

Presence of Bilateral Accessory Renal Arteries: A Rare Case Report

Ranjana Singh Arya¹, Amit Kumar², Shiksha Jangde², Koushik Saha³, Suhasini P Tayade²

¹Associate Professor, Department of Anatomy, Chhattisgarh Institute of Medical Sciences, CG AYUSH & Health University Chhattisgarh, Bilaspur, India, ²Assistant Professor, Department of Anatomy, Chhattisgarh Institute of Medical Sciences, CG AYUSH & Health University Chhattisgarh, Bilaspur, India, ⁴Demonstrator, Department of Anatomy, Chhattisgarh Institute of Medical Sciences, CG AYUSH & Health University Chhattisgarh, Bilaspur, India

Abstract

During the ascent to the final site, the embryonic kidneys receive their blood supply from superior vessels. Normally, the inferior vessels degenerate. When these vessels fail to degenerate remaining forms the accessory renal arteries. Hence, in the present case report one such variation was observed during routine dissection of undergraduate students in middle-aged male cadaver at Chhattisgarh Institute of Medical Sciences, Bilaspur, Chhattisgarh, India. Cadaver was preserved properly, and dissection was done stepwise. Bilateral accessory renal arteries are found originating from the abdominal aorta. The right accessory renal artery is originated higher than the left accessory renal artery. Knowledge of bilateral accessory renal arteries will be a help in surgical management during renal transplantation, aortic aneurysm, Urological procedures and for angiographic interventions.

Key words: Accessory renal arteries, Bilateral accessory renal arteries, Renal transplantation

INTRODUCTION

The paired renal arteries arise as lateral branches from the abdominal aorta just below the origin of superior mesenteric artery. The right renal artery is longer than left renal artery and runs behind the inferior vena cava and right renal vein. The left renal artery runs behind the left renal vein. Renal artery near the renal hilum divides into anterior and posterior division.¹ Usually the renal artery is the lateral branch of the abdominal aorta but may emerge from the posterolateral, anterolateral and posterior surfaces with less frequency. Other sites of origin such as the celiac trunk, common iliac and inferior phrenic artery are also noted. Initially, the renal arteries are branches of the common iliac arteries. Later, the kidney receives its blood supply from the distal end of the aorta. Usually, the inferior vessels degenerate and superior vessels supply the kidney. Normally the caudal branches of the renal vessels undergo involution and disappear but at times they persist

hence termed accessory renal arteries or additional renal arteries. Variations in the number and position of these vessels occur in approximately 30% of people.²

Approximately 25% of the adult kidney has two to four renal arteries arising from the Aorta. It may be superior or inferior to the main renal artery following the main renal artery to the hilum of the kidney. Accessory renal arteries may also enter the kidney directly either into the superior or inferior poles.³ It is important to know that accessory renal arteries are end arteries as a result if an accessory artery is damaged, the part of the kidney supplied by it will become ischemic. Accessory arteries are approximately twice as common as accessory veins.³

Most of the renal vessels anomaly remains unrecognized until they exposed to any surgical procedure, arteriography or autopsy. So, here a rare case found where right kidney as well as left kidney have an additional renal artery: "Bilateral accessory renal artery." 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.

During routine dissection study of undergraduate students (MBBS) vascular abnormalities of right and left kidney

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Corresponding Author: Dr. Ranjana Singh Arya, Department of Anatomy, Chhattisgarh Institute of Medical Sciences, Bilaspur, Chhattisgarh, India. Phone: +91-9424152635. E-mail: dr_ranjana2004@yahoo.co.in

were encountered in a unknown middle-aged male cadaver in Chhattisgarh Institute of Medical Sciences, Bilaspur, Chhattisgarh India in the year 2013. The cadaver was embalmed and preserved as per standard procedure. Abdominal viscera were removed to get clear access to posterior abdominal wall structure like kidney and associated blood vessels.

Dissection steps done carefully, and finally both kidney, renal vessels, aorta and accessory renal arteries removed intact and photographs were taken.

CASE REPORT

In our study, we found a rare case of bilateral accessory renal arteries, arising as lateral branches from the abdominal aorta to the lower pole of right and left the kidney. Right renal artery originated from the right side of the aorta at the level of upper border of L2 vertebra and left renal artery originated from the left side of the aorta at the level of lower border of L1 vertebra.

The right accessory renal artery is arising 2 cm below the origin of the right renal artery, it measures 3.2 cm. It enters the right kidney at a distance of 3 cm below from the entrance of right renal artery at the hilum. Left accessory renal artery is arising 6 cm below the emergence of the left renal artery, measurement is 3 cm. Left accessory renal artery enters the kidney almost at the lower pole at the distance of 5 cm from the emergence of the left renal artery at the hilum of left kidney.

Left ureter lying behind the left accessory renal artery in close contact whereas the right ureter is completely separate (Figure 1).

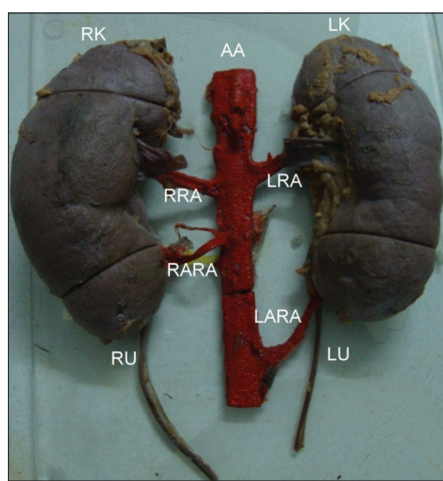


Figure 1: RK: Right kidney, AA: Abdominal aorta; LK: Left kidney, RRA: Right renal artery, LRA: Left renal artery, RARA: Right accessory renal artery, LARA: Left accessory renal artery, RU: Right ureter, LU: Left ureter

DISCUSSION

Accessory renal arteries are common in 30% of individuals and usually arise from the aorta above or below, mostly below the main renal artery and follow it to the renal hilum.¹ Dhar and Lal studied the renal vasculature in 40 cadavers and revealed multiple renal arteries in 20% of cadavers, unilateral anomaly was more common (15%) than the bilateral (5%).⁴ Khamanarong *et al.* conducted a study in 267 Thai cadavers observed 17% double renal arteries and 1% of triple renal arteries.⁵ Rao *et al.* have observed bilateral pre hilar multiple branching of renal arteries.⁶ Bilateral additional renal arteries originating from abdominal aorta has been reported by Bayramoglu *et al.*⁷

Bordei *et al.* analyzed 272 kidneys for a study of renal vascularization and identified 54 (20%) double renal arteries and 3 (1.1%) triple renal arteries.⁸ Ozkan *et al.* demonstrated an angiographic study on 855 cases of renal arteries variation, multiple arteries in 24%, bilateral multiple arteries in 5% and early division in 8% of cases. Moreover, additional renal arteries were found in 16% of the cases on the right side and 13% of the cases on the left side.⁹

The renal artery arises from the most caudal of the lateral splanchnic arteries.¹⁰ The kidneys begin to develop in the pelvic cavity and during this time they receive blood from the neighboring vessels and, therefore, their blood supply changes sequentially as they ascend to occupy the adult position in the abdomen.^{3,10}

In our present study, we found bilateral accessory renal arteries. Right accessory renal artery reaches the lower pole of the right kidney without crossing right ureter. Left accessory renal artery arises lower than a right accessory renal artery, obliquely passing to the lower pole of left kidney by crossing left ureter may cause obstruction, leads to hydronephrosis.³ Interest in the surgical and medical aspects of accessory renal arteries has been high because of hemorrhage and loss of renal parenchyma. Kidneys with accessory renal artery have higher incidence of transplant failures than kidneys showing no variation.¹¹

CONCLUSION

Knowledge about variation is of immense importance in surgical aspects such as renal transplantation, laparoscopic nephrectomy, renovascular anastomoses, pyelolithotomy, and porto-renal shunts. It is also useful for radiologists performing various endourologic procedures and interventional techniques. Variation of bilateral accessory renal vessels prevents the inadvertent damage to them during renal surgeries, especially in transplantation. They may be mistaken for capsular arteries or aberrant

arteries, and inadequate ligation of these vessels may lead to hemorrhage. Hence, the possibility of this variation should be borne in mind before surgical and radiological interventions.

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