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Case Report

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LOBULATED MALROTATED KIDNEY WITH ABERRANT RENAL ARTERY AND HIGH DIVISION OF GENITOFEMORAL NERVE: A CASE REPORT

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ABSTRACT

Abnormalities in structure of kidney and its aberrant vascularity make the kidney non-suitable for renal transplantation. We report here a case of mal-rotated left kidney with ventrally placed hilum, presence of an aberrant renal artery passing outside the hilum along with high division of genitofemoral nerve. The kidney having lobulated ventral surface which failed to rotate from its fetal position leading to ventrally placed hilum. The hilum was oval shape allowed passage of the renal vessels in upper part and renal pelvis in lower part. The shape of the left kidney found to be more ovoid as compared to bean shape of right kidney. The combination of such multiple variations described in the current observation are unique congenital malformation having surgical, urological, and radiological implications.

KEYWORDS: Kidney abnormalities, renal arteries, hilum, malrotation

INTRODUCTION

The kidneys are bilaterally located retroperitoneal along the posterior abdominal wall, between the transverse processes of T12-L3 vertebrae, with the left kidney typically somewhat more superior in position than the right kidney. During early period of development of kidney it ascends from pelvic cavity to sub diaphragmatic position as well as rotates from ventral to medial direction along its vertical axis. The foetal lobulations finally disappear and the hilum faces medially.[1]

The renal arteries arise at the level of lumbar 2nd vertebral level as a pair of lateral branches arising from the abdominal aorta below the level of superior mesenteric artery. Commonly, the renal arteries runs laterally towards the hilum. They enter the hilum between renal vein and renal pelvis. Each renal artery divides into anterior and posterior divisions at or very close to the hilum of the kidney. During its course towards hilum it gives branches inferior suprarenal, ureteric and muscular branches. The variation in the source, number, branching and course of the renal arteries are very common. The aberrant renal artery generally supplies the kidney without passing through its hilum. These aberrant arteries may exist for about 30% of the population.[1]

The occurrence of the aberrant renal arteries may lead to the cases associated with renal pathologies, radiological interventions, renal transplants, and diverse surgical approach on them. The hemodynamic in cases of multiple arteries, may also get altered.[2] The genitofemoral nerve is formed within the substance of psoas major, originating from the L1 and L2 ventral rami. It runs obliquely within the muscle and emerges on its medial border, at a level of third or fourth lumbar vertebra. It then follow a course deep to the peritoneum covering the psoas major, crosses obliquely behind the ureter. It divides above the level of inguinal ligament into genital and femoral branches.

The genital branch crosses the external iliac artery and traverses the inguinal canal after its entry through the deep ring to innervate the cremaster muscle and the skin of the scrotum in males and the skin of the mons pubis and labium majus in females. The femoral branch provides sensory innervation to the medial upper thigh and the skin over the femoral vessels in the upper part of the femoral triangle.[3] The level of division into terminal branches is also highly variable (Bergman et al., 1988).[4] Anloague and Huijbregts (2009) observed that the genitofemoral nerve variations was found in 47.1% of the cases.[5]

In the present study we reported the existence of the aberrant right renal artery besides main renal artery and

ventrally placed hilum of lobulated kidney along with the high branching of genitofemoral nerve and associated its clinical significance.

CASE REPORT

Using conventional dissecting techniques, the posterior abdominal wall was dissected in an old embalmed male cadaver during routine dissection teaching of undergraduates. The medical records of this cadaver was not available. In the present case we reported a rare case of lobulated left kidney with ventrally facing hilum and aberrant left renal artery arising from the abdominal aorta on the left side.

The lobulated appearance of bilateral kidney was present both on anterior and posterior surface as well as along the lateral border. The shape of the left kidney was slightly ovoid and that of right kidney was resembling the bean shape. The length, breath and thickness of the right kidney was 9.5cm, 5cm and 4cm respectively. The length, breath and thickness of the left kidney was 9cm, 4.5cm and 4cm respectively. The left kidney was present against the transverse processes of T12 to L3 vertebrae.

The hilum of the left kidney was facing ventrally with the vessels passing through its upper part and the renal pelvis passing through its lower part. It was also observed that the upper end of the ureter was descending down in front of the lower pole of the left kidney. The hilum of the right kidney is facing medially with normal arrangement of the renal vessels and the renal pelvis. On the ventral surface of the right side kidney a solitary small fluid cyst was also noted.

The aberrant left renal artery originated at the level of lower border of L3 vertebra along with the origin of the normal left renal artery. This aberrant renal artery had an oblique course running superolaterally to enter into the medial border of the kidney near to the inferior pole of the left kidney. The aberrant artery was also accompanied by aberrant renal vein emerging out from the ventral surface of the kidney and draining into the inferior vena cava. During its course it is also crossed by the gonadal vessels. The aberrant renal artery perforate the substance of kidney below the level of ventral facing hilum. (Figure 1).

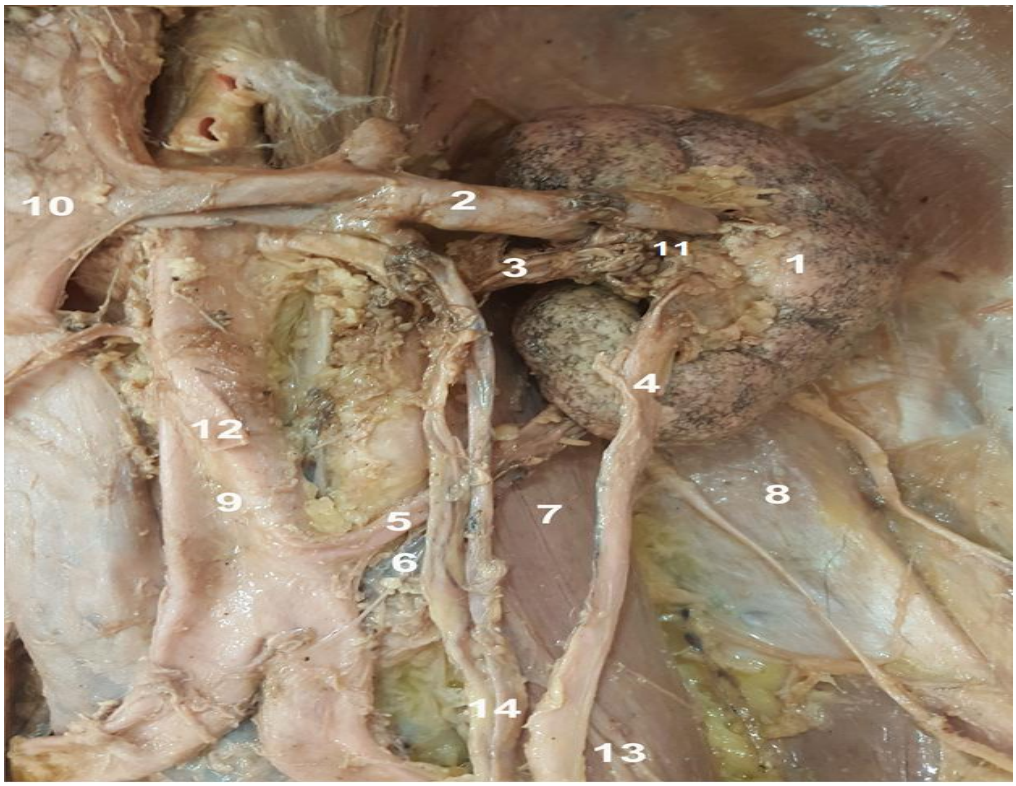

Figure 1: Showing the structures of posterior abdominal wall. 1. Left Kidney 2. Renal vein 3. Renal artery 4. Renal Pelvis 5. Aberrant Renal artery 6. Aberrant Renal vein 7. Psoas major 8. Quadratus lumborum 9. Abdominal aorta 10. Inferior vena cava 11. Renal hilum 12. Inferior mesenteric artery 13. Branches of genitofemoral nerve 14. Testicular vessels.

The right side genitofemoral nerve bifurcated into genital and femoral branch high up just after emerging at the medial border of the right Psoas major, both the branches descends beneath the peritoneum. The rest of the course of genital and femoral branch was normal in right side (Figure 2).

Figure 2: Showing emerging right genitofemoral nerve from the medial side of anterior surface of psoas major (yellow asterisk)

The left side genitofemoral nerve divided within the substance of psoas major muscle and emerges out separately and then accompany each other while descending down beneath the peritoneum over the right psoas major muscle. In lower part of its course both branches again move apart to run further a normal course (Figure 3).

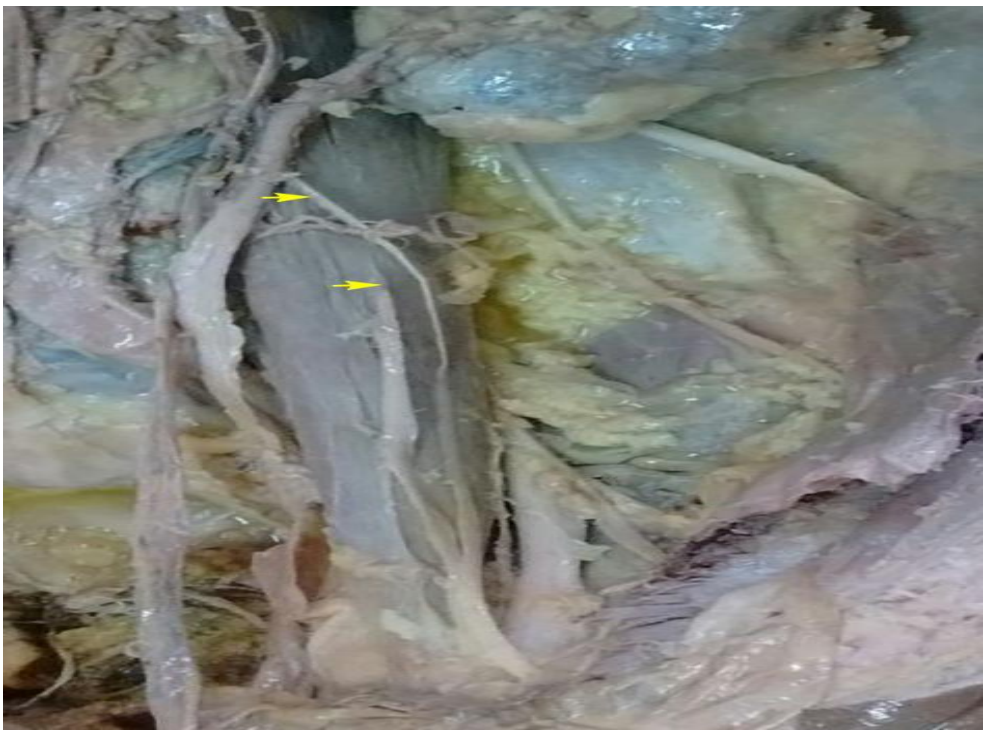

Figure 3: figure showing emerging left genitofemoral branches from surface of psoas major (yellow arrow).

DISCUSSION

The knowledge of existence of aberrant renal arteries has gained importance because they may get damaged during renal vascular reconstruction surgery and their presence must be evaluated in case of donor kidney for renal transplantation. Persistence of these aberrant arteries may result in intra-operative difficulties. It may cause post-operative hemorrhagic complications and graft rejection following the ligation of the aberrant arteries. The procedure of transplantation of the kidney with the single renal artery is easier compared to the multiple arteries.[6] These can be ruled out easily by radiological techniques such as renal angiogram prior to any renal surgical intervention. This helps in making an accurate diagnosis and in planning the right treatment.[7] These persistent arteries may be associated with non-ascent, incomplete ascent, an ectopic kidney, persistence of fetal lobulations or other congenital malformations.[8]

Felix observed that during the development of the structures such as mesonephros, metanephros, gonads and the adrenal glands gets their arterial supply from about nine pair of arteries. These arteries were grouped as the cranial (the 1st and the 2nd pair), middle (the 3rd to the 5th pair) and the caudal (the 6th to the 9th pair) groups. The renal arteries usually develops from the middle group, as a single pair of arteries.[9] The persistence of remaining arteries of the middle group, may give rise to the aberrant artery and also found to be associated with renal abnormalities such as persistence of fetal lobulations, incomplete ascent, an ectopic Kidney.[8]

The inferior polar arteries have been implicated as an etiological factor in a form of hydronephrosis correctable by surgery. Presence of variant renal arteries may be associated with other underlying renal pathological conditions.[10] The probability of aberrant renal arteries increases in cases, when the diameter of main renal artery was seen less than 4.15 mm. the main renal artery diameter may be considered as a predicting factor for existence of aberrant renal arteries.[11] In a study done by Elizabeth *et al*. on potential kidney donors, accessory renal arteries were found in 29% of left kidneys. Accessory renal arteries are typically equal in size to the single renal artery.[12]

The most common variation included a split of the genitofemoral nerve into the genital and femoral branches within the substance of the psoas muscle (26.5%). the bifurcation occurred at the upper end (20.6%), rather than the middle, portion of the anterior surface of the psoas major muscle. Sim and Webb (2004) also observed early division of the genitofemoral nerve prior to emergence from the psoas major in 8.3% of cases.[3]

CONCLUSION

With the increasing treatment modalities such as laparoscopic renal surgeries and donor nephrectomies, it is now mandatory for the surgeon to understand the abnormality or variations in the renal structure and vasculature. The anatomical knowledge of such variations may prevent the renal vascular catastrophes during renal transplant. It is therefore, important for academic, radiological as well as surgical procedures.

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