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Variant Anatomy of Renal Vein - A Rare Scenario in the Cadaveric Study

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Abstract: ***Introduction: Anatomy of kidney is of growing importance with increased number of transplantation and surgical procedures. This study shows a variation of renal vein. Aims and Objectives: To explore the renal vasculature. Materials and Methods: 30 cadavers were dissected as a part of UG and PG Course. The anomalies are observed as a part of routine dissection. Result: two of the30 cadavers had shown accessory renal veins. Discussion: In two dissected specimens of male cadaver, two renal veins parallel to each other was observed in a position antero-inferior to right renal artery. One vein emerged from upper portion of renal hilum, while the other emerged from lower portion of hilum. The two veins drained separately into inferior venacava and neither of them received any tributaries. Conclusion: Detailed knowledge of anatomy and anomalies of renal vein is necessary for urologists, vascular surgeons and radiologists for performing angiography prior to surgical interventions in the retroperitoneal space avoids complications especially with regard to kidney transplantation[8].***

1. Introduction

Kidneys are supplied by a single renal artery and a single renal vein, which accounts for about 20% of the cardiac output. The Renal vein is formed by convergence of 2 or 3 interlobar veins in the renal sinus, joins to emerge from the renal hilum as the Renal vein anterior to the renal artery and drains into the Inferior VenaCava at the level of L2 [1]. The Rt. renal vein measures 1/3rd of left renal vein and does not receive other tributaries, whereas, the left renal vein lies anterior to the abdominal aorta and open into the Inferior vena cava after receiving the Lt. inferior phrenic vein, Lt. suprarenal vein, and Lt. gonadal vein. The Lt. renal vein is longer, about 6-7cm. The left renal vein courses anteriorly to the abdominal aorta. The variations of the renal veins are not as common as arteries .Pick and Anson et al 1940, found Supernumerary arteries in 32.25% of kidneys but supernumerary veins in only 14.4%. Accessory or supernumerary renal vein is the condition whereby, the venous blood of the kidney is drained by an additional vein into the IVC, it may emerge either through the hilum or through the surface of kidney [2].

2. Aims and Objectives

To present the case of Rt. accessory renal vein and a group of pre hilar primary tributaries of left renal vein that was found during a routine Anatomical dissection at Gandhi Medical College, Secunderabad.

3. Materials and Methods

30 cadaver were dissected as a part of Undergraduate and Postgraduate curriculum during 2016-2019. The anomalies were observed during routine dissection.

4. Observations and Results

Two of the 30 cadavers had shown accessory renal veins and a group of pre hilar primary tributaries of renal vein.**Case 1**: Dissected specimen of about 60 years old female cadaver showed 2 Rt. renal veins in a position antero-inferior to Rt. renal artery. One vein emerged from upper portion of renal hilum, while the other emerged from lower portion of hilum at a distance of 1.5cm below the opening of the main Rt. renal vein draining to IVC. The 2 veins drained separately into IVC and neither of them received tributaries. No other abnormalities were found in the vicinity and structures were painted and relevant photographs were taken.

Case 1

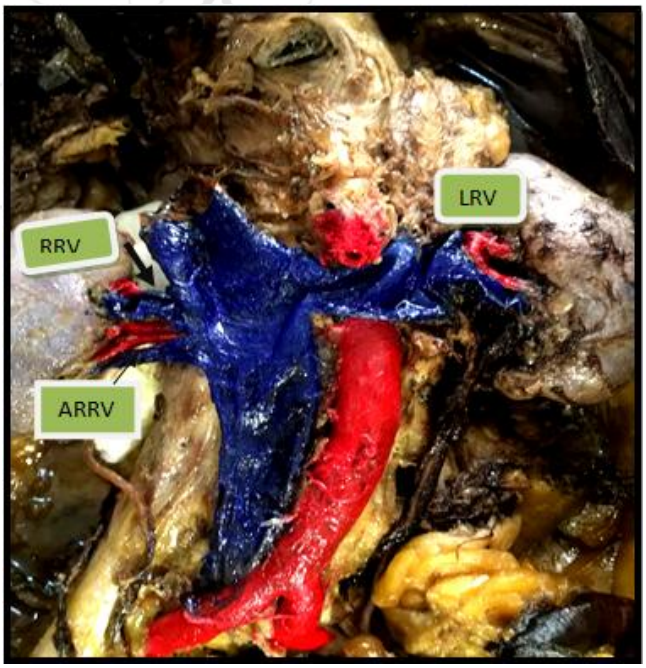

Figure: RRV: right renal vein **ARRV**: Accessory renal vein **LRV**: left renal vein.

Case 2: Dissected cadaver of about 70 years old male, 2 Rt. renal veins were observed antero-inferior to Rt. renal artery. Rt. Accessory renal vein measured 1.5cms and was not receiving tributaries.On the Left side, the left renal vein was single and formed by prehilar primary tributaries which were arranged as 3 anterior and 1 posterior tributary in front of and behind the left renal artery respectively.

Case 2

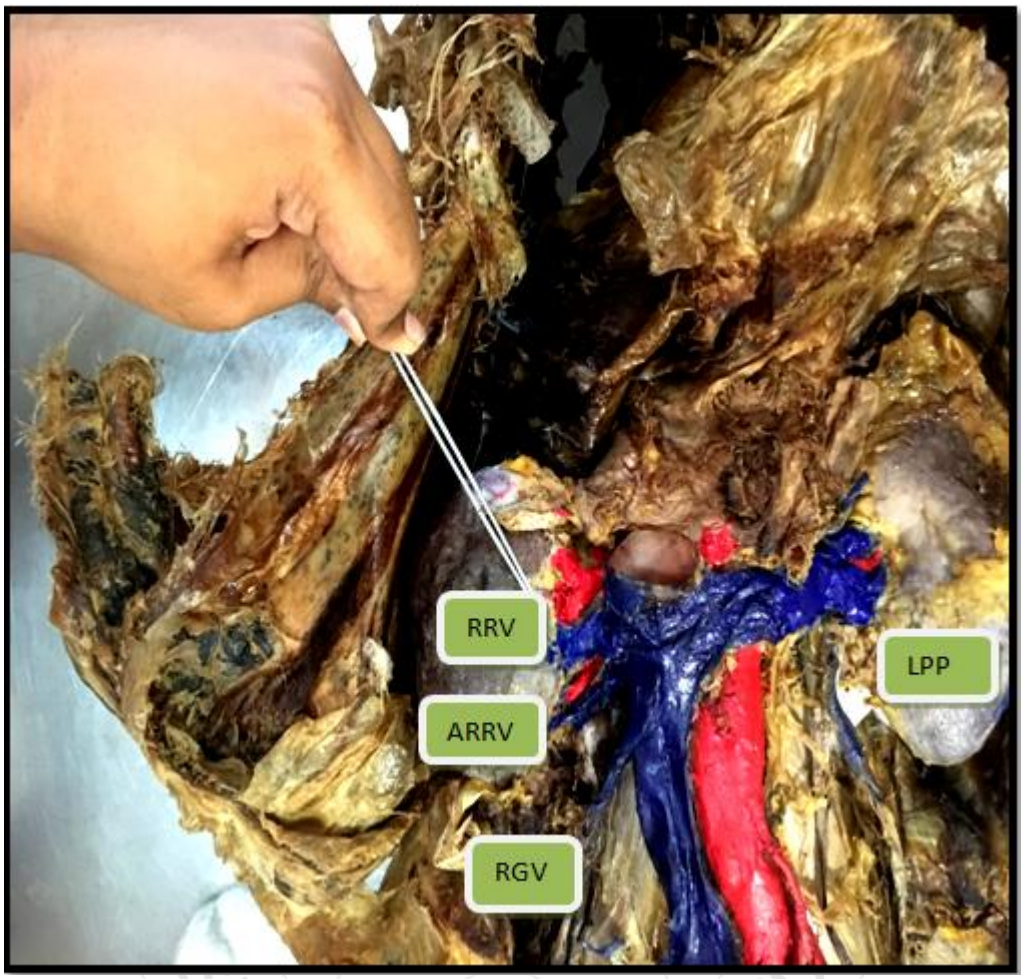

Figure: **RRV**:Right Renal Vein, **ARRV**: Accessory Right Renal Vein, **RGV**: Right Gonadal Vein, **LPP**:Left Prehilar Primary Tributaries

Embryological Basis

Embryologically, the bilateral symmetrical cardinal venous system becomes a unilateral Rt. 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. In the right side, one renal vein opens into the lateral portion of the renal collar and the other opens more dorsally towards cranial part of the supracardinal vein. Convergence of both tributaries results in the single vessel formation that connects with the lateral portion of renal collar. Complex embryogenesis involves the shifting of venous arrangement to the Rt. possibly discouraging any retention of accessory left sided renal veins. Probably, this is one of the major reason for the higher incidence of variations observed in the Rt. renal veins when compared to left renal veins[10].

5. Discussion

Satyapal K.S (1995) classified renal venous drainage patterns [7]. Accordingly, any extra vessel that drains separately from the kidney and independently into the IVC be considered as normal variation and named as Additional renal vein [3]. Type III He further classified the pattern based on drainage of the primary renal vein tributaries and the renal vein proper as a basis on both the Right and left sides.

Classification of Renal Vein

- **Type IA** consisted of two primary tributaries: an upper and a lower one,.
- **Type IB** had in addition a posterior primary tributary.
- **Type IIA** displayed more than two primary tributaries: upper, middle and lower.
- **Type IIB** had an additional posterior primary tributary.
- **Type III** consisted of any of the above classification patterns as well as displaying an Additional renal vein.

In the present case study both cases fit into **Type III** Pattern of venous drainage. In case 1, the additional renal vein on Rt. side and in case 2, the additional renal vein on the Rt. side with pre-hilar tributaries on the left side. Satayapal (1995) reported that incidence of additional right renal vein was 26% as compared to 2.6% on the left side [3]. 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 studied [2]

6. Conclusion

Variations of the renal venous system are clinically silent and remain unnoticed until discovered during autopsy or operation. Vascular variations shows a major significance in renal surgery, in partial or total nephrectomy and in renal transplant. The renal hilum should be examined properly prior to any surgical procedure and for post operative management by radiographic examination. Contrast enhanced CT Scan can provide enough information about venous variations of kidney for to proceed with invasive methods. Such variations should be known for angiography, and planning porto-renal shunt procedures and transplantation. Knowledge of variant renal vascular variations is essential for vascular surgeons and urologists operating in this region.

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