Wróbel Grzegorz. Unilateral triple renal artery as an anatomical variant - case study. Journal of Education, Health and Sport. 2018;8(8):1153-1156. eISNN 2391-8306. DOI http://dx.doi.org/10.5281/zenodo.1438761

http://ojs.ukw.edu.pl/index.php/johs/article/view/6137

https://pbn.nauka.gov.pl/sedno-webapp/works/879897

The journal has had 7 points in Ministry of Science and Higher Education parametric evaluation. Part B item 1223 (26/01/2017).

1223 Journal of Education, Health and Sport eISSN 2391-8306 7

The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 14.08.2018. Revised: 20.08.2018. Accepted: 31.08.2018.

Unilateral triple renal artery as an anatomical variant - case study

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Abstract

Knowledge of the renal vascular system is extremely important in everyday clinical practice. In kidney transplantation, knowledge about the amount, diameter of a blood vessel, and the course of arteries and renal veins are critical in the selection of kidneys to be taken and planning operations. Multi-detector CT provides quick, accurate determination of the anatomical location and course of the renal vessels. Additional renal arteries have been

reported in different population groups. The study concerned a 65-year-old male subjected to imaging diagnostics using computed tomography for oncological purposes. During the analysis of the image, the presence of three renal arteries emerged directly from the abdominal aorta and proceeded in the direction of the renal hilum

Keywords: kidney, artery, vein, computed tomography

1. Introduction

The renal arteries supplying the renal parenchyma go directly from the abdominal aorta and usually return the branches to the kidney pelvis and ureters before they reach the renal hilum [1]. Knowledge of the renal vascular system is extremely important in everyday clinical practice. The accurate visualization of kidney vascularization is important due to the high individual variability of the arterial and venous systems of the kidneys [2]. In kidney transplantation, knowledge about the amount, diameter of a blood vessel, and the course of arteries and renal veins are critical in the selection of kidneys to be taken and planning operations. The anatomy of renal arteries is very important for selecting kidney donors since its impact on renal transplant surgeries. Occurrence of anatomical variants of human kidney vascularization is a common phenomenon. Renal artery imaging using CT, allow to obtain precise information about the vascular anatomical data on the renal arteries and aorta [3-5].

2. Case presentation

The study concerned a 65-year-old male subjected to imaging diagnostics using computed tomography for oncological purposes. For diagnostic imaging was used the SOMATOM Definition AS (Siemens) and analyzed with SYNGO Multi-Modality CT Workstation (Siemens). During the analysis of the image, the presence of three renal arteries emerged directly from the abdominal aorta and proceeded in the direction of the renal hilum. The main renal artery diameter (5.38 mm) and two additional ones were distinguished: the first one with a diameter (3.58 mm) and the second with a diameter (2.85 mm). The distances between the observed arteries were small in the range of 2 to 4 mm (Figure 1).

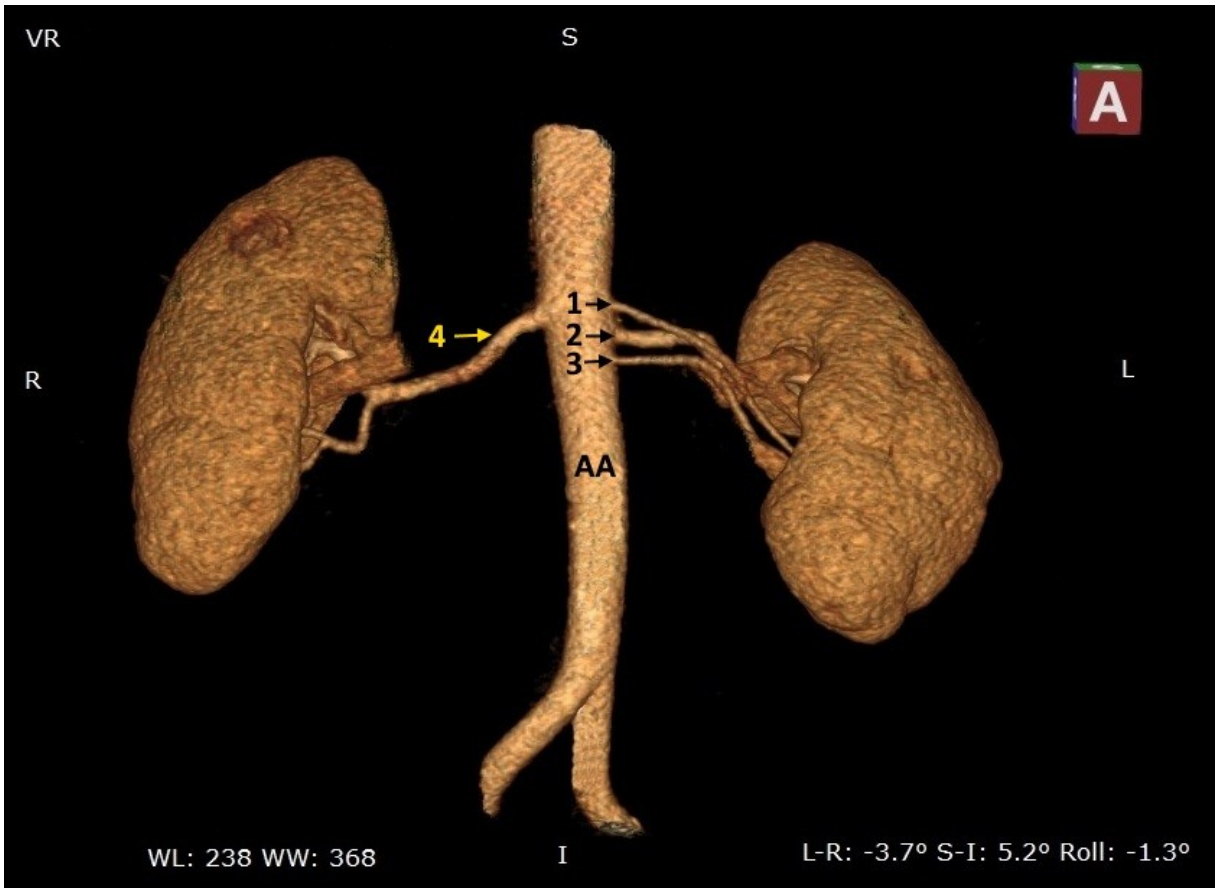

Figure 1. The CT scan (image with 3D reconstruction) presents the abdominal aorta (AA) and departing left renal arteries (black arrow): 1 - first additional, 2 - main, 3 - second additional and 4 - renal artery right (yellow arrow).

3. Discussion

Multi-detector CT provides quick, accurate determination of the anatomical location and course of the renal vessels [6]. Multiple renal arteries are unilateral in approximately 30% of patients and bilateral in approximately 10% [7]. Additional renal arteries have been reported in different population groups, incidence varying from 10% to 50% [8]. The origin of renal arteries and its variations can be explained by the development of mesonephric arteries. The additional arteries represent the vestiges of the embryological blood supply to the kidneys [9]. In a cadaveric study, 23% had double renal arteries, 4% had triple arteries, and 1% had quadruple arteries [10]. The accessory artery usually courses into the renal hilum to perfuse the upper or lower renal poles. Changes in the kidney vascular system can be caused by many factors that interact with each other and can affect the final shape of the arteries and renal veins. Knowledge of the potential anatomic variations is significant for clinicians [11-12].

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