CASE REPORT

Aberrant supra-diaphragmatic renal artery

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Received: December 4, 2014 **Accepted:** December 24, 2014 **Online Published:** December 30, 2014
DOI: 10.5430/jbgc.v5n1p20 **URL:** http://dx.doi.org/10.5430/jbgc.v5n1p20

Abstract

We present a rare case of aberrant supra-diaphragmatic renal artery originates at the level of T12 piercing the right hemi diaphragm and entering the hilum of the right kidney. Variations in renal arteries are quite common, and it is very important for renal interventionists to have a good knowledge about the possibility of anatomical variations in renal arteries. The most common reported variations are early division and accessory vessels, however, other rare variations like higher origin of renal arteries, as reported in this case report, should also be taken in consideration. The importance of these variations arise from the increase number of renal interventional procedures performed by interventional radiologists, urologists and general surgeons; in interventional radiology it is very important to know the possibility of higher origin renal artery in order to cover this vessel when performing conventional angiography. It is also important for urologists when performing renal transplant. The embryology of renal arteries dictates the possibility of these variations; theoretically, renal arteries can arise from the aorta along the whole length of rete arteriosum urogenitale which extends from cervical 6th to lumbar 3rd vertebra.

Key Words: Renal, Artery, Aberrant, Supra-diaphragmatic

1 Introduction

Variations of renal artery origin are very common; these are divided mainly into two main categories: early division and extra renal artery.[1] The classic anatomy, which is seen in up to 70% of patients, is a single renal artery supplying each kidney[2] arising directly from the aorta at a right angle, with only few millimeters difference between the origin of the right and left renal arteries.[3] These arteries arise at the level of L1-L2 vertebral body, inferior to the origin of inferior mesenteric artery.[4] Accessory renal artery is seen in about 30% of patients.[1,2] Awareness of the origin of renal arteries is very important due the increase number of renal interventional procedures performed by interventional urologists and interventional radiologists.[5] So mapping of renal arteries and reporting variations from classic anatomy is of great value to all renal invasive interventionist.

2 Case report

CT angiography of abdomen and pelvis of a 74 year old man showed aberrant right renal artery arising above the diaphragm at the level of T12, piercing the diaphragm and entering the renal hilum. This CT angiography was done to evaluate renal arteries as part of work up plan to identify secondary causes of hypertension in this patient (see Figures 1, 2, 3). It is not known, as of yet, if this anomaly is the cause of hypertension.

3 Discussion

The embryological development of mesonephric arteries dictates variations in renal arteries, these vessels extends from cervical 6th to lumbar 3rd vertebra, in an area called rete arteriosum urogenitale. They supply kidneys, adrenals and gonads.[1] These vessels degenerate overtime leaving

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only one mesonephric artery supplying kidney, defects in this process can result in renal artery variations in the form of accessory or aberrant renal artery.[1] Most common renal artery variations are illustrated in Table 1 and 2.

Table 1: Distribution of renal arteries according to the level of origin[1]

	T12-L1 (%)	L1 (%)	L1-L2 (%)	L2 (%)	L2-L3 (%)	L3 (%)	L3-L4 (%)	L4 (%)	Other (%)
Right MRA	0.4	43	23	32	0.6	0.1	0.0	0.2	0.8
Left MRA	0.2	37	22	38	1	0.5	0.2	0.0	0.7
Right ERA	0.0	31	20	30	2	8	4	5	0.7
Left ERA	0.0	25	22	34	5	8	1	5	2

Note. MRA: main renal artery; ERA: extra renal artery

Table 2: Distribution of renal arteries on the right and left sides according to quantity[1]

	None (%)	One (%)	Two (%)	Three (%)	Four (%)
Right RA number	7 (0.8%)	713 (83%)	126 (15%)	9 (1%)	0 (0%)
Left RA number	6 (0.7%)	736 (86%)	105 (12%)	6 (0.7%)	2 (0.2%)

Note. RA: renal artery

Figure 1: Coronal reformatted CT angiography image shows supra-diaphragmatic renal artery arising from the aorta at the level of T12, piercing the diaphragm and entering right renal hilum.

Renal arteries are the most common major trunk arteries to undergo variations.[2] These variations are important to renal interventions and they are important to understand flow dynamics and pathogenesis affecting these vessels.

To our knowledge this is the first time to report a case of aberrant supra-diaphragmatic renal artery. Interventional radiologists are advised to know about this possibility when performing routine angiography which might not include this aberrant vessel.

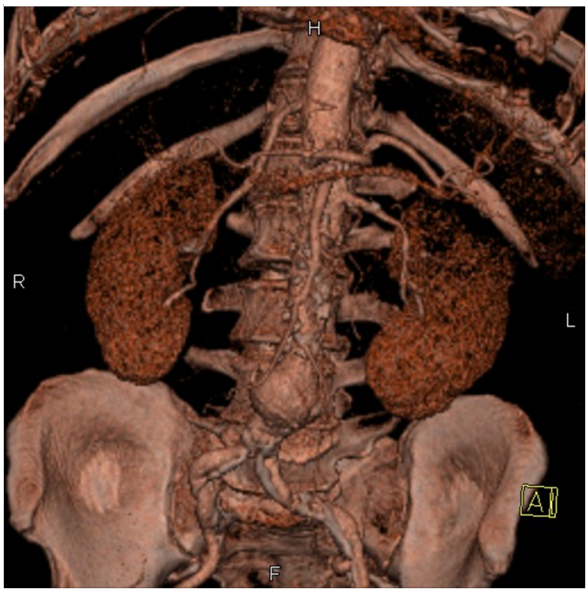

Figure 2: Volume-rendered 3D CT image shows right aberrant renal artery.

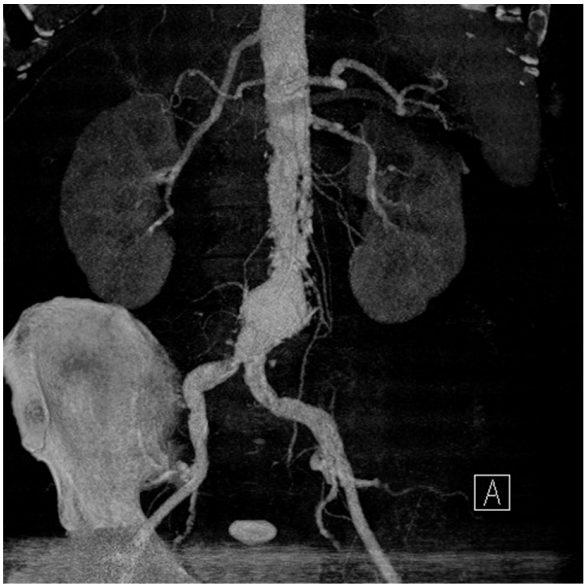

Figure 3: 3D reconstructed CT image (oblique view) shows right aberrant renal artery.

4 Conclusion

Understanding different anatomical vitiations of renal arteries is of great benefit for renal interventionists and other health care providers.

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