC in the orthotopic position [4–7]

Type II: left renal vein joining the IVC at L4-L5 [4–7]

Type III: left renal vein joining the IVC at the circumaortic or collar

Type IV: when left renal vein joins the common iliac vein [4–7]

We report the multidetector computed tomography (MDCT) findings of a RLRV joining the left common iliac

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vein, to our knowledge only two cases have been reported so far and only one of them has appeared in radiology literature in which CT and 3D phase-contrast magnetic resonance venography (MRV) was used to detect this anomaly, but we could ascertain the same anomaly on a MDCT and report the same.

CASE REPORT

A 51-year-old male presented to our hospital with history of road traffic accident. On routine imaging based on trauma protocol, incidentally, it was found that he had an anomalous course of the left renal vein which was coursing behind the aorta and joining the left common iliac vein.

On further eliciting the patient's past history he had one episode of hematuria in the past which had settled with antibiotics, apart from this he did not have any other symptoms related to this anomaly. The patient was managed conservatively and later he was discharged from the hospital in normal state of health with the advice to follow-up if he develops any symptoms like hematuria or flank pain or any other urological complaints.

On MDCT, the left renal vein was seen coursing obliquely and caudally behind the aorta and joining the left common iliac vein. The left renal vein was seen to join the left iliac vein at the level of L4-L5. The left renal was of normal caliber as seen in the three-dimensional volume-rendering technique (3D-VRT) images (Figures 1 and 2) and maximum intensity projection (MIP) image (Figure 3). Right renal vein was short in course and normal in caliber.

DISCUSSION

Venous anomalies resulting from errors of embryological development are frequent observations. The development of renal veins is a part of the complex developmental process of IVC, anomalies of the IVC include, namely, duplication of IVC, transposition of the IVC, circumaortic (left) renal vein, retroaortic left renal vein having an incidence of 0.2–3.0%, 0.2–0.5%, 1.5–8.7%, and 1.8–2.4%, respectively [1].

The incidence of RLRV type I, type II, type III, and type IV are 0.3–1.9%, 0.4–0.9%, 1.5–8.7% and 0.16%, respectively [2].

The embryological development of the renal vein starts from the fourth week of conception and ends at about the eighth week. The IVC forms from a vast network of three pairs of parallel veins. The posterior cardinal vein, the subcardinal vein and supracardinal vein are in order of appearance [8, 9].

Posterior cardinal veins are first to develop, they are the vessels of mesonephros and largely disappear with the transitory kidneys. The subcardinal veins appear by the fifth week. The veins are in a plane ventral to aorta

Figure 1: Multidetector computed tomography color three-dimensional volume-rendering technique with Omnipaque contrast material showing the left renal vein (arrow) coursing obliquely and caudally behind the aorta and joining the left common iliac vein at the level of L4-L5. The left renal vein was of normal caliber and long course.

Figure 2: Multidetector computed tomography color three-dimensional volume-rendering technique with Omnipaque contrast material, showing the left renal vein (arrow) coursing obliquely and caudally behind the aorta and left common iliac artery.

Figure 3: On multidetector computed tomography maximum intensity projection showing the left renal vein (arrow) coursing obliquely and caudally behind the aorta and joining the left common iliac vein, at the level of L4-L5. The left renal vein was of normal caliber and long course.

and supracardinal lie in an plane dorsal to aorta, and interconnected by a network of veins forming a venous collar around the aorta.

Renal veins develop from anastomosis of subcardinal and supracardinal veins. The subcardinal veins form the stem of left renal vein, suprarenal (adrenal) veins, the gonadal veins and prerenal segment of the IVC. Lastly, supracardinal veins develop. These are united by an anastomosis that in adult represent the azygos and hemiazygos veins [10]. The four types of left renal vein anomalies result are as follows:

- In Type I, ventral preaortic limb of the left renal vein is obliterated, but dorsal retroaortic limb persists and joins the inferior vena cava in the orthoptic position [4–7].
- Type II results from obliteration of the ventral preaortic limb of left renal vein and remaining dorsal limb turning into the RLRV. The left renal vein lies at the level of L4-L5 and joins the gonadal and ascending lumbar veins before joining the IVC [4–7].
- Type III is the circumaortic left renal vein or venous collar. The persistence of supracardinal and intersupracardinal anastomosis and the dorsal limb of left renal vein leads to the development of this type [4–7].
- Type IV being the RALRV, the ventral preaortic limb of the left renal vein is obliterated and remaining dorsal limb becomes the RLRV. This RLRV courses obliquely and caudally behind joining the left common iliac vein [4–7].

The diagnostic methods for detecting IVC anomalies have been autopsy study, renal venography, color Doppler ultrasonography, computed tomography and magnetic resonance imaging. With the advances in computed tomography, MDCT has replaced other conventional angiography and venogram in most of the conditions[2].

The importance of knowledge of the renal vessels is emphasized as it is crucial for surgeons to recognize these anomalies and failure to do so can lead to severe hemorrhage and renal damage [11]. Symptoms such as hematuria can be caused due to increased pressure of the renal vein due to its abnormal course behind the aorta and leading to its compression and subsequent elevation in pressure and congestion in the kidney [2].

In our case, patient did not have any overt symptoms related to this pathology but its timely diagnosis will definitely benefit him in future if such symptoms occur.

CONCLUSION

Knowledge of venous anomalies related to the renal vein is important in various surgeries and venographic procedures and multidetector computed tomography can very well diagnose this anomaly and help the surgeon to understand the anatomy better.

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Chandra Prakash – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Sajad Ali – Acquisition of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Samina Manzoor Khan – Acquisition of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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