

Presence of accessory renal artery and kinking of aorta due to the abnormal origin of renal arteries

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Citation

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Abstract

A sound knowledge of variations of blood vessels is important during operative, diagnostic and endovascular procedures in the abdomen. This report describes the kinking of the aorta due to the variations in the origin of the renal arteries. The variation was found during routine dissection in an approximately 55 years old male cadaver. The cadaver was healthy and it did not have any other anomalies in the other parts of the body. The right and left renal arteries took their origin from the anterior aspect of the aorta just below the origin of superior mesenteric artery. There was a kink in the abdominal aorta above the level of the origin of these arteries. The cadaver also showed the presence of an accessory renal artery which took origin from the abdominal aorta, an inch above its bifurcation and entered the left kidney through lower part of its anterior surface. A good knowledge of vascular variations in relation to the kidneys is very important in kidney transplantation surgery.

INTRODUCTION

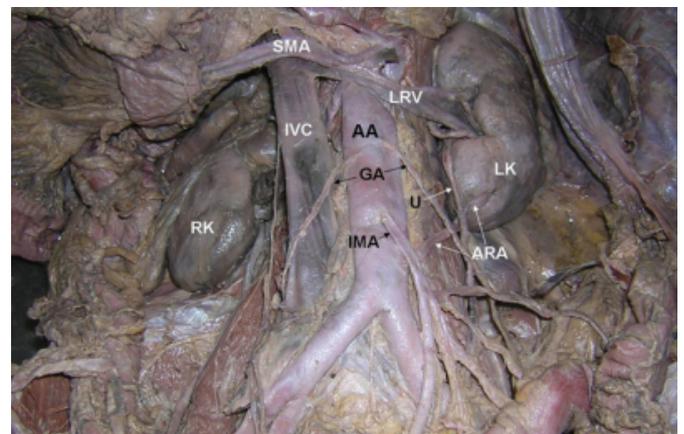
Renal arteries are a pair of lateral branches from abdominal aorta. Normally each kidney receives one renal artery. However, accessory renal arteries can also exist. The normal renal arteries enter the kidney through its hilum where as the accessory renal arteries might enter the renal artery through the hilum or through the surfaces of the kidney. A knowledge of the variations in the renal arteries is important for urologists, radiologists and surgeons in general. The objective of the case report is to bring awareness to clinicians about the variations in the blood supply of the kidney. This report may also be useful to clinicians performing invasive techniques and vascular surgeries.

CASE REPORT

During the gross anatomy dissection of the abdomen of an approximately 55 year old male cadaver, we observed variations in the renal arteries (Figs 1 and 2). The renal arteries originated from the anterior surface of aorta just below the origin of the superior mesenteric artery (Fig. 2.) The aorta showed a kink between the origin of celiac and superior mesenteric arteries (Fig. 2). An accessory renal artery originated from the aorta, just about an inch above its bifurcation. This artery passed upwards and to the left deep to the inferior mesenteric artery and left ureter and entered the left kidney through the lower part of its anterior surface.

Figure 1

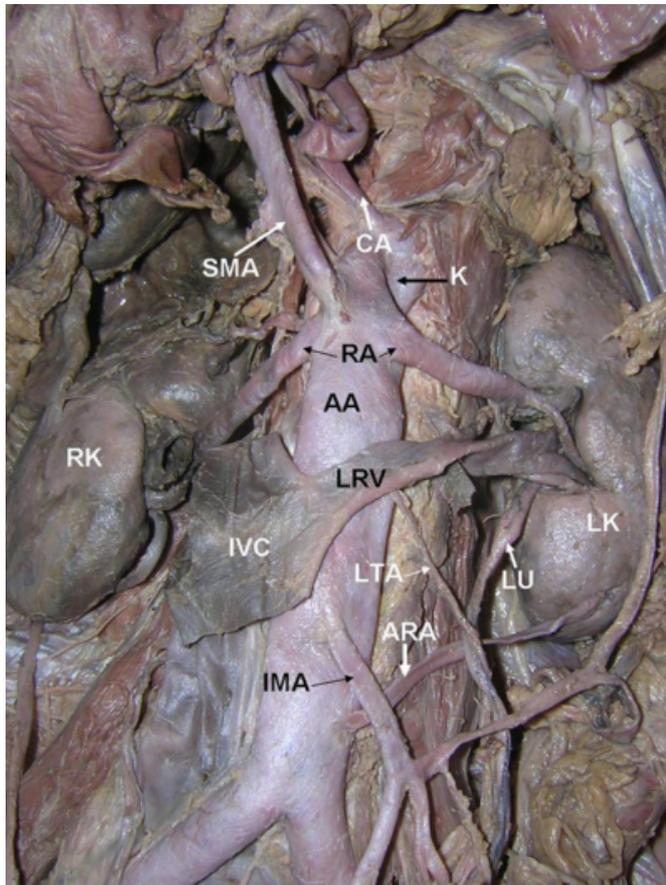
Figure 1: Dissection showing the major vessels of the abdomen.



SMA – superior mesenteric artery, LRV – left renal vein, IVC – inferior vena cava, AA – abdominal aorta, GA – gonadal arteries, RK – right kidney, LK – left kidney, IMA – inferior mesenteric artery, ARA – accessory renal artery, U – ureter.

Figure 2

Figure 2: Dissection showing the abnormal origin of the renal arteries and the kink in the aorta, With the inferior vena cava reflected downwards.



SMA – superior mesenteric artery, CA – celiac artery, K – kink in the aorta, RA – renal arteries, AA – abdominal aorta, IVC – inferior vena cava, LRV- left renal vein, RK – right kidney, LK – left kidney, LTA – left testicular artery, LU – left ureter, IMA – inferior mesenteric artery, ARA – accessory renal artery.

DISCUSSION

The renal arteries are a pair of lateral branches of abdominal aorta and they arise from aorta just below the level of origin of the superior mesenteric artery. The accessory renal arteries are also seen frequently (1,2,3). They enter the kidney either above or below the hilum. Their relations with the nearby structures can vary. Bilateral additional renal arteries originating from the abdominal aorta have been reported by Bayramoglu et al.(4). These anomalies noted by them were associated with non-rotated kidneys with extrarenal calices and pelvises. Most of the abnormalities in the renal arteries are due to the various developmental positions of kidney. (5). The kidneys begin their development in the pelvic cavity.

During further development, they ascend to their final position in the lumbar region. When the kidneys are located in the pelvis, they are supplied by the branches of internal iliac or common iliac arteries. While the kidneys ascend to lumbar region, their arterial supply also shifts from common iliac artery to the abdominal aorta. Accessory renal arteries originate from the abdominal aorta either above or below the main renal artery and reach the hilum. It is important to be aware that accessory renal arteries are end arteries; therefore, if an accessory artery is ligated or damaged, the part of kidney supplied by it is likely to become ischemic. The supernumerary arteries supplying the lower pole have been reported by the previous workers. These arteries might arise from abdominal aorta (6) or inferior mesenteric artery. (7,8) . In a study conducted by Dhar and Lal (9), accessory renal arteries were observed in 20% of the specimens. The anomaly was unilateral in 15% cases and bilateral on 5% of cases.

Kinking of the aorta is also known as pseudocoarctation, or buckling of the aorta. It is an uncommon anomaly. A case of kinking at of the abdominal aorta at the level of the renal arteries has been reported in the past. (10).

The kinking of the aorta presented here is seen just above the level of the renal artery. The kinking was probably due to the origin of the renal arteries from the anterior aspect of aorta. The origin of the left renal artery was more nearer to the anterior midline of the aorta and the artery passed to the left in front of the aorta to enter the kidney. This factor would have resulted in the kinking of the aorta above the level of renal artery due to the pull on aorta by the weight of the left kidney. The aortic kinking might decrease the blood flow to the kidneys and other pelvic organs and lower limbs. It might lead to pathological or true coarctation of aorta. The supernumerary arteries reported in the past, passed anterior to the ureter. The accessory artery that we are reporting passed posterior to the inferior mesenteric artery and ureter before entering the left kidney. This is a notable difference in our case when compared to the previously reported cases. The artery might get compressed by the inferior mesenteric artery or the cases of hydronephrosis produced by ureteric stones; consequently resulting in the vascular damage of the part of the kidney supplied by the artery.

The arterial variations, can not be ignored during the surgical procedures of the abdomen. The awareness of these variations in the origin of the renal arteries may be of utmost importance for the urologists while performing nephron-

preserving surgery, kidney transplantation, and the management of renal vascular hypertension. These variations can be confirmed preoperatively by selective angiography. The knowledge of these variations may also provide safety guidelines for endovascular procedures like therapeutic embolisation and angioplasties. The knowledge of variations reported here is very useful for radiologists, urologists and surgeons in general.

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