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Case Report

Aberrant arterial anastomosis between kidney and paranephric fat vasculature- A Serendipitous finding

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Abstract: Nephrectomies as well as renal transplantation are routinely performed in the current scenario due to high prevalence of end-stage renal disease and an increase in incidence of kidney cancers. A thorough knowledge of the arterial supply of kidney is imperative for the urologists and the general surgeons. We report a case of an aberrant artery arising from paranephric fat vasculature in a 55 year old male during routine educational cadaveric dissection, which was explored further by piecemeal removal of the kidney tissue and was seen to anastomose with interlobular artery, which is a rare finding and has not been reported in the existing literature. An aberrant artery, 5cm in length and 2 mm in diameter, arising from one of the lumbar arteries lying in the paranephric fat of left side was observed which ascended 1cm lateral to the kidney for 3cm and eventually perforated the substance of the left kidney, 5.5cm below the upper pole of the kidney at its lateral border. It was seen anastomosing with interlobular artery from the superior segment of the kidney. Awareness of such aberrant arterial anastomoses is clinically important for surgical interventions such as nephrectomy, nephro-ureterectomy and renal transplantation in order to prevent inadvertent damage to them during surgery. These also act as a source of collateral circulation in conditions leading to compromised vascular supply of kidney.
Keywords: Kidney, paranephric fat, Aberrant artery, anastomosis, surgery.

INTRODUCTION

Nephrectomies (partial, simple and radical) as well as renal transplantation are routinely performed in the current scenario due to high prevalence of end-stage renal disease, regardless of the cause (diabetes mellitus, hypertension, infections, etc.) and an increase in incidence of kidney cancers (esp. renal cell carcinoma). Renal artery divides into anterior and posterior divisions at the renal hilum and these divide into segmental arteries which supply the renal vascular segments. These segmental arteries further divide into lobar, interlobar, arcuate and interlobular arteries (end arteries). Interlobular arteries traverse the superficial cortex as perforating arteries to anastomose with the capsular plexus [1]. To the best of our knowledge, the interlobular arteries anastomosing with the paranephric fat vasculature has not been reported in the existing literature.

CASE REPORT

A 55 year old embalmed male cadaver, on routine educational cadaveric dissection of the posterior abdominal wall for undergraduate students presented with an aberrant artery. It was 5cm in length and 2 mm in diameter, arising from one of the lumbar arteries lying in the paranephric fat of left side. The perinephric fascia and the paranephric fat were dissected out and the artery was seen to ascend 1cm lateral to the kidney for 3cm. Then, it coursed upwards 4mm lateral to it for another 2cm. It eventually perforated the substance of the left kidney at the lateral border, 5.5cm below its upper pole, 1cm in front of the bloodless plane of Brodel (Fig. 1). The further course of this artery was explored by piecemeal removal of the kidney tissue (Fig. 2) which showed an anastomosis of the artery with interlobular artery branching from the superior segment of the kidney. After a short course of 1cm in the substance of the kidney it contributed a twig to one of the interlobular veins of the superior segment.

Fig-1: Aberrant artery(arrowhead) arising from paranephric fat (arrow) vasculature of the left kidney

Fig- 2: Aberrant artery (arrow) anastomosing with the interlobular artery (arrowhead) in the substance of left kidney

DISCUSSION

Normally, the renal artery divides into an anterior and a posterior division near the renal hilum and these divide into segmental arteries which supply the renal vascular segments. The segmental arteries branch into lobar, interlobar, arcuate and interlobular arteries which diverge radially into the cortex as end arteries. Some interlobular arteries traverse the superficial cortex as perforating arteries to anastomose with the capsular plexus supplied from the inferior

suprarenal, renal and gonadal arteries [1]. Bergman et al [2] described renal arterial variations in their number, source and course in about 35% of cases studied, the most common being the presence of an additional vessel(28%). According to a metaanalysis study, accessory renal arteries varying in size and generally derived from aorta are common (26 to 30% of all reported kidneys studied) and may enter kidneys at almost any point, usually polar in position[3].According to Fourman & Moffat [4], segmental arteries are virtually end arteries since they supply definite segments of the kidney and do not anastomose with the arteries of the adjacent segments except via very small capsular and pelvic branches which are unable to establish a collateral circulation whereas in the present case, one of the interlobular arteries has become large enough to be functional by anastomosing with one of the arteries supplying the paranephric fat which has not been reported in the existing literature. None of the studies have ever reported any accessory or aberrant vessel entering the kidney at or near its lateral border, as in the present case. We have proposed embryological as well as evolutionary basis of this variation.

Embryological basis

In the present case, presumably, anastomosis of one of the lateral splanchnic arteries with a somatic intersegmental artery of lumbar region has taken place during embryonic life.

Evolutionary basis

The anastomosis of the small twig with venous system can be explained by the persistence of a part of the renal portal system in the present case (existing normally in inverebrates and avians), supporting the recapitulation theory “Ontogeny repeats phylogeny.

CONCLUSION

The knowledge of such aberrant arterial anastomoses is clinically important for surgical interventions related to posterior abdominal wall such as nephrectomy, nephron-ureterectomy & renal transplantation which warrant acquaintance with such possible variations in order to prevent inadvertent damage to them. Also, angiographic procedures done for anatomical localization of kidney vasculature necessitate awareness of such anomalies. The presence of an aberrant artery is advantageous in conditions leading to compromised vascular supply of kidney such as, injury to renal vessels, thromboembolism, renal artery stenosis, compression by renal tumours, etc., as it may provide collateral circulation.

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