



## A case report: double renal arteries

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Patel SHASHIKALA +  
Wanjari ANJALI  
Naik ANSHUMAN  
Deshpande JAYSHREE

Department of Anatomy, Jawaharlal Nehru Medical College, Sawangi (Meghe) Wardha, Maharashtra, INDIA.



+ Dr. Patel Shashikala, MBBS, MD  
Department of Anatomy  
Jawaharlal Nehru Medical College  
Sawangi (Meghe) Wardha  
442004, M.S., INDIA.  
☎ +91 9970499132  
✉ shashi\_patel27@rediffmail.com

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### Abstract

Proper knowledge of variations of arteries supplying the kidney is essential not only to the anatomists but also to the surgeons. The present case shows unilateral left double renal artery in 54-year-old male cadaver during routine dissection of abdomen. First renal artery was arising from aorta at the level of L1 vertebra whereas second renal artery was arising from same 5 cm below it. Details are discussed.

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**Key words** [kidney] [renal artery] [anatomical variation] [double] [unilateral]

### Introduction

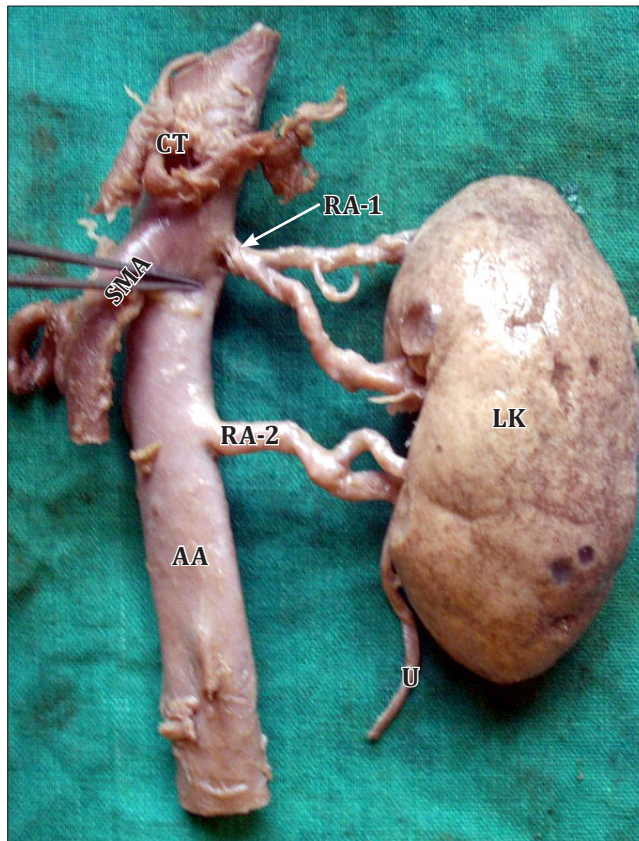
The renal arteries usually arise from the anterolateral or lateral aspect of the abdominal aorta just below the origin of the superior mesenteric artery [1]. Near the hilum of the kidney, each renal artery divides into anterior and posterior branch, which in turn divides into a number of segmental arteries supplying the different renal segments [2]. Classically, a single renal artery supplies each kidney [3]. Among renal morphological variations, those most often encountered are variations in the number of the renal arteries, of which double renal arteries are the most frequent [4]. Explanation for individual or combined variations of renal arteries had been related to the embryological development of vessels from the lateral mesonephric branches of the dorsal aorta [5]. 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 [6]. The objective of this 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.

### Case Report

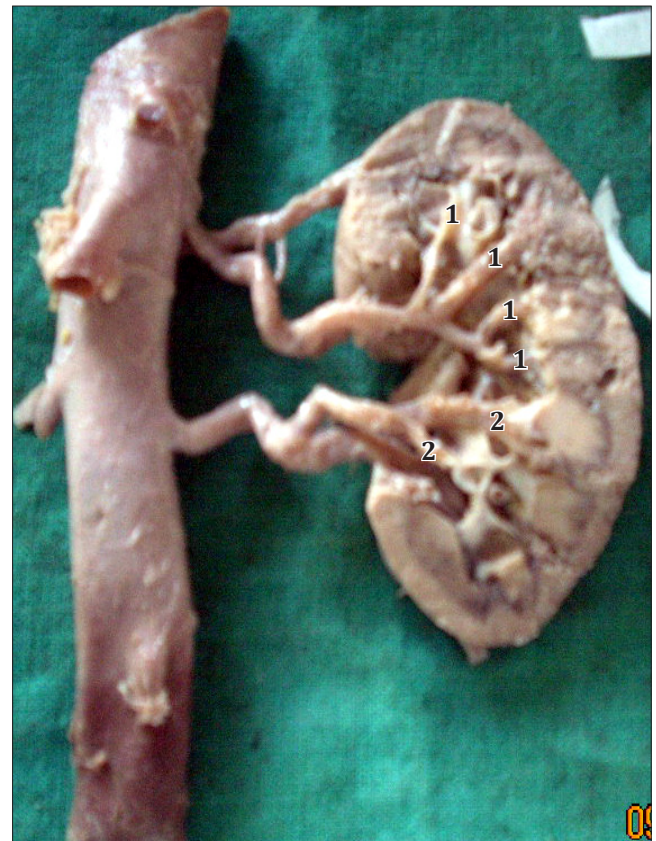
The case showed unilateral left double renal artery in 54-year-old male cadaver during routine dissection of abdomen in Department of Anatomy Jawaharlal Nehru Medical College Sawangi (Meghe) Wardha. First renal artery (RA) arose from aorta at the level of L1 vertebra, whereas 2nd renal artery arose from same 5 cm below to the first one. Both RA ran laterally and entered the kidney through the hilum with their anterior and posterior divisions. One branch (superior polar artery) of 1st renal artery arose from 0.5 cm away from main origin, ran supero-laterally to reach the upper pole of the kidney and supplied it. Anterior division of 1st RA divided into 4 segmental arteries (1 apical, 1 upper, 2 middle) having intrarenal course, whereas 2nd RA gave 2 segmental arteries (1 middle and 1 lower). Posterior division of 1st RA gave 2 (apical) whereas that of 2nd gave 6 (2 upper, 2 middle, 2 lower) segmental arteries.

### Discussion

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 [7]. The nomenclature of the variations of the renal arteries is still not clear, as different authors described them as additional, accessory, hilar, inferior and



**Figure 1.** Anterior view of left kidney showing double renal artery. (RA-1: 1st renal artery; RA-2: 2nd renal artery; LK: left kidney; U: ureter; CT: coeliac trunk; SMA: superior mesenteric artery; AA: abdominal aorta)



**Figure 2.** Section of left kidney showing course of anterior division of segmental artery. (1: segmental branches of 1st renal artery; 2: segmental branches of 2nd renal artery)

superior polar arteries. We named our renal arteries as double renal arteries [1]. Double renal arteries usually arise from the abdominal aorta, that entered the kidney through the hilum, the one with a larger caliber and thus supplying a larger renal territory, was designated the main renal artery and the other as the hilar supplementary renal artery [4]. In recent years, interest in the surgical and medical aspects of double renal arteries has been high because during renal surgical procedures, besides hemorrhage and loss of renal parenchyma, arterial lesions may induce segmental ischemia followed by hypertension. The presence of double renal arteries increases the complexity of renal transplantation; kidneys with double arterial supply being involved in a higher percentage of transplant failures than kidneys showing no variation [4].

Ashken stated that the incidence of double renal arteries in hypertensive subjects was 40%, compared with 20% of normotensive subjects [8].

Our results are quite similar with those of Bergman et al. and Bulic et al. [9, 10]. 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 [9]. Bulic et al. reported a right kidney receiving two renal arteries from the aorta that were similar in diameter, both entering through the hilum [10]. Satyapal et al. described double renal arteries in 31.3% of the African population in their study, 30.9% of the white population, 18.5% of the half-caste population and 13.5% of the Indian population [11]. Rusu reported bilateral doubled 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 [12]. Bordei et al. found 54 double renal arteries originating from the aorta in 272 kidneys (20%); six of them were bilateral (2,2%) [4].

With the increasing demand for kidney transplantation, living donor grafts has become the major source for maintaining the donor pool, and successful allograft with double arteries has become a necessity. Nevertheless, to plan the adequate surgical procedure and to avoid any vascular complication, arteriography should be performed prior to every nephrectomy [3]. The variations described in the current observation present a unique pattern of congenital renal vascular variants having surgical and radiological importance.

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**Figure 3.** Section of left kidney showing course of posterior division of segmental artery. (1: segmental branches of 1st renal artery; 2: segmental branches of 2nd renal artery)

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