

**Aortic renal collar – A case report**C.Sreekanth¹, K.Thyagaraju², V.Subhadra Devi³

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Corresponding Address: Dr. C.Sreekanth, Department of Anatomy, Sri Padmavathi Medical College for women, Tirupati, Andhra Pradesh. Email: drsrikanthc@gmail.com**Abstract:**

When the veins draining the left kidney surround the abdominal aorta in the form of a collar it is known as aortic renal collar. This condition has embryological basis and is referred as circum- aortic left renal vein or circum aortic renal collar in the literature. This condition results from persistence of embryonic veins or anastomosis between them that usually disappear to form left renal vein. It is a potentially hazardous developmental anomaly of left renal vein. In the present study on 50 adult cadaveric kidneys for renal vein variations one adult male cadaver presented circum aortic renal collar formed by left renal vein. The percentage incidence of circum aortic renal collar in the present study was 2%. Detailed knowledge of developmental variations of left renal vein is important for differential diagnosis of retroperitoneal pathologies and in retroperitoneal surgical interventions.

Key words: Aorta, Renal collar, Renal veins**Introduction:**

The right and left renal veins are of equal calibre and drain into the Inferior vena cava at right angles. The left renal vein is thrice as long as the right renal vein as it has to travel a longer distance in the transpyloric plane from the hilum of left kidney crossing anterior to the abdominal aorta to open into the Inferior vena cava (IVC) which is located to the right of abdominal aorta. The left renal vein receives left supra renal and left gonadal veins as tributaries. Development of renal veins is part of complex process in the developmental of IVC. Complex development of IVC and its tributaries can cause wide range of variations in the venous patterns of lower limb and abdomen. Some of these venous anomalies can produce serious complications and some can be asymptomatic. These variations are observed either at autopsy or during retroperitoneal surgical interventions. In the present study one such variation was observed in the study of renal vasculature in 50 adult cadavers.

Though renal vascular structures can be identified by contrast enhanced CT imaging, unusual venous arrangement is difficult to diagnose in those cases in whom contrast media is contraindicated [1] Bass et.al,2000). Knowledge on the distribution of

renal hilar structures is of crucial importance for urological surgical procedures that involve hilar vessel clamping [2].

Case report: (Fig.1)

An adult male cadaver of 50 years age presented two renal veins emerging from the hilum of left kidney (LK). One vein is anterior to renal artery (ARV) and the other is posterior (PRV) to it at the hilum. Both the veins are of same calibre. During their course to reach IVC both anterior and posterior veins surrounded the abdominal aorta (AA) in the form of a venous ring and finally terminated into the Inferior vena cava (IVC) separately. The posterior vein is at a more caudal level than the anterior both at its origin and termination and received the left gonadal vein. The left supra renal vein drained in to the anterior vein. The left renal artery (RA) at the hilum divided into two branches and was located between the anterior and posterior renal veins.

Discussion

Variations of renal veins are rare compared to that of renal arteries. Variations of right renal veins are more common than left renal veins [2]. Duplication of left renal vein is a rare variation

where one vein passes anterior and the other posterior to abdominal aorta as observed in the present case.

IVC development takes place between 6th to 8th week of gestation with the formation of three paired longitudinal/parallel veins in sequence that communicate with each other [3,4]. They are posterior cardinal, sub-cardinal and supra-cardinal veins. The posterior cardinal veins are veins of mesonephros and regress with the disappearance of mesonephric kidney. The subcardinal veins develop ventral/anterior to aorta where as the supra cardinal veins develop dorsal/posterior to it [3,4].

Rich anastomotic communications develop between supra cardinal and subcardinal veins around the aorta forming a venous collar around it known as circum aortic plexus. The venous anastomoses around the aorta are supracardinal –subcardinal, inter supracardinal and inter subcardinal. Regression of some and persistence of some others contributes for the formation of IVC, right and left renal veins [4].

The ventral vein of circumaortic plexus persists as left renal vein and the dorsal vein degenerates. Persistence of only dorsal vein forms a left renal vein posterior to aorta. Persistence of both ventral and dorsal veins forms circum aortic renal vein. The present case of circumaortic/aortic renal collar resulted from persistence of intersupracardinal anastomosis, left subcardinal and supracardinal anastomosis and left dorsal renal vein.

Due to longer course and complexities in its development left renal vein variations are clinically significant. Because of its length left renal vein is preferred in renal transplantation. Hence, it is important to know its course and to find out whether it is pre-aortic or both pre and post-aortic. Venous anomalies of the retroperitoneal region have clinical implications mainly in retroperitoneal surgeries i.e. nephrectomy and in renal vein catheterization.

Aortic renal collar was reported as an isolated case during autopsy or anatomical dissections [5,6] or in CT scan [7]. The percentage incidence reported based on observations in a number of kidneys either in cadavers [8,9] or radiological investigations for pre surgical evaluation of patients for retro peritoneal or renal surgeries [10,11] and based on cadaveric and radiological investigations, reduring renal and aortic surgeries [12] were presented in table.1.

Table 1: Percentage incidence of circum aortic renal collar reported in literature

Author/s	Percentage incidence	
Kramer and Grain [8]	5.71%	Observations in 175 cadavers
Reed et al [10]	4.4%	433 CT scans
Trigaux et al [11]	6.8%	1014 CT scans
Satyapal et.al.,1999[12]	0.2 – 30%	1008 cadaveric and clinical
Anupma et.al.[9]	6.6%	Observations in 30 cadavers
Present study,2015	2.0%	Observations in 50 cadavers

Conclusion:

The condition of aortic renal collar results from persistence of embryonic renal venous collar ie. dorsal limb of embryonic left renal vein and dorsal arch of renal collar which is formed due to inter supra cardinal anastomosis of inferior vena cava. There is increased risk of venous injury in patients with aortic/ circum aortic renal collar that is not diagnosed pre-operatively nor kept in mind during surgical interventions on kidneys, renal veins and aorta.

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FIG 1. CIRCUM AORTIC RENAL COLLAR FORMED BY ANTERIOR & POSTERIOR RENAL VEINS

