



Bilateral accessory renal artery and abnormal left testicular artery A case report

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Abstract:

Knowledge of the variations of renal artery has grown in importance with increasing number of renal transplants, vascular reconstructions and various surgical and radiologic techniques performed in recent years. Variations in the origin of the normal single testicular artery have been commonly reported by various authors. Proper knowledge of variations of renal and gonadal arteries is essential not only to the anatomists but also to the vascular surgeons, urologists, nephrologists and radiologists. We report the presence of bilateral accessory renal artery, discovered on routine dissection of a 70 year old male cadaver, originating from the abdominal aorta. In addition the left testicular artery originated from the left renal artery. Such vascular variations as noted in the present study have been explained in light of embryogenic development.

Key words: renal artery, accessory renal artery, testicular artery, abdominal aorta

Introduction:

Each kidney is normally supplied by a single renal artery which is a branch of abdominal aorta. The renal arteries usually arise from the anterolateral or lateral aspect of the abdominal aorta just below the origin of the superior mesenteric artery.

The testicular arteries are two long slender vessels which usually arise anteriorly from the abdominal aorta at the level of the second lumbar vertebra, a little inferior to the origin of renal arteries.

Embryologically these arteries are the lateral splanchnic branches of abdominal aorta. Certain

vascular and developmental anomalies of kidneys can be associated with variations in the origin and course of the gonadal arteries.

Case History:

During the gross anatomy dissection of abdomen of a 70-year old formalin fixed male cadaver we observed multiple variations in the branching pattern of abdominal aorta. Both kidneys received two (superior and inferior) renal arteries which took origin from the lateral aspect of abdominal aorta below the origin of superior mesenteric artery (Figure1).

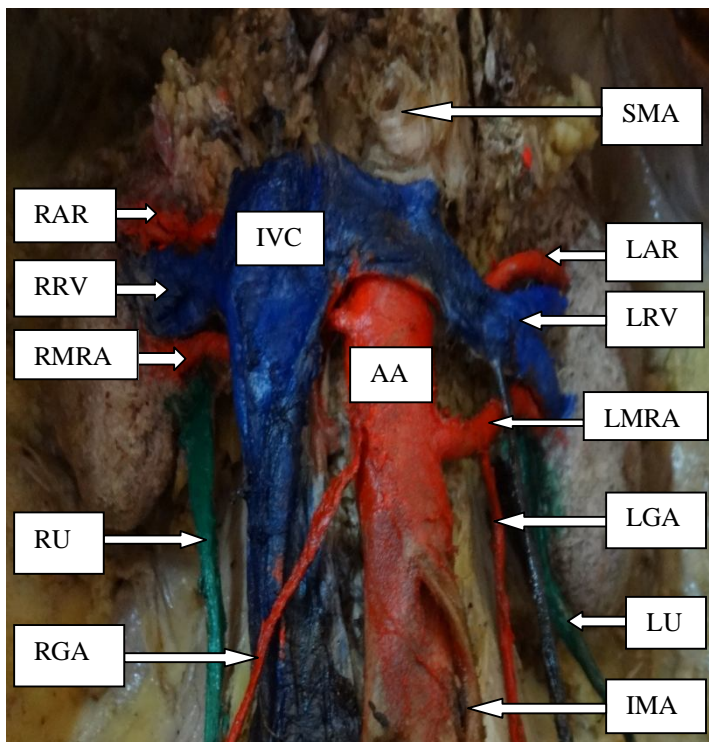


Figure 1. Variations in the branches of the abdominal aorta. SMA: superior mesenteric artery, IMA: inferior mesenteric artery, AA: abdominal aorta, IVC: inferior venacava, RARA: right accessory renal artery, LARA: left accessory renal artery, RRV: right renal vein, LRV: left renal vein, RMRA: right main renal artery, LMRA: left main renal artery, RU: right ureter, LU: left ureter, RGA: right gonadal artery, LGA: left gonadal artery

Accessory renal arteries were located superiorly and reached the upper pole of kidney bilaterally. Main renal arteries were located inferior to accessory renal artery and reached the hilum bilaterally maintaining the usual relation i.e. from before backwards- renal vein, renal artery and pelvis of ureter.

The right superior accessory renal artery arose from abdominal aorta 0.5-1cm below the origin of superior mesenteric artery, while the right main renal artery from abdominal aorta 1-1.5cm below the origin of superior mesenteric artery and 2.5-3cm above the origin of inferior mesenteric artery.

The left superior accessory renal artery arose from the abdominal aorta 1.5-2cm below the origin of superior mesenteric artery. However, the left main renal artery emerged from abdominal aorta 2.5-3cm below the origin of superior mesenteric artery and 1-1.5cm above the origin of inferior mesenteric artery.

Left testicular artery originated from left renal artery whereas the right testicular artery originated from abdominal aorta at the level of left main renal artery. (Figure1).

No other anomalies were observed in relation to the renal vasculature and morphology. The branching pattern of the abdominal aorta was otherwise normal.

Discussion:

Commonly reported variation regarding renal arterial vasculature is presence of an accessory renal artery (30% of individuals) along with the main renal artery. Accessory renal arteries usually arise from the aorta above or below the main renal artery and follow it to the renal hilum. Accessory vessels to the inferior pole cross anterior to the ureter and may, by obstructing the ureter, cause hydronephrosis. Rarely, accessory renal arteries arise from the coeliac or superior mesenteric arteries near the aortic bifurcation or from the common iliac arteries.¹ 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.² Bilateral additional renal arteries originating from the abdominal aorta have been reported by Bayramoglu et al.³

According to Dhar et al⁴ multiple (accessory) renal arteries are observed in 20 % of the specimens while unilateral anomaly (15 %) being more commonly encountered than bilateral anomaly (5 %).

Variations in the origin of the normal single testicular artery have been commonly reported by various authors. The testicular or ovarian artery may arise as a common trunk from the aorta (at the same or different levels), or one or both may arise from a renal or accessory renal artery, a suprarenal artery or other branches of aorta.⁵

Ravery et al⁶ reported that the testicular artery has a high or aberrant origin in 20% cases, in 5-6% of these cases the origin is from a main renal artery or from a supernumerary renal artery. Asala et al⁷ found that in 2.6% cases testicular arteries branched from the renal artery.

Embryological basis:

Variations of renal and gonadal vessels have an embryological basis. The developing mesonephros, metanephros, suprarenal glands and gonads are supplied by nine pairs of lateral mesonephric arteries arising from the dorsal aorta. These arteries are divided into three groups i.e. the first and second arteries, the third to fifth and the sixth to ninth arteries constitute the cranial, middle and caudal group respectively.^{8,9} The middle group gives rise to the renal arteries. Persistence of more than one artery of the middle group results in multiple renal arteries.^{8,9} The additional renal artery in our case could therefore be a result of a persistent lateral mesonephric artery from the middle group. Gonadal arteries can arise from any of these nine mesonephric arteries though they usually arise from the caudal group.⁸ In the present case, the origin of the left testicular artery from the inferior renal artery suggests the embryologic origin of this vessel from the middle group.

Conclusion:

Knowledge of the variations of the renal artery has grown in importance with increasing numbers of renal transplants, vascular reconstructions and various surgical and radiologic techniques being performed in recent years. The knowledge of these

variations could help the clinician in its prior recognition and due protection accordingly during renal surgeries. Due to the increased demand for living donor graft in renal transplants, the knowledge of such variant anatomy of the renal arteries is an important prerequisite to successful renal transplantation.¹⁰

The origin of the testicular artery from the renal artery should be noted as injury to this vessel may result in testicular infarction.¹¹ Awareness of variations of the gonadal arteries such as those presented here becomes important during surgical procedures like varicocele and undescended testes.

The anatomical knowledge of such variations may be important for academic, surgical as well as radiological procedures and the present case report is a humble effort to highlight the same.

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