Early division of Renal artery: A Case Report

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ABSTRACT

The kidneys are one of the vital organs in the human body. It receives rich blood supply, nearly 25% of the cardiac outputs pass through the renal arteries to be filtered by the kidneys. Classically each Kidney is supplied by a single renal artery originate from abdominal aorta. With the advent of laparoscopic renal surgeries and donor nephrectomies, it becomes mandatory for the surgeons to understand the abnormality or variations in the renal vasculature. The present case report shows bilateral early division of renal artery in a 59 years old female during routine dissection of abdomen for undergraduate students. Right renal artery was arising from aorta at the level of L1 vertebra whereas left renal artery was arising from aorta at the level of L2 vertebra 6 cm below from right renal artery. Awareness of bilateral variations of renal artery is necessary for surgical management during renal transplantation; repair of abdominal aorta aneurysm, urological procedures and for angiographic interventions.

KEYWORDS: Renal artery, variations, early division and clinical significance.

INTRODUCTION

Anatomical knowledge of the variations of the renal artery has grown in importance with increasing numbers of renal transplants, vascular reconstructions and various surgical and radiologic techniques being performed in recent years. The renal arteries arise from abdominal aorta below the origin of superior mesenteric artery, on each side. Near the hilum of the kidney, each renal artery divides into anterior and posterior branch which in turn divides into number of segmental arteries supplying the different renal segments. The variations in the renal arteries are considered critical issues and surgeons should have a thorough envision and appreciation of the condition. Accessory renal arteries constitute the most common clinically important vascular variant and are seen in up to one-third of patients.

The presence of unusual branching patterns of the renal arteries is not uncommon. In 70% of cases there is a single renal artery supplying each kidney by Standring S. Gray’s Anatomy [1], multiple renal arteries are unilateral in approximately 30% of patients and bilateral in approximately 10%. Variations in the pattern of renal arteries have been reported more frequently than other large vessels in the literature and alternative nomenclatures have been used to describe the same. Arteries vary in their level of origin, caliber, obliquity and precise relations. The objective of this present case report and review of literature is to bring awareness to clinicians about the variations in the blood supply of the kidney, especially for those who are performing invasive procedures and vascular surgeries on kidney. Renal artery variations are becoming more important due to the gradual increase in interventional radiological procedures, urological and vascular operations, and renal transplantation.

CASE REPORT

In the present case study we have observed early division of renal artery in a 59 years old female cadaver (10% formalin fixed) during routine dissection of abdomen for graduate students in the department of Anatomy, Integral Institute of Medical Sciences and Research Lucknow U.P. India. The embalmed cadaver dissections were performed on the abdomen and posterior abdominal wall carefully. Right renal artery was arising from aorta at the level of L1 vertebra whereas left renal artery was arising from aorta at the level of L2 vertebra (figure 1) 6 cm below from right renal artery. Right renal artery divided 1.5cm away from abdominal aorta into two branches (figure2) and left renal 0.5 cm away from abdominal aorta into three branches. In
another 66 years old male cadaver we found early division of left renal artery just lateral to abdominal aorta into two branches (figure 3). Kidneys and its surrounding vessels were studied for any variations carefully and photographs.

**Figure: 1** Dissection of posterior abdominal wall showing early division of renal arteries.

![Image 1](image1)

(RRA: Right renal artery and LRA: left renal artery with arrow. AA: Abdominal Aorta; RU: Right Ureter; LU: Left Ureter; SMA: Superior Mesenteric Artery)

**Figure: 2** Dissection of posterior abdominal wall showing early division of renal artery.

![Image 2](image2)

(RRA: Right renal artery with arrow. AA: Abdominal Aorta; SMA: Superior Mesenteric Artery)

**Figure: 3** Dissection of posterior abdominal wall showing early division of renal artery.
DISCUSSION

The various types of (accessory, additional, supplementary and aberrant) renal arteries, their positions, method of entry to the kidney and segmentation were studied extensively by number of authors [2, 3]. Knowledge of variations of blood vessels in the renal hilar region is important during operative, diagnostic and endovascular procedures in the abdomen. Incidence of renal failure being on the rise with renal transplant has further enhanced the importance to investigate the variable renal vasculature. Accessory renal arteries constitute the most common, clinically important vascular variant and are seen in up to one-third of patients. Classically, and in 75% of the people, the kidney is supplied by a single renal artery; about 25% of the adult kidneys have 2 or 4 renal arteries. It is a misnomer to call such vessels as accessory; aberrant or even supernumerary, because they are not extra but essential, tissue sustaining arteries without anastomosis between them, which correspond to the segmental branch of a single renal artery [4].

According to Graves 1956 [5], any artery arising from the aorta in addition to the main renal artery should be named ‘accessory’ and the renal arteries arising from sources other than the aorta should be called ‘aberrant’. Most of the abnormalities in the renal arteries are due to the various developmental positions of kidney [6]. The kidneys begin their development in the pelvic cavity. During further development they ascend to their final position in the lumbar region. When the kidneys are located in the pelvis, they are supplied by a branch of internal iliac artery or common iliac arteries. While the kidneys ascend to lumbar region, their arterial supply also shifts from common iliac artery to abdominal aorta [7].

Double renal arteries with an aortic origin are frequent vascular variations, representing the persistence of the embryonic vessels, the lateral branches of the mesonephros, within the renal ascent [8]. Hussein M. et al reported bilateral variation of renal artery in 22 cadavers (39.2%). Bilateral variation was present in 12 cadavers (21.4 % %), unilateral in 10 cadavers (17.8%). The unilateral variation was present on right side in 3 cadavers (5.3%) and on left side in 7 cadavers (12.5%) [9]. Budhiraja et al., [10] observed that in10.7% of cases the superior polar artery originated directly from the abdominal aorta as an additional renal artery. A branch originating directly from the renal artery (superior renal polar branch) was observed on the right hand side in 26 kidneys (17.2%) and in 19 kidneys on the left-hand side (13.5%) as reported by Saldarriaga et al., [11].

CONCLUSION

Renal artery variations knowledge is of utmost importance to the urologist and surgeons dealing with kidney retrieval and transplantation. It is also important to the radiologists in performing various end urologic procedures and innumerable interventional techniques. In the majority of such situations it is the comprehensive knowledge of the renal arterial variations that remains the key issue in determining the technical feasibility of surgical interventions as well as the post operative management.

REFERENCES


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