Accessory right renal vein draining into inferior vena cava

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Abstract
Introduction
The variations of the renal veins are not as common as arteries. Reports on presence of renal arterial abnormalities predominates the venous abnormalities. Hence venous variations go unnoticed. Thus here we report a case of right accessory renal vein.

Case report
We report here a case of accessory right renal vein arising from the hilum of the right kidney, inferior to the main renal vein and draining into the inferior venacava at its posterior aspect at about 1.5cm below the level of termination of the main renal vein.

Conclusion
Detailed knowledge of the anatomy and anomalies of renal veins is necessary for retroperitoneal surgery and venographic procedures in addition to providing safety guidelines for endovascular procedures.

Introduction
Renal veins are formed at the corresponding renal sinus by the union of interlobar veins. Each kidney is drained by a single renal vein into the inferior venacava at the level of L2 vertebra. The right renal vein is about one third of the left and does not receive any other tributaries. Whereas the left renal vein lies anterior to the abdominal aorta and open into the inferior venacava after receiving the left suprarenal vein and left gonadal vein¹. Accessory or supernumerary renal vein is the condition whereby, the venous blood of the kidney is drained by an additional vein into the inferior vena cava with the similar course and termination as its normal vein. Generally, variations of renal veins are overlooked until it is demonstrated by venography or encountered during surgery or cadaveric dissection.

Development of the renal veins is a complex process with the alternative patterns of formations particularly for the left renal vein. Probably this is one of the major reason for the higher incidence of variations observed in the left renal veins when compared to right renal veins. However, familiarity with the variations in terms of their variant pattern or supernumerary numbers is essential in order to avoid vascular injury during various surgical and interventional procedures².

Presence of accessory renal veins may influence the technical feasibility of operation as well as restrict the availability of veins for mobilization procedures³. The aim of this study is to provide an additional information on variant renal vasculature to avoid any vascular injury during retroperitoneal surgery and venographic procedures.

Case report
During routine cadaveric dissection of the posterior abdomen region for undergraduate medical students, we observed presence of an accessory renal vein draining the right kidney in addition to its normal renal vein. The accessory vein emerged from the lower part of the hilum just below the right renal pelvis and then it traversed almost parallel to the right renal vein.

Right renal vein was found to have two tributaries from the kidney, one upper and another lower. The upper tributary was crossed by one of the branches of the right renal artery. It opened into the lateral part of the inferior vena cava opposite to the left renal vein, but the accessory renal vein on the right side opened into the posterior aspect of the inferior vena cava at a distance of 1.5cm below the opening of the right renal vein (Figure 1). Apart from presence of

Figure 1: Dissection of right side of abdomen showing the right kidney (RK) with right renal vein (RRV) and artery (RRA) along with the accessory renal vein (ARV). Right renal artery is crossing the upper tributary (UT) of right renal vein. RU-right ureter, IVC- inferior vena cava, RGA-right gonadal artery, RGV-right gonadal vein, LT-lower tributary of right renal vein, UT-upper tributary of right renal vein, RRA-right renal artery, RRV-right renal vein, RPMM-right psoas major muscle.

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unilateral accessory right renal vein no other vascular variations were observed in this formalin fixed male cadaver aged about 60 years.

Discussion
Among the variations of the renal morphology, unusual vessels are the most common form of variations4. Few studies and reports have mentioned about the accessory renal vein and artery. The available literature confirms the prevalence of accessory renal veins on the right side is much higher than the left side.

Gupta et al. revealed that the incidence of accessory renal vein on the right side is 33% and on the left side to be 3.3% in cases studied2. Supernumerary vein was found in 36.3% cases, retro-aortic left renal vein in 6.6%, Circumaortic left renal vein in 6.6% and Plexiform left renal vein in 6.6% cases studied2.

Previous study revealed the presence of additional renal veins in 3.3% cases on the right side and in 2.6% on the left5. Narendiran et al. suggested that the incidence of additional unilateral or bilateral renal veins is about 0.4%6.

Paul has reported the similar case of accessory right renal vein draining into the inferior vena cava just proximal to union of common iliac veins7. Single et al. reported a case of left renal vein passing behind the aorta to drain into the inferior vena cava at the level of lower pole of the left kidney8. According to Reed et al., the study of 433 CT scans revealed the presence of circumaortic left renal vein in 4.4% and single retroaortic left renal vein in 1.8% cases9.

Embryologically, the bilateral symmetrical cardinal venous system becomes a unilateral right sided inferior vena cava around the 8th week of development. Initially two renal veins are present on each side at the ventral and dorsal plane. Convergence of both tributaries results in the single vessel formation. Persistence of these two veins leads to the presence of accessory or additional renal veins10. Complex embryogenesis involves the shifting of venous arrangement to the right possibly discouraging any retention of accessory left sided renal veins. Thus right-sided anatomical variations of the renal vein are more common2.

Conclusion
In the present case, the right renal vein opened into the inferior vena cava opposite to the left renal vein, but the accessory right renal vein opened into the posterior aspect of the inferior vena cava at a distance of 1.5 cm below the opening of the right renal vein. Presence of the accessory renal vein may clinically remain unnoticed and can be found only in venography, operation or autopsy. Such variations should be known to the angiographer, catheter design, and planning porto-renal shunt procedures and to a transplant surgeon. Knowledge of variant renal vascular variations is essential for vascular surgeons and urologists operating in this region.

References