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I. Y. Yevtushenko

Department of Clinical Anatomy and Operative Surgery (Head – Prof. V.G. Dudenko) Kharkiv National Medical University

GENERAL CHARACTERISTICS OF RENAL CALICES OF A MATURE AND ELDERLY HUMAN

ЗАГАЛЬНА ХАРАКТЕРИСТИКА НИРКОВИХ ЧАШОК ЛЮДИНИ ЗРІЛОГО ТА ЛІТНЬОГО ВІКІВ

Резюме. Застосування неінвазивних та малоінвазивних методів діагностики та лікування у сучасній урологічній практиці диктує необхідність вивчення локалізації початкового відділу позаниркових сечовивідних шляхів. **Метою** даного дослідження був опис загальної характеристики ниркових чашок людини зрілого та літнього віку.

Матеріал і методи. До дослідження було включено 175 корозійних препаратів чашково-мискових комплексів людини. Проведено органометричне дослідження кількості, форми склепіння, лінійних параметрів, об'ємів, ранжування місця у розподілі об'ємів ниркових чашок.

Результати. Верхня ниркова чашка характеризується великою висотою ($14,8 \pm 9,2$ мм) та широкою шийкою ($7,2 \pm 2,3$ мм) та найбільшим об'ємом $1202-1246$ мм³. Передня верхня чашка нирки має округле склепіння середнього діаметра ($6,7 \pm 2,3$ мм) та середньої висоти ($7,2 \pm 3,1$ мм), вузьку шийку ($5,0 \pm 1,6$ мм) та невеликий стабільний об'єм ($14,8$ мм³). Передня середня чашка має кругле склепіння середнього діаметра ($7,4 \pm 2,2$ мм) і висоти ($10,7 \pm 5,1$ мм) і вузьку шийку ($4,8 \pm 1,6$ мм); її об'єм становить $348,4$ мм³. Передня нижня ниркова чашка має середній діаметр ($7,2 \pm 2,3$ мм) та висоту ($8,9 \pm 4,6$ мм), вузьку шийку ($4,8 \pm 1,8$ мм); її об'єм становить $275,2-307,1$ мм³. Задньо-верхня ниркова чашка має середній діаметр склепіння ($8,4 \pm 3,0$ мм) та висоту ($8,6 \pm 4,5$ мм), вузьку шийку ($5,7 \pm 2,1$ мм) та невеликий стабільний об'єм (менше $500,0$ мм³). Задня середня ниркова чашка має середній діаметр ($7,2 \pm 2,3$ мм) та висоту ($10,7 \pm 5,1$ мм), вузьку шийку ($5,1 \pm 1,9$ мм), середній об'єм ($402,1$ мм³). Задня нижня ниркова чашка середнього діаметра ($7,2 \pm 2,2$ мм) та висоти ($7,0 \pm 3,6$ мм) з вузькою шийкою ($5,3 \pm 2,3$ мм), невеликим стабільним об'ємом ($402,1$ мм³). Нижня чашка нирки середнього діаметра ($7,4 \pm 2,4$ мм) та висоти ($8,6 \pm 4,6$ мм) з вузькою шийкою ($5,7 \pm 2,2$ мм) та середнім об'ємом ($402,1$ мм³).

Висновки. В результаті дослідження ми визначили загальну характеристику ниркових чашок людини зрілого та літнього віку. Нові морфологічні дані про будову чашково-мискового комплексу можуть бути використані для покращення діагностики та лікування екстрауренальних сечовивідних шляхів нирок.

Ключові слова: нирка, чашечно-мисковий комплекс, ниркова чашечка.

The use of non-invasive and minimally invasive diagnostic and treatment methods (ultrasound, MRI, percutaneous puncture, etc) in modern urological practice dictates the need to study the location of the initial section of the extrarenal urinary tract [1-5]. In the last decade, new data on the structure of the human renal calyces have been obtained [6-10]. However, to date, these structures have not been sufficiently studied in terms of age.

The aim of the study was to describe general characteristics of renal calices of a mature and elderly human.

Material and methods. The study included 175 corrosive preparations of human pyelocalyceal complexes. Organometric study of number, shape of arches, linear parameters, volumes, ranking place in the ranking distribution of renal calyces' volumes was performed.

The morphometry of the renal calyces, carried out using the methods of variation statistics (with the control of the reliability of the results by the t-test), made it possible to establish significant differences in the linear characteristics of human renal calyces. It should be noted that the introduction of quantitative estimates of morphometric features of any anatomical structure (including renal calyces) is associated with the need to operate with the concept of statistical error, which is associated with two factors: direct measurement error and individual anatomical variability of the structure. However, this circumstance was considered, and that is why each parameter is given with its standard deviation.

Results and discussion. The upper renal calyx collects urine from the upper end (pole) of the kidney. It has a scalloped arch of large diameter (11.3 ± 4.7 mm). It is also characterized by a large height (14.8 ± 9.2 mm) and a wide neck (7.2 ± 2.3 mm). It has the largest volume: 1202 mm³ in women and 1246 mm³ in men, which is 23.9-35.2% of the total volume of the renal calyces and occupies the first rank in the rank distribution of the volumes of the renal calyces.

The anterior superior renal calyx collects urine from the upper third of the anterior surface of the kidney. It has round vault of medium diameter (6.7 ± 2.3 mm) and medium height (7.2 ± 3.1 mm), a narrow neck (5.0 ± 1.6 mm) and a small stable volume (14.8 mm³). It is the smallest volume and it takes 6.3-6.5% of the total volume of the renal calyces (rank 8).

The anterior middle calyx drains urine from the middle section of the anterior surface of the kidney. It has a round vault of medium diameter (7.4 ± 2.2 mm) and height (10.7 ± 5.1 mm) and a narrow neck (4.8 ± 1.6 mm). The absolute value of the cup volume is 348.4 mm³ and increases with age. It makes up 9.6-10.0% of the total volume of the renal calyces.

The anterior inferior renal calyx collects urine from the lower third of the anterior surface of the kidney. It has medium diameter (7.2 ± 2.3 mm) and height (8.9 ± 4.6 mm) with a narrow neck (4.8 ± 1.8 mm). The absolute value of its volume is 275.2 - 307.1 mm³. This is 8.0-8.3% of the total volume of the renal calyces. It ranks sixth in the distribution of volumes.

The posterior superior renal calyx drains urine from the upper third of the posterior surface of the kidney. It is a calyx of medium arch diameter

(8.4 ± 3.0 mm) and height (8.6 ± 4.5 mm) with a narrow neck (5.7 ± 2.1 mm) and a small stable volume (less than 500.0 mm³). It ranks 3-4 in the distribution of volumes.

The posterior middle renal calyx collects urine from the middle part of the posterior surface of the kidney. It has medium diameter (7.2 ± 2.3 mm) and height (10.7 ± 5.1 mm) with a narrow neck (5.1 ± 1.9 mm), medium volume (402.1 mm³), decreasing with age (third rank).

The posterior inferior renal calyx drains urine from the lower third of the posterior surface of the kidney. It has medium diameter (7.2 ± 2.2 mm) and height (7.0 ± 3.6 mm) with a narrow neck (5.3 ± 2.3 mm), small stable volume (402.1 mm³). It is ranked 7.

The lower renal calyx collects urine from the lower end (pole) of the kidney. It has medium diameter (7.4 ± 2.4 mm) and height (8.6 ± 4.6 mm) with a narrow neck (5.7 ± 2.2 mm), as well as medium volume (402.1 mm³), progressively decreasing with age. It ranks 2-3 in the distribution of volumes.

The number of renal calyces, characterized by the coefficient of quantitative anatomical heterogeneity, is associated with gender. Thus, a smaller number of renal calyces in the kidneys in men occur 1.5-2.0 times more often than in women.

The total volume of the renal calyces decreases with age by 33.1%. The absolute mean value of the total volume decreases from 4699.2 mm³ to 3144.0 mm³ (significant decrease ($t > 3.0$), correlation coefficient with age – $r = -0.64$). At the same time, the volume of the upper renal calyx is reduced by half, and of the lower one – by three times.

Conclusions. As a result of the study, we determined the general characteristics of the renal calyces of a person of mature and elderly ages. New morphological information about the structure of the pyelocalyceal complex (morphometric classification characteristic of the renal calyces in different age groups and with distribution by sex) can be used to improve the diagnosis (X-ray, ultrasound, CT and MRI) and treatment of the kidneys (surgical technique of organ-preserving operations) and extrarenal urinary tract (percutaneous puncture, etc.).

Perspectives for further research. Increasing incidence of kidney diseases, especially urolithiasis, requires morphologists for further research of morphometric characteristics of renal calyces in various aspects (age, sex, etc.).

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Abstract. The use of non-invasive and minimally invasive diagnostic and treatment methods in modern urological practice dictates the need to study the location of the initial section of the extrarenal urinary tract. The aim of the study was to describe general characteristics of renal calices of a mature and elderly human.

Material and methods. The study included 175 corrosive preparations of human pyelocalyceal complexes. Organometric study of number, shape of arches, linear parameters, volumes, ranking place in the ranking distribution of renal calyces volumes was performed.

Results. The upper renal is characterized by a large height (14.8 ± 9.2 mm) and a wide neck (7.2 ± 2.3 mm) and the largest volume $1202-1246$ mm³. The anterior superior renal calyx has round vault of medium diameter (6.7 ± 2.3 mm) and medium height (7.2 ± 3.1 mm), a narrow neck (5.0 ± 1.6 mm) and a small stable volume (14.8 mm³). The anterior middle calyx has a round vault of medium diameter (7.4 ± 2.2 mm) and height (10.7 ± 5.1 mm) and a narrow neck (4.8 ± 1.6 mm); its volume is 348.4 mm³. The anterior inferior renal calyx has medium diameter (7.2 ± 2.3 mm) and height (8.9 ± 4.6 mm) with a narrow neck (4.8 ± 1.8 mm); its volume is $275.2-307.1$ mm³. The posterior superior renal calyx has medium arch diameter (8.4 ± 3.0 mm) and height (8.6 ± 4.5 mm) with a narrow neck (5.7 ± 2.1 mm) and a small stable volume (less than 500.0 mm³). The posterior middle renal calyx has medium diameter (7.2 ± 2.3 mm) and height (10.7 ± 5.1 mm) with a narrow neck (5.1 ± 1.9 mm), medium volume (402.1 mm³). The posterior inferior renal calyx has medium diameter (7.2 ± 2.2 mm) and height (7.0 ± 3.6 mm) with a narrow neck (5.3 ± 2.3 mm), small stable volume (402.1 mm³). The lower renal calyx has medium diameter (7.4 ± 2.4 mm) and height (8.6 ± 4.6 mm) with a narrow neck (5.7 ± 2.2 mm) and medium volume (402.1 mm³).

Conclusions. As a result of the study, we determined the general characteristics of the renal calyces of a person of mature and elderly ages. New morphological information about the structure of the pyelocalyceal complex can be used to improve the diagnosis and treatment of the kidneys extrarenal urinary tract.

Key words: kidney, pyelocalyceal complex, renal calyx.

Відомості про автора:

Євтушенко Ірина Яківна – кандидат медичних наук, доцент, доцент кафедри клінічної анатомії та оперативної хірургії Харківського національного медичного університету.

Information about the author:

Yevtushenko Irina Y. – Candidate of Medical Sciences, Associate Professor, Associate Professor of Department of Clinical Anatomy and Operative Surgery of Kharkiv National Medical University.

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Рецензент – проф. Т.В. Хмара (Чернівці)