An unusual origin of right testicular artery from right aberrant renal artery

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Abstract

The increasing use of invasive diagnostic and interventional procedures in cardiovascular diseases makes it important that the type and frequency of vascular variations are well documented and understood. With the advent of laparoscopic renal surgeries and donor nephrectomies, it becomes mandatory for the surgeons to understand the abnormality or variations in the renal vasculature. Otherwise renal transplant may be jeopardized by the presence of aberrant vessels as well as unusual branches arising from the renal artery. Existence of the aberrant arteries is accountable in cases of renal pathologies, radiological interventions, renal transplants, and other surgical approach on them. Therefore this case report would serve as ray of light for knowing the possible anatomical variations associated with the renal vasculature. During routine dissection we observed an unusual variation in the vascular supply to the right kidney and unusual origin of right testicular artery on the right side of a 60-year-old male cadaver. However such variation was not found on the opposite side. Patients with such variations may be asymptomatic.

Key words: renal artery, accessory renal artery, aberrant renal artery, gonadal artery, testicular artery

Introduction

The renal arteries are a pair of lateral branches arising from the abdominal aorta below the level of superior mesenteric artery at the upper lumbar level (L1-L3). The paired renal arteries take about 20% of the cardiac output to supply organ. The right renal artery is longer in its course owing to the location of the abdominal aorta more towards the left side of midline. Each renal artery divides into anterior and posterior divisions at or very close to the hilum of the kidney. Further it divides into segmental arteries to supply the respective segments of the kidney being themselves the end arteries.

Variation in the number, source, branching and course of the renal arteries are very common. These accessory renal arteries or the aberrant arteries account for about 30% of existence, while 70% owes for the normal type. Further there is a difference in terminologies related to an aberrant renal artery and an accessory renal artery. An accessory renal artery is the one that is accessory to the main artery accompanying the same towards the hilus and entering the kidney through the hilum to supply it, while the aberrant artery supplies the kidney without entering its hilum (1).

The renal artery may give rise to branches normally derived from other vessels, such as, the inferior phrenic, hepatic, middle suprarenal, gonadal, pancreatic and one or more of the lumbar arteries. Existence of the aberrant arteries is accountable in cases of renal pathologies, radiological interventions, renal transplants, and other surgical approach on them. Altered state of hemodynamic was thought of in cases of multiple arteries supplying it.

Gonadal arteries arise from the front of the abdominal aorta, a little below the origin of the renal arteries. From its origin it runs downwards and laterally on the psoas major superficial to the ureter and genitofemoral nerve, but deep to ileum on the right and colon on the left side. On the right side the artery crosses the inferior vena cava.

In the present study we reported the unusual origin of right testicular artery from the right aberrant renal

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artery and associated clinical significance of the same.

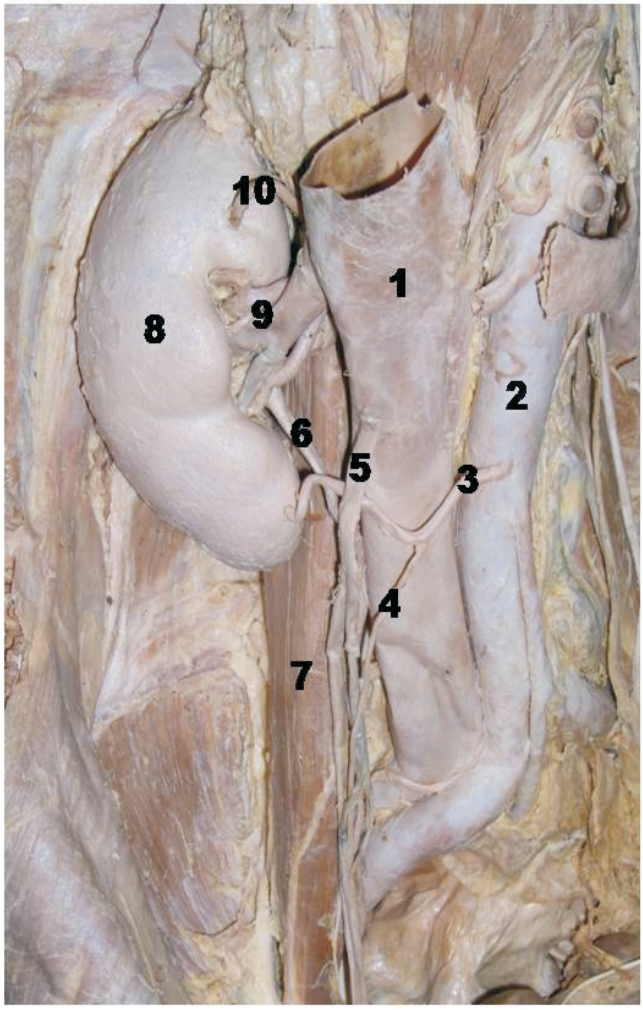
Case Report

Using conventional dissecting techniques, the posterior abdominal wall was dissected in a 60-year-old embalmed male cadaver, with a purpose of preparation of the teaching and museum anatomical specimens. The medical history of this cadaver was not available. In the present case the origin of the right testicular artery is from the right aberrant renal artery and we also found one of the branches of the normal renal artery entering the kidney from its anterior surface. The aberrant renal artery with its right testicular branch was photographed. However, such variation was not found on the opposite side of the same cadaver.

In the present case, we noticed that the aberrant right renal artery originated from the abdominal aorta, at the level of L2 vertebra, just above the origin of inferior mesenteric artery. This aberrant renal artery, from its origin was found running almost horizontally in front of inferior vena cava but behind the right testicular vein to enter the kidney along the medial border near its lower pole. The aberrant renal artery gave its unusual right testicular branch while running in front of inferior vena cava (Figure 1). Further course of the right testicular artery was normal.

Figure – 1

1. Inferior vena cava
2. Abdominal aorta
3. Aberrant renal artery
4. Right testicular artery
5. Right testicular vein
6. Right ureter
7. Right psoas major
8. Right kidney
9. Right renal vessels
10. Aberrant branch of right renal artery



Discussion

Knowledge of the existence of aberrant renal arteries is important because they may be inadvertently damaged during renal surgery and their presence must be considered in evaluating a donor kidney during renal transplantation. Persistence of certain of the cephalic mesonephros vessels, however, may result in the arterial abnormalities [2].

Different origins of the renal arteries and its frequent variations are explained in various literatures owing to the development of mesonephric arteries. These mesonephric arteries extend from C6 to L3 during the foetal development. Most cranial vessels disappear while the caudal arteries form a network, the rete arteriosum urogenitale that supplies in future the metanephros. The metanephros in future develops into adult kidney deriving its blood supply from the lowest suprarenal artery which later forms the renal artery. Persistent roots of the network form these segmental arteries of the adult kidney having variations at their point of origin. The kidney grafts with multiple arteries resulted in post transplant morbidity and graft loss following the ligation of the polar arteries. The transplantation of the kidney with the single renal artery is technically easier compared to the kidney with multiple arteries [3].

Variations in the origin and course of the renal arterial blood supply occur frequently and are of special interest to the urologist with respect to the diseases associated with it. The relevance of the aberrant arteries in systemic hypertension and urethral obstruction was established. Aberrant renal arteries occur in about 30% of the kidneys. Aberrant or accessory arteries have been of interest to the clinicians, mainly because of the possible part the vessel may play in the causation of hydronephrosis. Aberrant renal arteries are common in fused kidneys. These arteries could arise as high as inferior phrenic artery or as low as internal iliac arteries. The anomalous vessels may originate from the aorta, gonadal, common iliac, middle sacral, external or internal iliac or superior or inferior mesenteric arteries. With the advent of laparoscopic renal surgeries and donor nephrectomies, it becomes mandatory for the surgeon to understand the abnormality or variations in the renal vasculature. Otherwise renal transplant may be jeopardized by the presence of aberrant vessels. Therefore, considering the increase in incidence of the accessory and multiple renal arteries, the anatomical knowledge of such may be important for academic, surgical as well as radiological procedures and the present study is a humble effort to highlight the same [4].

Variations of the gonadal arteries are not numerous, but they are significant because of their unique placement. The aortic origin of the gonadal arteries is normal type. Two other patterns occur and they are related to renal arteries. The first type (10%) has a high aortic origin and the vessels descend, crossing ventral to the renal veins. In the second type (12%) the gonadal arteries arise from the aorta below the renal artery, ascend and arch over the ventral surface of the renal vein. In both types, on the right, the gonadal artery passes dorsal to the inferior vena cava. The variations presented may not occur in bilateral symmetry. It is important to note the relation of the gonadal arteries to the renal pedicle, especially important on the left because of the higher incidence of variation there [5].

The gonadal arteries usually arise from the anterior surface of the aorta below the renal vein, although cases have been reported of origins behind or above the renal vein. In 15% of cases, the gonadal arteries arise; either from the renal artery or from one of the branches of renal artery, or from a supernumerary renal artery. The right gonadal artery may arise from a renal artery and the left from the aorta or vice versa. More rarely, a gonadal artery can originate from suprarenal, phrenic, superior mesenteric, lumbar, common iliac or internal iliac artery. In some cases (17%), the gonadal arteries are double on one side and less commonly, they are double on both sides. The two gonadal arteries may have an aortic and a renal origin or both may have the same origin. The inferior one of double gonadal arteries is usually of aortic origin, whereas the superior one can be from either the renal artery or the aorta. Occasionally gonadal arteries arising from the aorta have two or three roots which subsequently merge into one and their origins are generally between the first and third lumbar vertebrae [6].

The developmental origins of testicular blood vessels are very complex. Nine lateral mesonephric

arteries are divided into the cranial, middle and caudal groups. One of the caudal arteries usually persists and differentiates into the definitive gonadal artery. The persistence of cranial lateral mesonephric artery results in a high origin of the gonadal artery, probably from supra renal or from a more superior aortic level. Persistence of more than one lateral mesonephric arteries result in double, triple or quadruple gonadal arteries. If the kidney ascends much higher carrying its renal vein to a higher level than origin of the gonadal artery, then the gonadal will be forced to follow an arched course around the vein [7].

Conclusion

Variations in the origin and course of the renal arterial blood supply occur frequently and are of special interest to the urologist with respect to the disease associated with it. With the advent of laparoscopic renal surgeries and donor nephrectomies, it becomes mandatory for the surgeon to understand the possible abnormalities or variations in the renal vasculature. Otherwise renal transplant may be jeopardized by the presence of aberrant renal vessels. Abnormal origin of right testicular artery is important, not only from a developmental standpoint, but also from a physiological prospective. Accessory arterial vasculature and an unusual origin and path of the testicular and renal arteries is worth knowing for its clinical applications. Therefore, considering the increase in incidence of the accessory and multiple renal arteries, the case is reported.

References

1 Standring S,. Gray's anatomy. The Anatomical Basis of Clinical Practice - 40th Ed., Edinburg, Churchill & Livingstone. 2008; 1231-1233

2 Joseph CC, Daniel K - Aberrant renal arteries – Urology, Volume II, Number 6, 1973; 623-626

3 Ugur O, Levent O, Fahri T, Osman K, Zafer K, Niha. Renal artery origins and variations: Angiographic evaluation of 855 consecutive patients. Diagnostic and interventional Radiology, 2006; 12:183-184

4 Rao TR and Rachana. Aberrant renal artery and its clinical significance: a case report. International Journal of Anatomical Variations. 2011; 4:37–39.

5 Anson BJ. Morris' Human Anatomy. 12th Ed., New York, Mc Graw-Hill Book Company. 1966; 747-748.

6 Bergman RA, Thomson SA, Afifi AK, Saadeh FA. Compendium of Anatomic Variation. Baltimore, Urban & Schwarzenberg. 1988; 83.

7 Salve VM, Ashalatha K, Sawanth S, Gajendra K. Varient origin of right testicular artery – a rare case. International Journal of Anatomical Variations. 2010; 3:22–24.

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