

Morphology and Variations of Renal Artery Pattern: A Case Report

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Abstract: Anatomical variations of Renal arteries are common, usually kidney is supplied by the renal artery which is the anterolateral branch of the abdominal aorta. During the regular dissection of cadavers in the Department of Anatomy, we observed no. of variations in the pattern of renal artery instead of single renal artery to the kidney. Some renal arteries showing early ramification before entering into the hilum of kidney. For some other kidneys along with main renal artery extra renal arteries going to the kidney through its hilum are accessory renal arteries and some extra renal arteries are directly going to the upper or lower pole of the kidney without entering into the hilum are aberrant arteries. As per our study 32% of the specimens showing variations. 68% are the single renal arteries irrigating the kidneys. Morphological variations of the renal arteries are common. It is better to have awareness to prevent the surgical hazards because of anatomical consideration.

Keywords: Variations, renal artery.

I. Introduction

Renal arteries are a pair of wide bored straight vessels arising at right angles from the antero lateral part of aorta just below the superior mesenteric artery. Right artery is longer than the left artery because abdominal aorta lies on the left side of vertebral column. About 1 Ltr of blood circulates through both kidneys per minute. The renal arteries present in diameter of around 5mm. Some times extra renal artery arising from the aorta which is the precocious origin of segmental artery. (AK Datta ;2003)

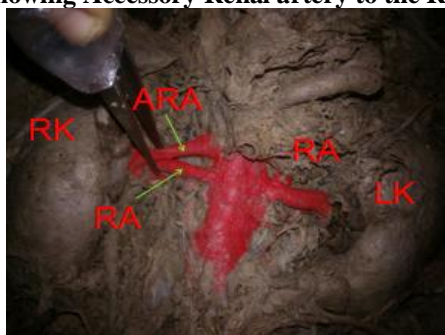
Renal arteries variations are divided into two groups.

1. Early division of renal artery: Ramification of the main renal artery into segmental branches more proximal to the hilum of the kidney is called Early Division.
2. Extra renal artery: It is divided into two types.
 - a. Accessory or Hilar renal arteries: enter the kidneys through the hilum with the main renal artery.
 - b. Aberrant or Polar renal arteries: enter the kidneys directly through the capsule without entering though the hilum.

Most of the abnormalities in renal arteries are due to the various developmental positions of kidney. At first the Metanephric kidney lies in pelvic cavity opposite the sacral segments and receives the arterial supply from the median sacral artery. Gradually the kidney ascends and reaches the iliac fossa after crossing the pelvic brim, it gets nutrition from the common and internal iliac arteries. Finally it appears on the under surface of the diaphragm where its ascent is arrested by the supra renal gland which has mean while developed in this region. Here the kidney receives the blood supply from the lowest suprarenal artery, and this branch persists after birth as the permanent renal artery. Extra renal arteries are arising either above or below the main renal artery.

Observations:

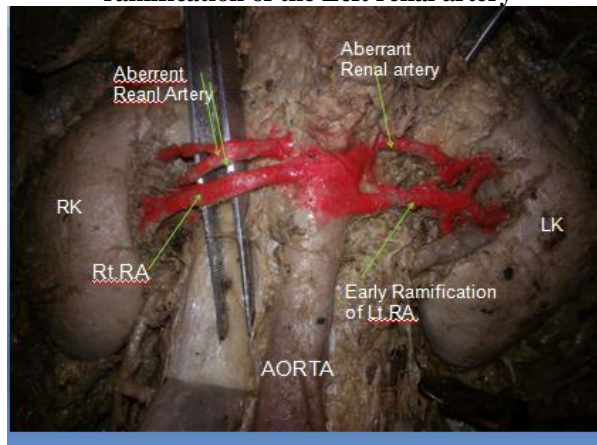
Figure-1 showing Accessory Renal artery to the Right Kidney



RK : Right Kidney
LK : Left Kidney
RA : Renal Artery
ARA: Accessory Renal Artery

In this figure -1 we observed two renal arteries entering to the right kidney through the hilum. The accessory renal artery is above the renal artery. Left kidney had single renal artery.

Figure 2 showing Aberrant arteries to the upper pole of both right and left kidneys and Early ramification of the Left renal artery



RK : Right Kidney
LK : Left Kidney
RA : Renal Artery

In figure -2 Both right and left kidneys are supplied by two renal arteries . Right and Left kidneys having extra renal artery (Aberrant) to the upper poles.
Left renal artery showing early ramification (before entering to the hilum).

Figure 3 showing early ramification of left renal artery



RK : Right Kidney
LK : Left Kidney
IVC : Inferior vena cava

In the figure -3 Left kidney showing Early ramification of the renal artery.

II. Discussion

Renal artery variations are common. The frequency of extra renal arteries show variability from 9-76% and is generally between 28-30% in anatomic and cadaver studies.

In present study 68% of specimens getting renal irrigation through single renal artery. Renal irrigation is assumed to be provided by a single renal artery in descriptions given by texts dealing with anatomy ;

however, considerable variations on this pattern have been reported in the literature specializing in the topic (Bordei et al 2004²). Renal irrigation provided by a single renal artery has 75.1% frequency, agreeing with that reported by Harrison et al. The presence of bilateral single renal arteries had 62.9% frequency, similar to that reported by Odman & Ranniger⁶. Remaining 32% specimens having variations like Early ramification accessory (hilar) renal arteries and polar (aberrant) renal arteries. 22% specimen showing unilateral variation, 6% specimen showing bilateral variations. 3 specimens showing unilateral early ramification, 1% specimen showing bilateral early ramification. Our findings (3.4%) had an intermediate range between the percentages reported by Sampaio & Passos⁷, the presence of these arteries was observed as a characteristic of early ramification of the renal artery. Accessory renal arteries are common due to the persistence of embryonic arteries which did not regress during ascent of the kidney studied by Grays Anatomy⁴ and Dhar and Lal; 2005³. The accessory renal arteries are also seen frequently (Satyapal KS et al;2001⁸). They enter the kidney either above or below the hilum(Khamanarong K ;2004⁵). Their relations with the nearby structures can vary. Bilateral additional renal arteries originating from the abdominal aorta have been reported by Bayramoglu et al¹ (2003), (Singh G; 2003⁹) these anomalies noted by them were associated with non rotated kidneys with extra renal calices and pelvises. Most of the abnormalities in the renal arteries are due to the various developmental positions of Kidney.

III. Conclusion

The renal arteries present a broad spectrum of variability in their morphological expression respecting their length, level of ramification and emergence to the kidney. Such aspects are important when considering a surgical approach trauma, interpreting diagnostic images, teaching renal vascularisation and kidney transplantations. Renal vascular anomalies are usually asymptomatic. It is important to have the knowledge about the variations of renal arteries which give awareness and also help in minimising the hazards like bleeding or ligation of the artery during various surgical procedures. As the incidence of renal arterial variation is up to 30%. It is better to have the knowledge about the anatomical consideration of renal arteries.

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