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Accessory renal artery: A case report and literature review

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ABSTRACT
Introduction: Variations of renal arteries were most frequent anatomical variation. Moreover, they have clinical implications in surgery and radiology. **Case report:** During the dissection of approximately 50 year old male cadaver abdomen for undergraduate student, a unilateral right accessory renal artery was observed arising from the lateral side of the abdominal aorta below the origin of the right main renal artery. **Conclusion:** Knowledge of accessory renal arteries has great importance in the field of surgery, radiology and renal transplantation.

KEYWORDS
Accessory renal artery, variation, cadaver and transplantation.

Case report

During the dissection of approximately 50 year old male cadaver abdomen for undergraduate students year 2018-2019 at the department of anatomy, faculty of medicine, Nile Valley University in Atbara city, Sudan. a unilateral right accessory renal artery was observed arising from the lateral side of the abdominal aorta below the origin of the right main renal artery. However, two renal arteries and one renal vein were encountered entering the hilum of the right kidney.

The abdomen was opened and dissected according to Cunningham's manual guideline. The skin, underlying muscles and viscera were removed and preserved. The right accessory renal artery arose from the lateral side of the abdominal aorta at level disc between L3 and L4, just below the origin of inferior mesenteric artery, it measured about 3.90 cm. This artery inclining when running up where it crosses the anterior surface of inferior vena cava and then passes deep to the testicular vessels and ureter on it's way to enter the lower pole of the right kidney hilum below the right main renal artery. Moreover, the right accessory renal artery was given a pre-segmental branch near to hilum. The right renal vein was noted normal passing superficial to the artery. The left renal artery was in a normal pattern. The detected accessory renal artery was documented by photography.

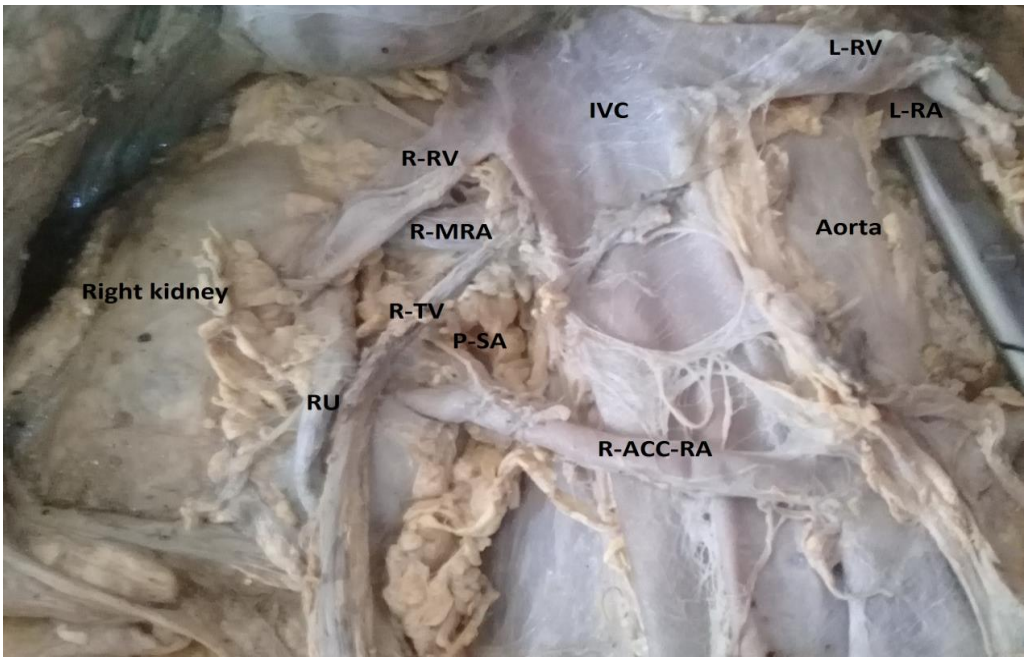

Figure 1: Viewed the right accessory renal artery (R-ACC-RA) and its pre-segmental artery(P-SA),right main renal artery (R-MRA), inferior vena cava(IVC),right ureter(RU), right testicular vessels (RTV),left renal artery(LRA) and left renal vein (LRV).

Introduction

The renal arteries arise from the abdominal aorta at level L2 vertebra in right angles and lie behind the pancreas and renal vein[1]. Accessory renal arteries represent persistent fetal renal arteries, which grow in sequence from the aorta to supply the kidney as it ascends from the pelvic cavity[2]. Variations in the number and locations of the renal vessels occur in approximately 25% of people[3]. The diameter of renal artery has an impact in the presence of additional renal arteries[4]. Accessory renal arteries were noted in 9 out of 86 kidneys 10.5%[5]. A total of 496 kidneys were analyzed by CT, multiple renal arteries were observed in 19.35% of cases[6].

Discussion:

A study of Ethiopian population reported that 33.3% accessory renal arteries, 63.63% of it were found on the left side while 27.27% right side[7]. In 201 cases diagnosed by CT Accessory arteries were observed bilaterally in (10%) and unilaterally was (20.6%) kidneys[8].

The single renal artery constitutes 70% of cases[9]. Another study by Kornafel et al reported that 72.6% of kidneys was supplied by a single renal artery[8]. A rare case of a 70 year old female cadaver presented with multiple variations. A right ectopic kidney observed with three renal arteries and two renal veins; on the left side, the kidney was unrotated and presented two renal arteries and normal renal vein[10]. Another case report mentioned three left renal arteries. The left main renal artery originate from the anterior aspect of the abdominal aorta. The other two arteries were arising with a common trunk coming out from the lateral side of abdominal aorta inferior to the main left renal artery[11]. A study of 17 accessory renal arteries showed that 12 (20%) originated from the aorta, whereas 5(8.33%) from the main renal artery[12]. In contrast the present case report the detected right accessory renal artery was arising directly from the lateral side of abdominal aorta caudal to the right main renal artery, just slightly below the origin of inferior mesenteric artery as viewed in Figure1. Aberrant renal arteries usually arise from the aorta and enter the superior or inferior poles of the kidneys[13]. The additional inferior renal polar artery presents in 8.7% of cases[7]. On the basis of the current observations the right accessory renal artery gave one pre-segmental branch near the hilum and then it ran through the lower pole of the kidney. Merklin and Michels(1958) categories the origin of accessory renal arteries as follows. Class 1; accessory renal arteries originating from the aorta, class 2; accessory renal arteries originating from the main renal artery and class 3; accessory renal arteries originating from other sources[14]. The encountered right accessory renal artery in this case, according to their classification belong to class 1.

The clinical importance of the accessory renal vessels was reported by many authors in the fields of surgery and in Interventional Radiology. Understanding of the variations of renal vessels was significant prior to laparoscopic nephrectomy to avoid the bleeding[15]. Abnormal origin of renal arteries from the abdominal aorta should be

noted to avoid vessels injury[16]. Additional renal arteries can be associated with renal artery complications like thrombosis and stenosis[17]. Characteristics of an accessory inferior polar artery has a great importance in the treatment of stenosis at the uretero-pelvic junction[18]. Crossing of accessory renal arteries anterior to the ureter in their way to the inferior pole of the kidney may cause hydronephrosis. The majority of accessory renal arteries pass through the inferior pole of the kidney[2,19,20]. The relationship between inferior vena cava and precaval renal arteries are reported in a few cases[10].

The right accessory renal artery in this case crosses the anterior surface of the inferior vena cave and may compress it and decrease the blood follow to the heart. Moreover the cadaver in this case was of unknown cause of death or morbidity. Developmentally the accessory renal arteries are common, they derive from the unoblitrated of embryonic vessels that formed during ascent of the kidneys[8]. The embryonic kidneys receive their blood supply from more superior vessels. After the kidneys ascend to their normal position, usually the inferior vessels degenerate, failure of these vessels to degenerate result in accessory renal arteries[3].

Conclusion:

A unilateral right accessory renal artery was observed arising from the lateral side of the abdominal aorta in this case report. Knowledge of accessory renal arteries has great importantance in the field of surgery, radiology and renal transplantation.

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Limitations of the Study

Funding

This study was self-funded .

Conflict of Interests

There is no conflict of interest.

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