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# BILATERAL VARIATION OF RENAL VESSELS WITH ITS CLINICAL SIGNIFICANCE-A CASE REPORT

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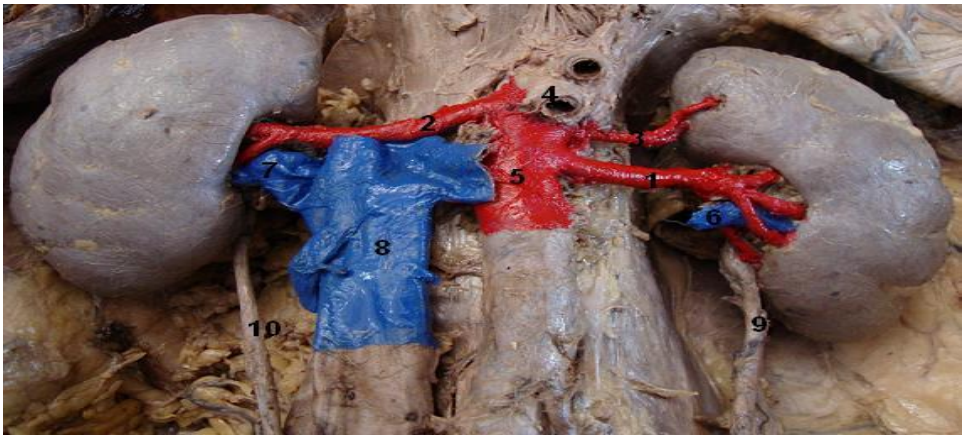
## ABSTRACT
In recent years, use of renal transplant surgeries, laparoscopic surgeries, various radiological and surgical procedures over kidneys are being very common. To avoid intraoperative as well as postoperative complications, surgeon should have the knowledge about the possible variations among the renal vessels. Our aim is to focus on one of such variation of renal vessels. During routine undergraduate dissection, we found a case in which variations were observed in renal vessels on both sides of 58 yr old male cadaver. Here we observed an accessory artery which entered the left kidney through the anterior surface of upper pole. Also variations were found regarding arrangement of structures at renal hilum.

**KEY WORDS:** Accessory renal artery, Variations, Renal transplant.

## INTRODUCTION
Abdominal aorta gives two renal arteries from its lateral aspect just below the emergence of superior mesenteric artery. The length of the right renal artery is more and its position is slightly higher than the left one. Approximately 20% of the cardiac output was taken by paired renal arteries to supply the kidneys. After the origin of renal arteries from abdominal aorta, both arteries cross the respective crus of diaphragm by making right angle to the aorta. In approximately 70% of individuals single renal artery is observed to supply each kidney. There may be variable level of origin, caliber, and obliquity of renal arteries. Each renal artery, near the hilum, divides into two divisions, anterior and posterior. Anterior division gives four segmental arteries as apical, superior, middle and inferior. While posterior division gives posterior segmental artery. [1]

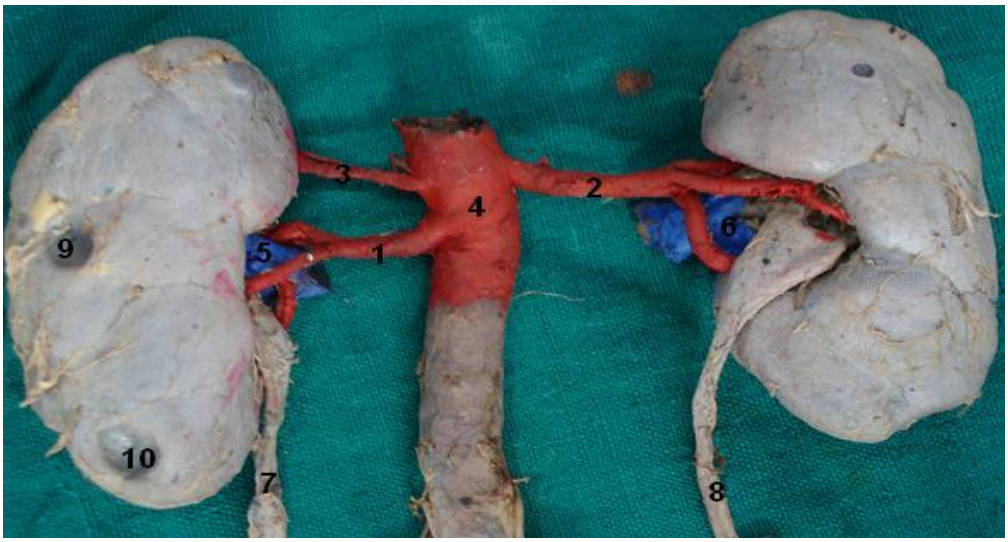
While performing radiological interventions, renal replacement therapy including renal transplantations and many surgical procedures, we come across most of these variations. All these variations must be documented because of its surgical and therapeutic utility.

## CASE REPORT
While performing dissection of a 58 yr old male cadaver as per the Cunningham's dissection manure for undergraduate teaching and learning, we noticed an accessory renal artery which arose from the left side of the abdominal aorta, just below the emergence of superior mesenteric artery. This accessory renal artery ran above and parallel to the left renal artery. On reaching the upper pole of left kidney, this accessory renal artery bifurcated and entered the upper pole of left kidney from its anterior surface [photograph 1].




**Photograph 1 –kidneys in situ: Anterior view** [1 Left renal artery, 2 Right renal artery, 3 Left accessory renal artery, 4 Superior mesenteric artery, 5 Abdominal aorta, 6 Left renal vein, 7 Right renal vein, 8 Inferior vena cava, 9 Left Ureter, 10 Right Ureter]

We also observed altered relationship of structures at the renal hilum. The arrangement of structures at the renal hilum from anterior to posterior was renal artery, renal vein and renal pelvis. This was observed bilaterally. Renal arteries divided as usual into anterior and posterior divisions. Anterior division divided into four segmental branches as usual while posterior division continued as posterior segmental artery. We also found two cystic lesions of about 1cm on the posterior surface of left kidney [photograph 2].




**Photograph 2 –kidneys dissected out and removed from the body of cadaver : Posterior view** [1 Left renal artery, 2 Right renal artery, 3 Left accessory renal artery, 4 Abdominal aorta, 5 Left renal vein, 6 Right renal vein, 7 Left Ureter, 8 Right Ureter, 9 &10 cysts on posterior surface of left kidney]

**DISCUSSION**

As the kidney ascends from pelvic to lumbar region, they receive their vascular supply from the nearby vessels. Previously common iliac arteries give renal arteries. Later on, renal arteries arises from distal end of aorta and as the kidneys go at a higher level, new branches arise from the aorta to supply it. There occurs involution and disappearance of caudal branches. At 9$^{th}$ week, kidneys come into contact with the suprarenal glands and it leads to the confirmation of site of kidneys. [2]

During embryonic and early foetal life, there occurs continuous change in the blood supply of kidney which leads to vascular variations. Two or four renal arteries may be observed in approximately 25% of adult kidneys. These are called accessory or supernumerary renal arteries. These arise from the aorta either superior or inferior to the main renal artery. These accessory renal arteries may enter the kidney either through the hilum of kidney following main renal artery or it may enter through superior or inferior poles. This accessory renal artery entering through the inferior pole of kidney may pass anterior to the Ureter and may obstruct it, leading to dilatation of renal pelvis and calices with urine called hydronephrosis. [2]

IIke Ali et al (2009) reported a bilateral double renal artery which was associated with testicular arteries double on the right side. [3] Chavan et al (2010) observed variations in renal vascular pattern. Only three blood

vessels were found to supply the right kidney as upper, middle and lower. They also observed lobulated left kidney showing two aberrant vessels, one entering from its upper pole and other from its lower pole. [4]

Some authors reported double renal arteries in left kidney and triple renal arteries in right kidney. Two renal arteries arose from lateral side and one from anterior aspect of the abdominal aorta in right kidney. In left kidney, one renal artery originated from the lateral side and one from the anterior aspect of abdominal aorta. [5] Another study was performed on fifty cadavers showing multiple branching of renal arteries which was prehilar in 11.66% cases. Other variations were renal artery duplication in 8.33% cases and superior polar arteries in 6.66% cases. [6]

Another author found a common stump for normal right renal artery and aberrant right renal artery which originated from abdominal aorta at the level of L1 vertebra. Aberrant right renal artery was above and parallel to normal right renal artery entering the upper pole of right kidney from its anterior surface. [7]

Teli and Kothandaraman (2012) reported multiple prehilar renal arteries branching as well as multiple tributaries which joined to form renal vein. Thus it leads to formation of loop around the Ureter. Thickening and dilatation of both the ureters were observed along the whole length. All these changes were bilateral. [8]

When the study was carried out on forty two formalin fixed cadavers, single renal artery was observed in 42.9% cases on right side and 47.6% cases on left side all these originated from abdominal aorta. While multiple renal arteries which originated from abdominal aorta were found in 57.1% cases on right side and 52.4% cases on left side. Double hilar arteries, three hilar arteries, one hilar and one superior polar artery and one hilar with an inferior polar artery, all these variations were included in multiple renal arteries. [9]

The main renal artery having diameter less than 4.15mm shows the presence of additional renal arteries. Whereas additional renal arteries do not exists in kidney presenting main renal artery diameter more than 5.5mm. Thus the diameter of renal artery may be one of the important factors to determine the existence of additional renal arteries. [10]
While performing any surgical intervention on kidney, we should be aware that since accessory renal arteries are end arteries if they are damaged or ligated, there may occur ischemic necrosis of that part of kidney. [2]

## CONCLUSION

Variations in renal vessels are not uncommon. Day by day renal transplantation surgeries are increasing. To fulfill the need, allograft with multiple arteries has become a necessity. But the risk of complications with allograft having single renal artery is very minimal as compared to that with multiple renal arteries. Thus before planning any surgical procedures on kidney and to cut off any vascular complications, there is a very important role of arteriography before undergoing any nephrectomy.

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