CASE REPORT

THE EXISTENCE OF ACCESSORY RENAL ARTERIES IN A MALE CADAVER IN ETHIOPIA: A CASE REPORT

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ABSTRACT

Renal arteries that supply each kidney arise from the abdominal aorta and enter the renal hilum. Following the dissection of ten male cadavers at the University of Gondar, Ethiopia, we identified an anatomical variation of multiple renal arteries in a subject. In the present study, the accessory renal arteries enter the lower pole of the right and left kidneys. This finding, We hope, will provide a valuable input for surgical procedures and radiological interpretations.

Key words: *Accessory renal artery, anatomical variation, cadaver, kidney, Ethiopia.*

INTRODUCTION

Renal vessels are primarily retroperitoneal structures which supply or drain each kidney. Usually, there is one renal vessel either entering or leaving the renal hilum. A single renal artery supplies each kidney in approximately 70% of individuals [1, 2]. Near the renal hilum, each renal artery divides into anterior and posterior divisions; later, each divides into segmental arteries to supply the renal segments. Accessory renal arteries are common in 30% of individuals and usually arise from the abdominal aorta above or below the main renal artery and follow it to the hilum [2]. Rarely, they arise from common iliac, superior and inferior mesenteric arteries [1- 5]. Moreover, double, triple, and quadruple variations of renal arteries have been reported [1-3, 6].

The existence of an additional renal vessel may result in an erroneous interpretation of radiological images as in angiograms and pyelograms. Lack of prior information regarding the variations of renal vessels may result in surgical complications such as hemorrhage [7] in that specific population. In particular, accessory renal vessels reach the inferior pole by crossing the ureter. This may cause an obstruction to the ureter resulting in hydronephrosis [8]. This report aims to inform the occurrence of an anatomical variation in the vasculature of kidneys among the Ethiopian people.

CASE REPORT

During our dissection session with medical students at the University of Gondar, we identified an anatomical variation of multiple renal arteries in one male out of ten cadavers. It was approximately 50 years old with unknown clinical history. The abdominal cavity was opened, the small and large intestines were removed, and the structures in the retroperito-

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neal space were dissected. Then, all branches of the abdominal aorta from celiac trunk to inferior mesenteric arteries were observed. Finally, below the superior mesenteric artery we identified additional renal arteries (we called them accessory renal arteries) arising from the anterolateral side of the abdominal aorta on both sides reaching the inferior pole of each kidney.

Accessory renal arteries are described in a way relative to their bifurcation from the abdominal aorta and size. A renal artery with a large diameter is usually considered as main, while the smaller one is known as accessory [4, 5]. The concept of unilaterality or bilaterality depends on the number reaching each kidney on both sides.

On the right side, the superior, right main renal artery which is 0.8cm rises from the lateral side of the abdominal aorta 9.4cm superior to bifurcation of the aorta and passes obliquely posterior to inferior vena cava to enter the kidney through its hilum. The inferior, right accessory renal artery, which is 0.5cm rises from the lateral side of the abdominal aorta 3.5cm superior to the bifurcation of the aorta. It passes horizontally between the inferior vena cava (precaval right renal artery) ureter or testicular vein to reach the inferior part of the hilum (Figs. 1 and 2).

On the left side, the two superior and inferior renal arteries, respectively, rise from the lateral side of the abdominal aorta 8.5cm and 7.8cm the bifurcation of the aorta. The superior, left main renal artery which is 0.7cm runs horizontally anterior to the ureter to enter the hilum. The inferior, left accessory renal artery which is 0.4 cm also runs horizontally anterior to the ureter and below the left main renal arteryto enter the lower part of the hilum (Figs. 1and 2).

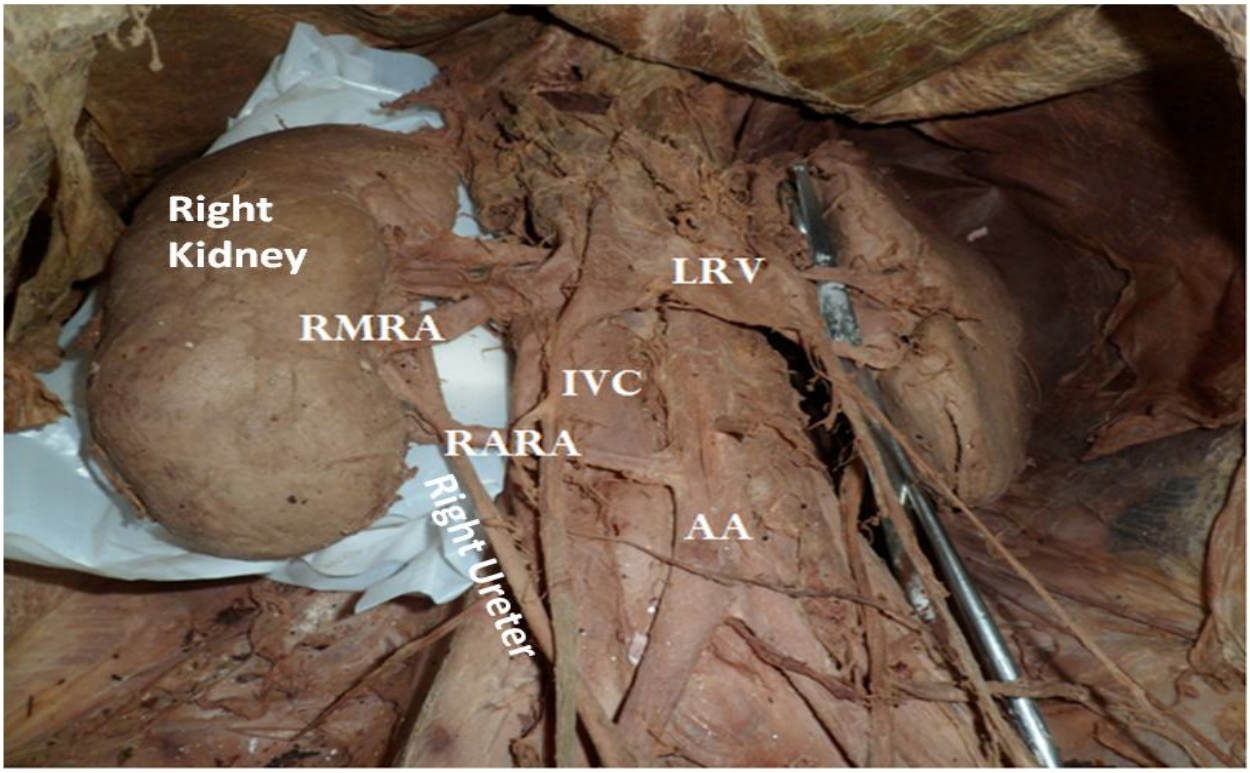

***Figure1**: Representative example of the right and left kidneys and the vessels supplying and draining the kidneys (AA- abdominal aorta, IVC- inferior vena cava, LRV- left renal vein, RARA-right accessory renal artery, RMRA- right main renal artery).*

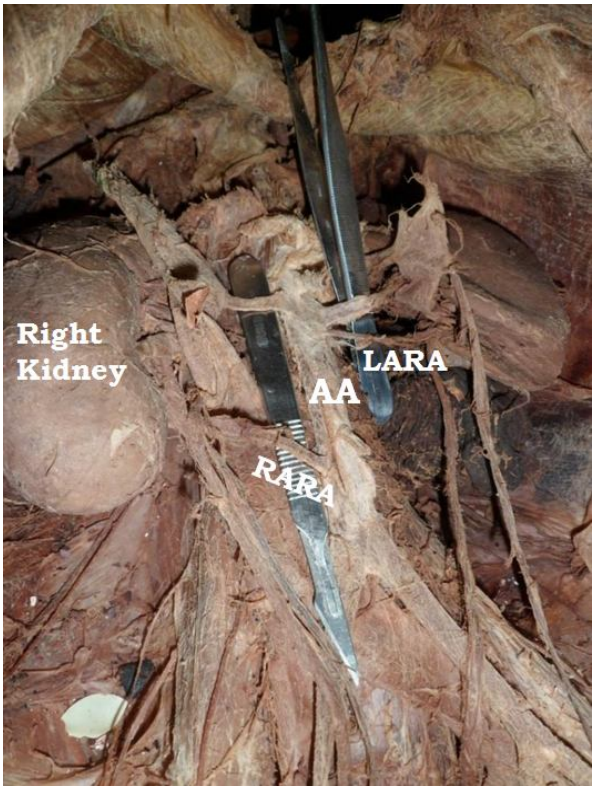

Figure 2: *Bilateral accessory renal arteries (AA- abdominal aorta, LARA- left accessory renal artery, RARA- right accessory renal artery)*

DISCUSSION

A single large renal artery, a lateral branch of the abdominal aorta, supplies each kidney. Usually, they arise just inferior to the origin of the superior mesenteric artery between the 1st and 2nd lumbar vertebrae. Of note, the left renal artery commonly commences a little higher than the right, and the right renal artery is longer and passes posterior to the inferior vena cava [9,10,11,12]. Understanding the developmental aspects of the vasculature of the kidney is helpful figuring out the causes of anomalies of renal vessels [9, 10].

Recent findings report the existence of double renal arteries on both sides. Out of 225 patients, fourteen were observed to have them on the right and five on the left [11]. In another cadaveric study, out of 50 kidneys, 4% of the cases were reported to have accessory renal arteries on the right side. According to report, the destination of the accessory renal artery varied among four cadavers; it enters the kidney either on the superior pole, inferior pole, or as it approaches the inferior pole in one, two, and one cases, respectively [14]. Here, we report the presence of bilateral accessory renal arteries in 10% of the male cadavers at the University of Gondar, Ethiopia.

Variations in the number, source, branching patterns, and course of renal arteries are very common [10, 11]. Extrahilar renal arteries from the renal artery or aorta may enter through the external surface of the kidney, commonly at their poles [12]. Arteries other than the main artery that supply the kidney are usually named differently as supernumerary, multiple, or aberrant by various authors [11, 13, 15]. The accessory renal arteries or the aberrant arteries account for about 30% of existence, while 70% owe to the normal type [10, 12]. In our case, the existence of accessory artery accounts for 10%. Accessory renal arteries usually cross anteriorly to the right and right ureter, respectively, which may result in obstructive hydronephrosis [10, 12, 14, 15].

In the present study, we found double precaval right renal arteries. This was supported by another angiographic evaluation in 225 patients who reported the presence of twenty-one precaval renal arteries classified as double in one male subject and single in twenty males [10]. Another cadaver-based study reported an incidence of 1.3% (1/77) bilaterally accessory renal artery arising from the abdominal aorta [16]. On the right side, the accessory renal artery was precaval and entered the kidney via the inferior pole.

Similarly, in our report we found a single accessory hilar right precaval renal artery which might also cause compression of the inferior vena cava.

A recent study revealed that in 11.2% of kidneys, there existed multiple renal arteries [15]. They were bilateral in 13% and unilateral in 87%. Other reports also showed the bilateral occurrence of multiple renal arteries [10, 17]. Our result is in line with the available literature concerning bilateral accessory renal arteries. Panagoulin and collegues [16] reported that right accessory renal artery runs anterior to the ureter. In contrast, in our case it runs posterior to the ureter like the main renal artery. Thus, any pathology that involves the inferior vena cava or the right testicular vein might cause compression, as it is sandwiched between these structures.

Understanding the presence of anatomical variations of accessory renal arteries is vital in the interpretation of images in radiology and renal transplantation, abdominal aorta aneurysm, and ureteric surgery [11-13]. Furthermore, since they belong to anatomical end arteries, awareness will consequently assist in understanding the ischemia of the kidneys [10, 12].

In summary, the present case report indicates the presence of a bilateral accessory renal artery in Ethiopians. The finding might be helpful to determine the possible source of bleeding in the abdomen of patients who undergo surgical interventions.

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