

ACCESSORY RENAL ARTERY: A CASE REPORT

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ABSTRACT

The present case was found during routine dissection in the Anatomy Department of RIMS Ranchi. Usually kidney is supplied by one renal artery and drained by one renal vein. But here left kidney received three renal arteries, all of which took their origin from abdominal aorta directly. 1st artery (LRA1) arose from the anterolateral border of the abdominal aorta. Immediately after its origin it gave left inferior suprarenal artery and passed towards hilum. Inside hilum it turned downward with a tortuous course and supplied anterior segment. 2nd branch (LRA2) took origin from posterolateral border of abdominal aorta and passed posteriorly where it gave two segmental branches LRA2b1 and LRA2b2 just before hilum. 3rd branch (LRA3) originated from anterolateral border of abdominal aorta. It gave one capsular branch and then continued towards inferior segment.

KEYWORDS : Renal Artery, Accessory Renal Arteries, abdominal Aorta, Hilum Of The Kidney

Introduction

Anatomical variations in the origin of arteries from abdominal aorta are very common. Most frequently the variations are shown by the celiac trunk, renal arteries and gonadal arteries. Renal artery which supplies kidney arises normally as a single branch from the lateral aspect of abdominal aorta. Its origin is just below the origin of the superior mesenteric artery. At the medial border of each kidney there is an area known as the hilum, where the renal artery enters and the renal vein leaves the kidney. There are many variations in level of origin, calibre, obliquity and precise relations of the renal artery with neighbouring structures. But the most common variation is the presence of an accessory renal artery, occurring in approximately 30% of cases.¹ Accessory renal arteries usually arise from the aorta superior or inferior (most commonly inferior) the main renal artery and follow it to the renal hilum.

Each renal artery after giving off one or more inferior suprarenal arteries, and branches to the ureter, perinephric tissue, renal capsule, and the pelvis, divides into an anterior and a posterior division. These divisions further divide into segmental arteries supplying the renal vascular segments. It was Graves (1954) who described first time about five vascular segments of renal parenchyma supplied by five segmental arteries.² He also explained that these are the end arteries and so there is no collateral circulation between segmental arteries. Accessory vessels to the inferior pole has been found crossing anterior to the ureter and have been incriminated as obstructing the ureter, causing hydronephrosis. Involvement of accessory renal artery in causation of such complication creates a concern for the clinicians.

Kidney transplantation is a permanent and safe treatment for patients with chronic kidney failure. However, the presence of supernumerary renal arteries increases the complexity of the procedure of kidney transplantation.³ The existence of accessory renal arteries is a challenge for the surgeons and urology interventionalists, performing the kidney transplantation, segmental and reconstructive surgeries, since each renal artery is a terminal blood vessel and its injury causes segmental ischemia with delayed hypertension and leads to a direct link between essential hypertension and the presence of supernumerary renal arteries, without the existence of other pathological changes.^{4,5}

Case report

During routine dissection procedure on the posterior abdominal wall being performed by the undergraduate students in department of Anatomy, RIMS Ranchi, an uncommon vascular variation was found. Three arteries were noticed arising directly from the abdominal aorta on left side and passing towards the left kidney in an adult female cadaver (age unknown) at the level of 1st lumbar vertebra. Right kidney of that cadaver was having a single

renal artery originating from the abdominal aorta a little above that level. Fig.1

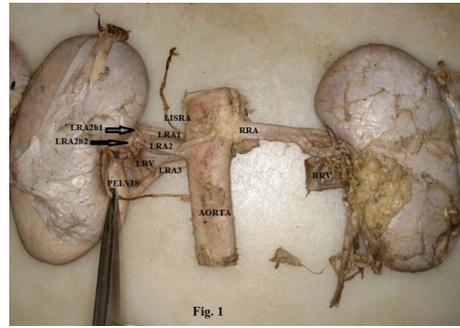


Fig.1: Posterior view of both kidneys with renal branches from aorta

1st artery (LRA1) was arising at a level little below that of right renal artery from the anterolateral border of the abdominal aorta. Immediately after its origin it gave a branch to left suprarenal gland, that is left inferior suprarenal artery (LISRA). After giving this branch it passed towards hilum. Inside the kidney it twisted upon itself, changed its direction and took an oblique downward course. It was looking tortuous throughout its course while giving branches to anterior segment. Once inside hilum it maintained its precaval position. Fig.2

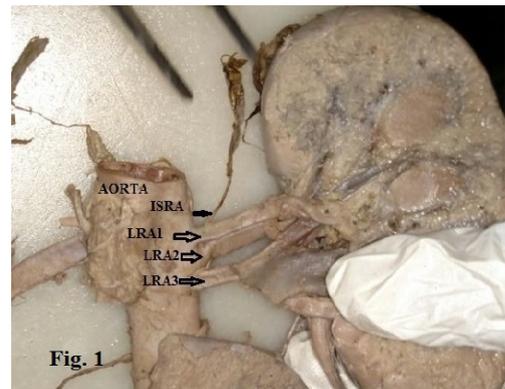


Fig.2 Coronal section through hilum showing anterior view of left kidney

The 2nd branch (LRA2) arose from the posterolateral border of abdominal aorta. Being largest in calibre among three branches it was supposed to be the main artery and it justified this by giving two segmental branches LRA2b1 & LRA2b2 just before hilum

posteriorly. Fig.1.

3rd branch (LRA3) also took origin from anterolateral border of abdominal aorta. It gave one small capsular branch almost midway to hilum from its origin and then continued towards inferior end as inferior segmental branch. During its course to inferior segment it crossed the pelvis of ureter anteriorly.

Among all three branches LRA1 and LRA3 were almost equal in calibre while LRA2 was having greater calibre than these two.

All three arteries LRA1, LRA2 and LRA3 were in posterior relation to renal vein after origin from abdominal aorta. But LRA3 while passing to inferior segment at hilum became parallel to the renal vein and in anterior relation to pelvis of ureter.

Discussion

Clinically accessory renal arteries constitute one of the most common vascular variant. Many researchers have observed and reported different presentation of the accessory renal arteries. But to the best of our review of literature we could not find any documentation showing tortuosity and change in the direction of course traversed by the segmental artery.

Abolhassan B et al., (2007)⁶ found bilateral accessory renal artery on digital subtraction angiography performed on a renal transplant donor. On right side they found two renal arteries arising from the aorta. On left side they noticed accessory renal artery supplying upper and lower pole simultaneously by replacing the upper / apical and lower segmental artery. Beata Patasi et al., (2009)⁷ reported a case with single accessory renal artery originating from right side of abdominal aorta entering lower pole of right kidney at the same point of exit of renal vein. S Bindhu et al., (2010)⁸ also described rightsided accessory renal artery arising from the abdominal aorta. He further commented on origin of testicular artery from the accessory renal artery.

Recently Babu BP et al (2014)⁹ observed three accessory renal arteries on the right side arising from abdominal aorta in a male cadaver. He further reported that the superior accessory artery was arising from aorta just above the normal renal artery while the middle and inferior arteries arose caudal to the normal renal artery. They noticed middle accessory artery giving right testicular artery during its course. One of the rare presentations of the accessory arteries include that reported by SreekanthTallapaneni et al in 2013.¹⁰ They observed an accessory renal artery arising at about 1.5 cm below the origin of the Inferior Mesenteric Artery (IMA) from the antero lateral aspect of the Aortic Bifurcation.

The possible aetiology of these variations has been explained by embryological development from the lateral mesonephric branches of the primitivedorsal aorta by Felix W. (aamesonephricae).¹¹ Sinnatamby CS. (2006)¹² proclaim the Persistence of fetal renal vessels as a cause of accessory vessels when it is polar in type. Persistence of lateral splanchnic arteries in the form of accessory renal arteries maybe attributed to misexpression of any of these transcription factors and signalling molecules such as GF, TGF β , PDGF, SHH and EphB2.¹³

Incidence of reported accessory renal arteries has a wide range between 8.7% and 75.7%, and they can cause hydronephrosis by compressing the ureter.¹⁴

So knowledge and awareness of these possible variations and anomalies of the renal accessory arteries is not necessary for safe and effective surgical management during renal transplantation, repair of abdominal aorta aneurysm, urological procedures and angiographic interventions only but is equally important for managing cases of hydronephrosis.

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