

Case Report

BILATERAL DUPLICATION OF RENAL ARTERIES

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ABSTRACT

Routine dissection of a male cadaver revealed the presence of bilateral double renal arteries. On the right side the accessory renal artery originated from the abdominal aorta just above the main renal artery. On the left side the accessory renal artery originated from the abdominal aorta about 1 cm above the main renal artery. Knowledge of the variations of renal vascular anatomy has importance in exploration and treatment of renal trauma, renal transplantation, renal artery embolization, surgery for abdominal aortic aneurysm and conservative or radical renal surgery.

KEYWORDS: Bilateral, Double renal artery and Accessory renal artery.

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INTRODUCTION

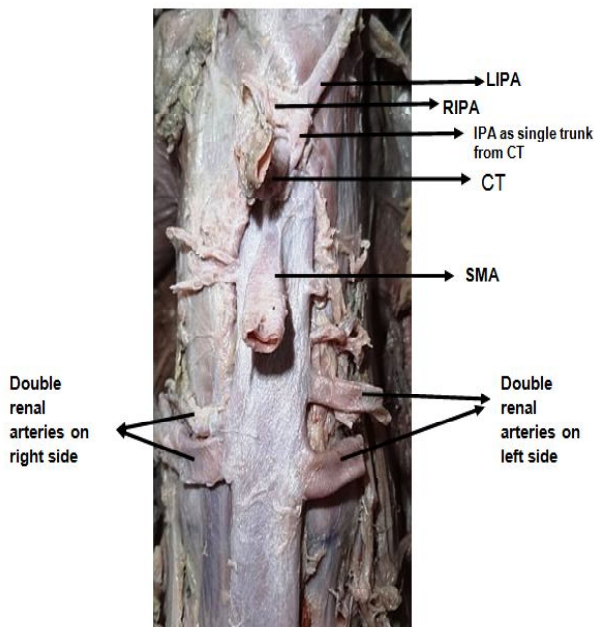
The renal arteries arise on each side from the abdominal aorta below the origin of superior mesenteric artery. Near the hilum of the kidney, the renal artery divides into an anterior and posterior branch, which in turn divides into number of segmental arteries supplying the different renal segments. 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 [1]. Numerous reports have appeared in literature describing variations in renal vascular anatomy. Knowledge of the variations of renal vascular anatomy has importance in exploration and treatment of renal trauma, renal transplantation, renovascular hypertension, renal artery embolization, angioplasty or vascular reconstruction for congenital and acquired lesions, surgery for abdominal aortic aneurysm

and conservative or radical renal surgery [2].

The objective of this case report and is to bring awareness to clinicians about the variations in the blood supply of the kidney especially to those who are performing invasive procedures and vascular surgeries on kidney.

CASE REPORT

During routine dissection of a 50 year old cadaver, bilateral double renal arteries were noticed. On the right side, the main renal artery arose from the abdominal aorta; the accessory renal artery arose from the abdominal aorta just above the main renal artery. On the left side also the main renal artery and accessory renal arteries both arose from the abdominal aorta; accessory renal artery arising about 1 cm above the main renal artery. (Fig. 1)

Fig. 1: Bilateral Double renal artery.

CT = celiac trunk.

SMA = superior mesenteric artery.

IPA = inferior phrenic artery.

RIPA = right inferior phrenic artery.

LIPA = left inferior phrenic artery.

On the right side the accessory renal artery was 4 mm in diameter 3cm in length and originated from the abdominal aorta laterally. On the left side the accessory renal artery was 6mm in diameter and 4cm in length and originated from the abdominal aorta laterally.

The right and left kidneys, the ureters and renal veins were normal.

DISCUSSION

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. Multiple renal arteries are unilateral in approximately 30% of patients and bilateral in approximately 10%. Accessory renal arteries usually arise from the aorta or iliac arteries anywhere from the level of T11 to the level of L4 vertebra. In rare cases, they can arise from the lower thoracic aorta or from lumbar or mesenteric arteries. Usually, the accessory artery courses into the renal hilum to perfuse the upper or lower renal poles. Accessory vessels to the polar regions are usually smaller than accessory hilar renal arteries, which are typically equal in size to a single renal artery [3].

Initially the metanephric kidneys (primordial permanent kidneys) lie close to each other in the pelvis, ventral to the sacrum. As the abdomen and pelvis grow, the kidneys gradually come to lie in the abdomen and move apart. During the changes in kidney position, they receive their blood supply from vessels that are close to them. Initially the renal arteries are branches of the common iliac arteries, then the distal end of aorta and when kidneys are located at a higher level, they receive new branches from the aorta. Normally the caudal renal vessels undergo involution and disappear. The kidneys receive their most cranial arterial branches from the abdominal aorta; these branches become the permanent renal arteries.

The common variations in blood supply to the kidneys reflecting the manner in which the blood supply continually changes during embryonic and early foetal life. Approximately 25% of adult kidneys have 2 to 4 renal arteries. Accessory renal arteries usually arise from the abdominal aorta superior or inferior to the main renal artery and follow the main renal artery to the hilum of the kidney. Accessory renal arteries may also enter the kidney directly, usually into the superior or inferior poles of the kidney.

It is important to be aware that accessory renal arteries are end arteries; consequently, if an accessory artery is damaged or ligated, the part of kidney supplied by it will become ischemic. Accessory renal arteries are approximately twice as common as accessory renal veins [4].

In recent years, interest in the surgical and medical aspects of accessory renal arteries has been high. One has to keep in mind that transplanting a kidney with accessory renal arteries has several theoretical disadvantages – acute tubular necrosis and rejection episodes, decreased graft function, and prolonged hospitalization [5].

Bergman et.al. observed double renal and testicular arteries in a well-developed 69-year-old Caucasian male. The right kidney had two renal arteries, one at its usual midorgan(hilar) position and one inferior polar. One testicular artery arose from the mid-point of the usual renal artery. The second testicular artery arose from the inferior polar renal artery near its origin

from the abdominal aorta [6]. Rusu reported bilateral double renal arteries on the right side as superior hilar and inferior hilar renal arteries and on the left side as superior hilar and inferior polar renal arteries. All these renal arteries emerged from the abdominal aorta, as in our case [7]. Bayramoglu et al. reported a variant which consisted of bilateral additional renal arteries originating from the abdominal aorta and an additional right renal vein accompanying the additional right renal artery. These anomalies were associated with unrotated kidneys with extrarenal calices and pelvis. All the additional vessels were located posterior to the ureter with a close relationship to the ureteropelvic junction on the right side [8]. Bulic et al. reported that the right kidney received two renal arteries from the aorta that were similar in diameter, both entering through the hilum. The left kidney had three arteries originating from the aorta, one at its usual hilar position and two entering the renal cortex at its upper and lower poles. The upper pole of the left kidney also gave rise to an additional tributary of the renal vein [9]. Gupta et al. reported certain variations in renal vasculature. The right kidney was well lobulated and measured 11 x 5 x 3 cm. It was supplied by three renal arteries and was drained by two renal veins. The left kidney measured 10 x 6.5 x 4 cm. The hilum was 4 cm wide. Well-defined lobules were seen. There were two renal arteries on left side [10].

Satyapal et al. have reported differences in the incidence of accessory renal arteries according to sex and ethnic origin (Males 28.0%, Females 16.4%, African 31.1%; Indian 13.5%; White 30.9% and "coloured" 18.5%.) [11].

CONCLUSION

The accessory renal arteries have an embryological basis and the knowledge of the variations of renal vascular anatomy has importance in exploration and treatment of renal trauma, renal transplantation, renal artery embolization, surgery for abdominal aortic aneurysm and conservative or radical renal surgery.

Conflicts of Interests: None

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