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*The frequency of different plural renal arteries rare variants*

From the beginning of the 20th century the researchers were interested in the study of the plural renal arteries. Some new facts appeared in the 60s when the correlations between pathological developmental changes and arterial blood pressure were found. The clinico-roentgenological material analysis showed that double-sided anomaly of kidneys leads to aerodynamic problems and causes the development of nephrology diseases. The special practical meaning have accessory arteries, which goes to the lower pole of the kidney. They may cross urochesial routes and may be a reason of urine running disorders, especially hydronephrosis. In spite of a great number of publications questioning plural renal arteries the data in literature about them are very different. There is no generally accepted terminology describing different variants of these vessels either.

The aim of this work was to evaluate the frequency of different plural renal arteries rare variants in healthy patients and in many different pathological diseases.

#### MATERIAL AND METHODS

Abdominal aortography with following selective angiography was performed on 35 randomly selected patients of Medical Department, with the use of radiopaque and with followed radiological parameters: P – 75 kV, I – 9 mA, T – 10 sec.

#### RESULTS AND DISCUSSION

According to the available literature the following classification was introduced: 1) double renal arteries – DRA, 2) triple renal arteries – TRA, 3) upper pole accessory



Fig. 1. Aortonephrogram of the double left renal arteries



Fig. 2. Aortonephrography of the double right upper pole accessory arteries



Fig. 3. Selective angiography of the single left upper pole accessory artery



Fig. 4. Selective angiography of the left lower pole perforating artery

artery – UPAA, 4) lower pole accessory artery – LPAA, 5) upper pole perforating artery – UPPA, 6) lower pole perforating artery – LPPA.

DRA arteries are two vessels originating from the aorta, similar in diameter, blood supply areas, and their branches entering kidney through hilum (Fig. 1).

TRA are three vessels originating from the aorta with different diameter and blood supply areas, and their branches entering kidney through hilum.

UPAA and LPAA originate from aorta, diameter of which being comparable to segmental arteries, supplying one segment only (upper or lower pole) entering kidney through hilum (Figs. 2, 3).

UPPA and LPPA originate from aorta or one of its major branches, diameter of which being comparable to segmental or sub-segmental arteries, supplying one segment only (upper or lower pole) entering kidney outside of hilum (Fig. 4).

Table 1. The frequency of different plural renal arteries variants

Patients	DRA (%)	TRA (%)	UPAA (%)	LPAA (%)	UPPA (%)	LPPA (%)	Total No
without pathology	4 33%	none	2 17%	4 33%	2 17%	none	12
arterio-sclerosis	none	none	none	5 50%	4 40%	1 10%	10
diabetes mellitus	1 20%	1 20%	none	2 40%	1 20%	none	5
renal stenosis	1 50%	none	none	1 50%	none	none	2
Total	6	1	2	12	7	1	29

Statistical characteristics about examined material are presented in Table 1.

Accessory renal arteries are found frequently, more often on the left side and occurring as 25–35% of cases, as present Baniel et al. (2) and Glodny et al. (8). Knowledge of these anatomical variations is extremely important for surgeons, which was showed by Baryshnikov et al. (3), Bielyj (4) and Dudarev et al. (6).

Hirmanov et al. demonstrated that double-sided anomaly of kidney's blood supply, as a rule, impairs the process of urodynamics and results in the onset of various disorders (9). So far there has been no generally accepted anatomical terminology referring to plural renal arteries phenomena (7). Additional arteries supplying the lower pole seem to be of greatest importance from the practical point of view. In spite of a relatively large number of publications regarding the prevalence of plural renal arteries, the available data considering their number, level of origin and ultimate organ penetration are rather inconsistent (10,11). In our analysis lower pole accessory arteries occurred with almost equal frequency in patients without any vascular pathology and in patients with arterio-sclerosis, diabetes mellitus and renal arteries stenosis. The anomaly of the kidneys and

their vessels were observed in nearly similar percentage by Atasever et al. (1) and by Debatin et al. (5).

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2001.12.19

## SUMMARY

The aim of this work was to evaluate the frequency of different plural renal arteries rare variants in healthy patients and in many different pathological diseases. Abdominal aortography with following selective angiography was performed on 35 randomly selected

patients of Medical Department, with the use of radiopaque and with followed radiological parameters: P – 75 kV, I – 9 mA, T – 10 sec. According to the available literature the following classification was introduced: double renal arteries – two vessels originating from the aorta, similar in diameter, blood supply areas, and their branches entering kidney through hilum (observed in 20% of cases), triple renal arteries – three vessels originating from the aorta with different diameter and blood supply areas, and their branches entering kidney through hilum (observed in 3%), upper pole accessory artery – originates from aorta, diameter of which being comparable to segmental arteries, entering kidney through hilum (6%), lower pole accessory artery (40%), upper pole perforating artery – originates from aorta or one of its major branches, diameter of which being comparable to segmental or subsegmental arteries, supplying one segment only, entering kidney outside of hilum (26%), and lower pole perforating artery (3%).

#### Rzadkie warianty występowania mnogich tętnic nerkowych

Celem pracy była ocena częstości występowania rzadkich wariantów unaczynienia tętniczego nerek. Badania przeprowadzono na grupie 35 pacjentów z oddziału chorób wewnętrznych, u których z przyczyn diagnostycznych wykonywano aortonefrografię z następową selektywną angiografią tętnic nerkowych. W 29 na 70 wykonanych angiogramów stwierdzono obecność więcej niż jednej tętnicy unaczyniającej poszczególne nerki. Najczęstszym naczyniem dodatkowym były tętnice dodatkowe unaczyniające biegun dolny (40%) oraz tętnice przeszywające unaczyniające biegun górny (26%). Podwójne tętnice nerkowe opisano w 20% przypadków, potrójne – w 3%. Równie rzadko spotykano tętnice dodatkowe unaczyniające biegun górny (6%) oraz tętnice przeszywające unaczyniające biegun dolny (3%).