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Short communication

Bilateral accessory renal arteries in a fetus: importance for surgical and radiological practice

José Aderval Aragão [1]*, Danillo Primo Andrade Santana [2], Ellen Caroline da Conceição Brandão [2], Viviane Freitas Andrade [3], Marianna Ribeiro de Menezes Freire [4], Francisco Prado Reis [5]

[1]Associado Professor I, Department of Morphology and the Postgraduate Physical Education and Applied Health Sciences Programs, Federal University of Sergipe (UFS), and Titular Professor of the Medical School, Tiradentes University (UNIT), Aracaju, Sergipe, Brazil
[2] Medical Student, Federal University of Sergipe (UFS), Aracaju, Sergipe, Brazil
[3] Postgraduate Student Applied Health Sciences Programs, Federal University of Sergipe (UFS), Aracaju, Sergipe, Brazil
[4] Medical Student, Tiradentes University (UNIT), Aracaju, Sergipe, Brazil
[5] Titular Professor, Medical School of Tiradentes University (UNIT), Aracaju, Sergipe, Brazil
**Corresponding author E-mail: jaafelipe@infonet.com.br*

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Abstract

Context: Knowledge of anatomical variations of the renal vessels is considered important, in view of the increasing use of kidney transplantation, vascular reconstruction and imaging methods.
Objective: To report on a case of triple right renal artery, and double left renal artery and its clinical-surgical implications.
Case report: In a female fetal cadaver of age 30 weeks, multiple renal arteries were observed: triple in the right and double in the left renal artery. All the arteries were hilar and originated from the lateral face of the abdominal aorta. The lengths of the triple renal arteries were 17, 10 and 12 mm respectively for the upper, middle and lower arteries. The lengths of the double arteries were 10 and 12 mm respectively for the upper and lower arteries. There was no extrarenal segmentation.
Conclusion: Knowledge of possible variations in the renal arteries may be very useful for radiologists, urologists and vascular surgeons.

Keywords: *Anatomy; Renal Artery; Urogenital Abnormalities; Kidney Transplantation.*

1. Introduction

Anatomical knowledge of variations in the numbers of renal arteries is considered important, in view particularly of the gradually increasing use of invasive radiological procedures, comprising urological, vascular and kidney transplantation operations [1-5]. The present study has aim of reporting on a case of triple right renal artery, and double left renal artery in a human fetus.

2. Case report

After dissecting 60 kidneys from human fetuses in order to determine the frequency of multiple renal arteries, one case of triple and double renal arteries (right and left, respectively) was found in a female fetus of estimated age 30 weeks (hallux-calcaneus measurement (Fig. 1). All the arteries were hilar and originated from the lateral face of the abdominal aorta. The lengths of the triple renal arteries were 17, 10 and 12 mm respectively for the upper, middle and lower arteries, which were located at distances of 2, 3 and 5 mm from the superior mesenteric artery. Before entering the renal hilum, the upper and middle triple renal arteries originated two segmental renal arteries. The lengths of the double renal

arteries were 10 and 12 mm respectively for the upper and lower arteries, and were located 3 and 10 mm from the superior mesenteric artery. There was no extrarenal segmentation.

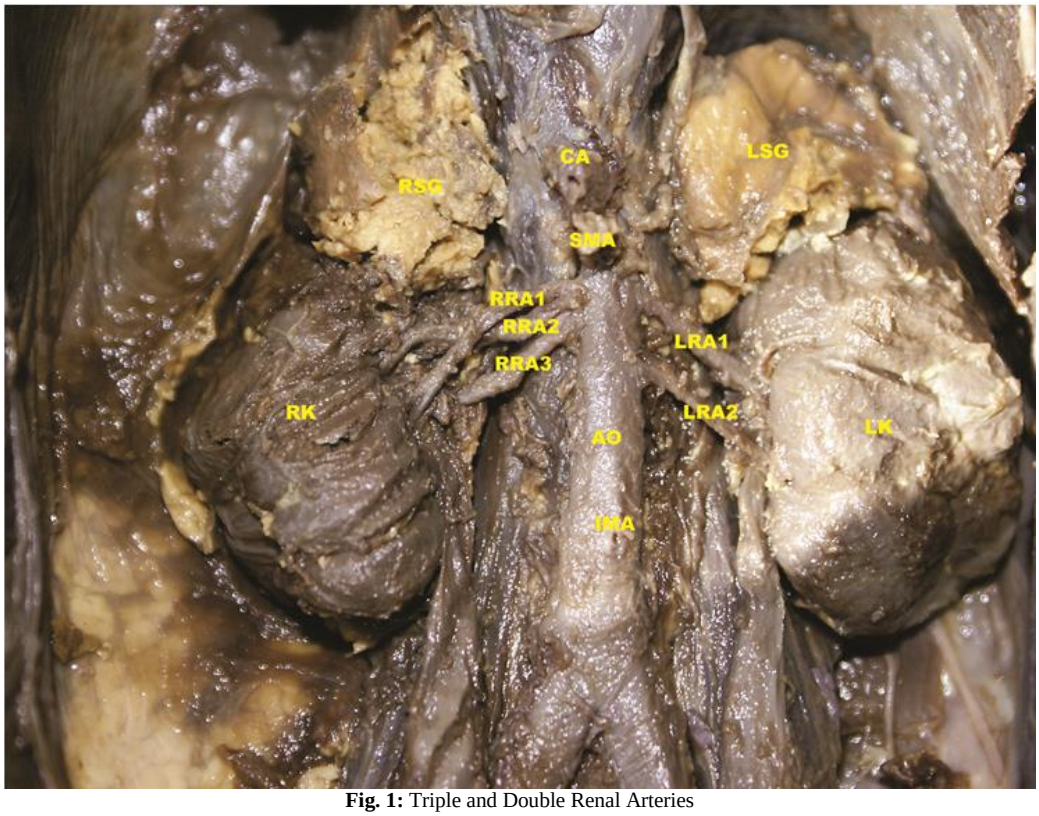


Fig. 1: Triple and Double Renal Arteries

3. Discussion

An additional renal artery, named variously as accessory, aberrant, anomalous or malformed artery, which is commonly presented in the literature, may arise from different portions of the aorta and end at different locations in the kidney. Although there is no exact differentiation between these terms, the latter ones should be applied when the structural changes are translated into dysfunction [6], [7].

According to authors such as Sykes [8], Willan, and Humpherson [9], the anatomical variations generally do not have any effect on body functions, although, they may influence the course of a disease, and also the clinical and surgical findings. The renal arteries have been the subject of many systematic studies [10], although the numbers of reports of cases of double and triple arteries have been much smaller [11]. Nevertheless, variations in the numbers of renal arteries are more common than variations in any other vessel [12], [13], and this can be explained by the ascension of the kidneys from the pelvis during embryonic development [14]. The frequency of variations may range from 8.7 to 75.6% [15], [16].

The frequency of occurrences of triple renal arteries has been found to range from 0.6 to 4.5% [1], [2], [4], [17-23]. In our study, the frequency of triple renal arteries was 3.33% among 60 kidneys dissected from 30 human fetuses. This number was similar to what was found by Busato Júnior and Ribas Filho [20], who evaluated 30 molds obtained from the kidneys of fresh human cadavers, which had been prepared by means of the injection-corrosion technique using acrylic copolymer, as used in dentistry. According to Merklin and Michels [17], Harrison et al [18], Sampaio and Passos [1], Gościcka et al [19], Busato Júnior, and Ribas, Filho [20], Khamanarong et al [4], Bordei [21], Bergman et al [22] and Kaneko et al [23], this frequency ranged from 0.6 to 1.9%, while according to Satyapal et al [2], it was 4.5%.

Knowledge of these anatomical variations in renal vascularization are of etiological, diagnostic, and therapeutic importance, both for surgeons and for radiologists [24], [25]. The presence of multiple renal arteries increases the complexity of surgical procedures such as kidney transplantation, implantation of vascular stents and vascular reconstruction, and also has clinical importance with regard to diagnosing renovascular hypertension [26].

4. Conclusion

Knowledge of the multiple variations in the renal hilum is of great importance in making diagnoses through imaging before surgical interventions, and also in reducing the surgical complications in kidney transplantations.

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Legends of figures

Figure 1 Triple and double renal arteries (RRA1, RRA2, RRA3 and LRA1, LRA2)
AO – Aorta
CA – Celiac artery
IMA - Inferior mesenteric artery
LK – Left kidney
LRA1 – Left renal artery1
LRA2 – Left renal artery2
LSG – Left suprarenal gland
RK – Right kidney
RRA1 – Right renal artery1
RRA2 – Right renal artery2
RRA3 – Right renal artery3
RSG – Right suprarenal gland
SMA – Superior mesenteric artery