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Unusual Origin of Right Renal Artery: A Report of Two Cases

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The knowledge of variations in origin of renal arteries at different levels of vertebra is important before the kidney transplantation, as it has technical limitation in selecting the appropriate kidney (left or right) for laparoscopic procurement. Generally both renal arteries originate from abdominal aorta at right angle below the origin of Superior Mesenteric Artery (SMA) between L1 and L2 vertebral intervertebral disc space [1]. We encountered with the unusual high origin of right renal artery before the origin of celiac artery at level of 11th and 12th thoracic vertebrae in 2 cases.

During routine pre operative assessment of live renal donor, Computed Tomographic Angiography (CTA) was performed in radio diagnosis department of our Institute. We observed an anatomic variation of origin of right renal artery before the origin of celiac artery in two cases within past 8 months. Both the donors were female.

Case 1: Donor was 26-year-old. Computed Tomographic Angiography (CTA) showed single right renal artery originated from aorta at level of the 11th thoracic vertebrae. CTA also showed that there were two left renal arteries, both originated from aorta between 1st and 2nd lumbar vertebrae and two right renal veins [Table/Fig-1].

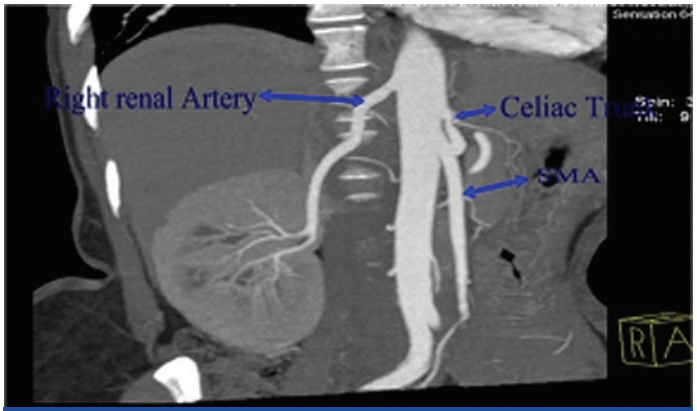
Case 2: In our second case, donor was 56-year-old. CTA showed single right renal artery originates from aorta at level of IV disc space between 11th and 12th thoracic vertebrae. It also showed that single left renal artery originated from aorta at level of 1st lumbar vertebrae [Table/Fig-2].

Rest of the abdominal organs were unremarkable in CTA of abdomen. Both the kidneys were in their usual normal position, relation and appearance in both the cases. In our both cases, right renal artery originated from aorta above the level of celiac axis and below the level of diaphragm. There were no accessory renal arteries on right side. In our first case due to high origin of right renal artery donor nephrectomy was performed on left side despite of dual renal arteries. In our second case donor is in waiting list for nephrectomy, but surgeons are planning to take left kidney due to this rare variation.

Anatomic variation of the origin of renal arteries has been broadly divided into two groups by Garti et al., (a) multiple renal arteries originating from the aorta or branches thereof; (b) ectopic origin of a single main renal artery [2,3]. Knowledge regarding embryology of renal vasculature and its structural development is necessary to understand different type of anomalies which may occur [4]. The abnormal location of renal arteries is due to various position of kidney during development. Normally kidneys developed in the pelvic cavity. At that time they receive blood from the neighbouring vessels. After taking its normal position in abdomen their blood supply also changes sequentially [5]. So variations in origin of renal arteries are explained by the development of mesonephric arteries. These arteries form a vascular net known as rete arteriosum urogenitale which supplies the both kidneys, supra renal glands and gonads on either side between the cervical sixth and lumbar third vertebrae. Gradually these arteries degenerate leaving only one mesonephric artery, and it became major arterial supply to the kidneys. So it could be possible that origin of renal artery above the celiac axis [1,6,7]. There are a large number of variants in origin of renal artery noted in literature [1,2,6-8]. But very few papers concern this variation, a renal artery arising from aorta at level of 11th and 12th thoracic vertebrae above celiac trunk.

Knowledge of anomalous origin of renal arteries serves as the road map before surgery. If surgeons have knowledge about this, they can minimize the trauma to the vessels during various surgical procedure like donor nephrectomy, repair of renal artery aneurysm and endourological procedures. There are many theories regarding the origin of renal artery and knowledge regarding its

[Table/Fig-1]: Volume-rendered (VRT) coronal image of computed tomographic angiography of abdominal aorta shows high origin of right renal artery at level of 11th thoracic vertebrae.



[Table/Fig-2]: Thick Maximum Intensity Projection (MIP) coronal image of computed tomographic angiography of abdominal aorta shows high origin of right renal artery above the origin of celiac trunk and below the level of diaphragm.

origin has major implications in the field of transplant surgery and interventional radiology. In future there will be more similar reports will be reported as more use of non invasive imaging.

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