


N. N. Burdenko Voronezh State Medical University  
Department of human anatomy

«Утверждаю»  
Зав. кафедрой нормальной  
анатомии человека,  
проф. Н. Т. Алексеева  
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**GUIDELINES FOR STUDENTS ON THE TOPIC OF PRACTICAL TRAINING:**  
***"Urinary system. Kidneys: external and internal structure, topography, functions. Urinary bladder, ureters, urethra: structure and functions".***

Specialty general medicine

Course I

**Theme of the lesson:** «*Urinary system. Kidneys: external and internal structure, topography, functions. Urinary bladder, ureters, urethra: structure and functions*».

**Aim of the lesson:**

- learn to use Latin terminology to name and demonstrate the organs of the urinary system and their parts on natural preparations
- study the internal structure and functions of the urinary system and their topography in the abdominal and pelvic cavities.

**Motivation of the lesson topic:** the formation of knowledge about the structure and functioning of the organs of the urinary system is necessary for the study of subsequent sections of anatomy, histology, normal physiology, topographic anatomy, pharmacology, pathological anatomy, pathological physiology, and is the basis for the study of clinical disciplines: urology and internal diseases.

**Control questions on the topic of the lesson (App. 1)**

**Plan of the lesson.**

**1. Checking the assimilation of knowledge obtained in the previous lesson: test control, oral interview, test of practical skills.**

**2. Conversation on the topic of the lesson.**

**3. Preparation of tasks.**

**3.1. Independent classroom work of students .**

The kidneys are organs that remove the end products of metabolism through the formation of urine. When considering the topography of the kidneys, it is necessary to pay attention to the fact that the kidneys are located in the abdominal cavity retroperitoneal in the retroperitoneal space and lie against the posterior abdominal wall and therefore are projected on the surface of the body in the lumbar region. Skeletotopy of the kidneys should be considered on the skeleton (Th XII-LIII), emphasize the location of the right kidney half a vertebra below the left, as well as the position of the kidneys in relation to the XII rib during x-ray examination. Syntopia of the kidneys is to demonstrate on a corpse. On individual preparations, show the surfaces, edges, ends, and gates of the kidneys and the renal veins, arteries, and ureter located in them. Note the asymmetry of the position of the abdominal aorta (left) and the inferior Vena cava (right), in connection with which the length of the right and left renal arteries and veins is different.

When considering the fixing device of the kidneys, emphasize the importance of the fat capsule and the openness of the renal fascia downwards, since with rapid resorption of adipose tissue around the kidneys, nephroptosis is possible, leading to deformation of the renal vessels and ureters.

Internal structure to explore on the exposed front section of drugs kidney: medulla (pyramids), the cortex (the surface layer of the parenchyma and the renal poles), renal sinus, minor and major calyx, pelvis.

The diagram should consider the structure of the structural and functional unit of the kidney (nephron); determine the projection of renal segments on the surface of the kidney.

On the corpse and individual preparations, consider the ureters, their topography, the structure of the wall, constrictions (their clinical significance), bends, the place of confluence with the bladder.

The topography and relation of the bladder to the peritoneum should be considered on the cadaver and on the sagittal cut of the pelvis. On a separate preparation, show parts of the bladder. When studying the structure of the bladder wall, it should be noted, the muscle layer (detrusor) and the mucosa, presence of urinary triangle openings of the ureters and the internal urethral orifice.

When studying x-ray anatomy of the urinary organs, it is necessary to consider the topography of the kidneys, their contours, shape and size, various forms of renal pelvis and calyx during pyelography, the course and narrowing of the ureters when filling them with a contrasting mass. It is recommended to consider x-ray images of kidneys examined by arteriography. The bladder is examined on radiographs when it is filled with a contrast agent.

**List of anatomical formations that a student should be able to find and demonstrate on natural preparations**

- |                             |                        |
|-----------------------------|------------------------|
| 1. The urogenital apparatus | Apparatus urogenitalis |
| 2. Urinary organs           | Organa urinaria        |
| 3. Kidney                   | Ren                    |
| 4. Gates the kidneys        | Hilum renale           |

5. Adipose capsule of kidney	Capsula adiposa
6. Kidney fascia	Fascia renalis
7. The cavity of the kidney	Sinus renalis
8. Cortical substance	Cortex renalis
9. Medullar substance	Medulla renalis
10. Kidney pyramids	Pyramides renales
11. Renal papillae	Papillae renales
12. Kidney pillars	Columnae renales
13. Small calices (cups)	Calices renales minores
14. Large calices (cups)	Calices renales majores
15. The renal pelvis	Pelvis renalis
16. Ureter	Ureter
17. Bladder	Vesica urinaria
18. Bottom of the bladder	Fundus vesicae
19. Bladder cervix (neck)	Cervix vesicae
20. The tip of the bladder	Apex vesicae
21. The body of the bladder	Corpus vesicae
22. Internal opening of the urethra	Ostium urethrae internum
23. Urogenital triangle	Trigonum vesicae
24. The openings of the ureters	Ostium ureteres
25. The uvula of the bladder	Uvula vesicae

### 3.2. Control of the knowledge obtained in this lesson (App. 2).

#### 3.3. Clinical cases.

1. The patient is shown a kidney operation. From which side should the kidney operation be performed, so as not to penetrate into the peritoneal cavity?
2. The patient suffers from urolithiasis. Indicate where the ureteral lumen is most likely to be closed by passing stones.
3. A sick man developed a tumor in the area of the bottom of the bladder. What organ can it grow into, given the syntopia of the bladder?

**4. Task for the next lesson.** Topic: «Urinary system. Kidneys: external and internal structure, topography, functions. Urinary bladder, ureters, urethra: structure and functions». The topic «Male genitals: external and internal structure» designed for self-study.

#### Literature

M. Prives, N. Lysenkov, V. Bushkevich Human anatomy. Vol.1 Moscow:Mir (printed Rajdhanni offset), P. 536-543.

*App. 1*

#### Control questions on the topic of the lesson

1. What are the organs touching the left and right kidney?
2. Fixing system of the kidneys.
3. Describe the structure and location of the cortical and medullar compartment of the kidneys.
4. What is the structural and functional unit of the kidney?
5. The value of the fornical apparatus of the kidney, than it is formed?
6. Tell us about the structure and location of small and large calices, renal pelvis.
7. Age-related features of the kidney.
8. Describe the topography of the right and left ureters from their beginning to the wall of the bladder.
9. In what places does the ureter have constrictions, and why did they appear?
10. Describe the topography of the bladder and its relation to the peritoneum.
11. What is the formation of the urogenital triangle?
12. Name the ligaments that fix the bladder.
13. Describe the structure and value of the muscle membrane of the bladder.
14. Describe the structure and topography of the female urethra.
15. Describe the structure and topography of all parts of the female urethra.

**List of questions for the test control of knowledge obtained in the current lesson**

1. The primary kidney (the trunk kidney, or wolf's body) is laid in the human embryo?
2. The final kidney is developing?
3. The final kidney (permanent, or pelvic) is laid in the human embryo?
4. How the pronephros developing?
5. Primary kidney developing?
6. The surface of the kidneys?
7. Marges of the kidney?
8. The XII rib crosses the posterior surface of the left kidney?
9. Skeletotopia of the right kidney?
10. The XII rib crosses the posterior surface of the right kidney?
11. Skeletotopia of the left kidney?
12. Specify what the kidneys touch from above?
13. Specify the bodies that come into contact with the kidneys in the back?
14. The left kidney is in contact?
15. Is it attached to the medial edge of the right kidney?
16. The right kidney is in contact?
17. The kidneys enter through the gate?
18. Do the kidneys go out through the gate?
19. The right kidney is located relative to the left?
20. The juxtaglomerular complex consists of?
21. The juxtaglomerular complex is located?
22. Cells of the juxtaglomerular complex secrete?
23. The straight tubules forming the juxta-medullary nephron loop are located?
24. Above the bases of the renal pyramids at the border of the cortical and cerebral substance are?
25. In the kidney columns are located?
26. In the radiant part of the kidneys are located?
27. In the convoluted part of the cortical substance are?
28. Specify the muscles that form the kidney bed?
29. Specify the shell of the kidneys?
30. The depression in the middle of the medial edge of the kidney is called?
31. In the renal sinus are?
32. Specify the Department of nephron where filtration occurs?
33. Specify the segments of the kidneys?
34. Specify the correct sequence of excretory pathways of the kidney?
35. Which form of the excretory kidney tree is characterized by the absence of large calices?
36. Which form of the excretory kidney tree is characterized by the absence of a pelvis?
37. For the fetal form of the excretory tree of the Kidney is characteristic?
38. For the embryonic form of the excretory tree of the Kidney is characteristic?
39. Muscles of the fornical apparatus of the kidney?
40. Regulates the excretion of urine from the renal tubules to the small renal cups?
41. Does the fornical apparatus of the kidney participate?
42. The fixing device of the kidney include?
43. Which form of the excretory kidney tree is characterized by the absence of a pelvis?
44. Specify formations related to the nephron?
45. Primary urine is formed?
46. Does it apply directly to the substance of the kidney?
47. The kidneys are covered with peritoneum?
48. Specify the number of kidney segments?
49. External ureteral lining?
50. When moving to the pelvis, the left ureter crosses?
51. Layers of the ureter wall?
52. The openings of the ureters are?
53. Are the ureters covered with peritoneum?
54. The muscular lining of the ureter has two layers?
55. Length of the ureter in an adult?

56. The muscular lining of the ureter has three layers?
57. Is the urogenital triangle located?
58. The bottom of the bladder in women is in contact with?
59. Layers of the bladder wall in the area of the urogenital triangle?
60. The posterior surface of the bladder in women touches?
61. The filled bladder is covered with peritoneum?
62. The bottom of the bladder in men is attached?
63. The posterior surface of the bladder in men is attached to?
64. Parts of the bladder?
65. An empty bladder covered with peritoneum?
66. The crest of the urethra is located?
67. In the spongy part of the male urethra opens?
68. Length of the female urethra?
69. Part of the male urethra passes through the urogenital diaphragm?
70. Length of the male urethra?
71. The navicular fossa is located in part of the male urethra?
72. Parts of the male urethra?
73. Specify the narrowest Part of the male urethra?
74. The arbitrary sphincter of the male urethra is located in the?
75. The shortest part of the male urethra?