КРАСНОЯРСКИЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ
1942/2022

Federal State Budgetary Educational Institution of Higher Education "Krasnoyarsk State Medical University named after. prof. V.F. Voino-Yasenetsky" Ministry of Health of the Russian Federation
Department of Operative Surgery with Topographic Anatomy

SURGICAL ANATOMY OF THE RETROPERITONEAL SPACE ORGANS

Lecturer: PhD, Associate professor Anna D. Shabokha

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LECTURE PLAN

1. *Lumbar region. Boundaries. Layer structure.*
2. *Muscles and weak points of the lumbar region. Petit triangle, Lesgaft-Grunfeld rhombus.*
3. *Kidneys. Topography. Blood supply. Innervation.*
4. *Ureters. Topography. Blood supply. Innervation.*
5. *Access to the organs of the retroperitoneal space.*
6. *Perinephric block according to A.V. Vishnevsky.*
7. *Nephrectomy. Nephrotomy.*
8. *Pyelotomy. Pyelostomy.*
9. *Resection and suture of the ureter.*

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PURPOSE

Describe the topographic anatomy of the retroperitoneum, kidneys and ureters.

Indicate the main stages in the development of surgical interventions on the kidneys and ureters.

To acquaint students with the techniques of a number of surgical interventions on these organs and give their topographic and anatomical justification.

To acquaint students with basic definitions and classifications.

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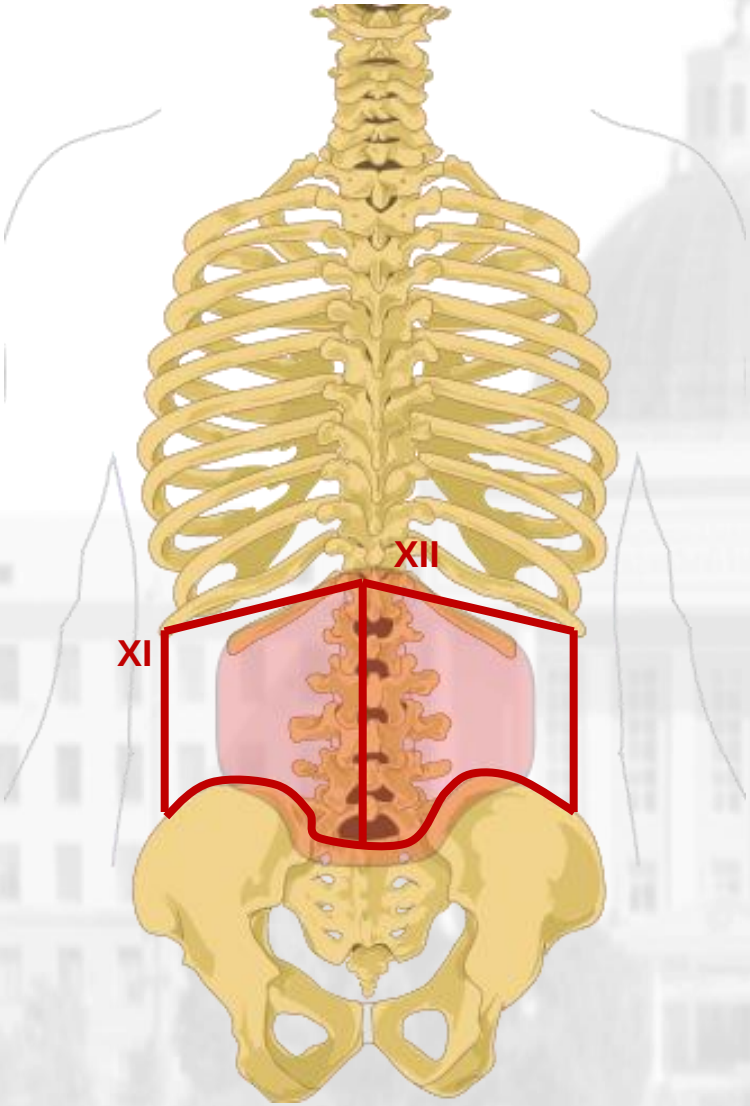
LUMBAR REGION. BORDERS



Above – the lower edge of the XII rib;
Below - the iliac crest;
Medially – line of spinous processes L_{1-5};
laterally – Lesgaft line

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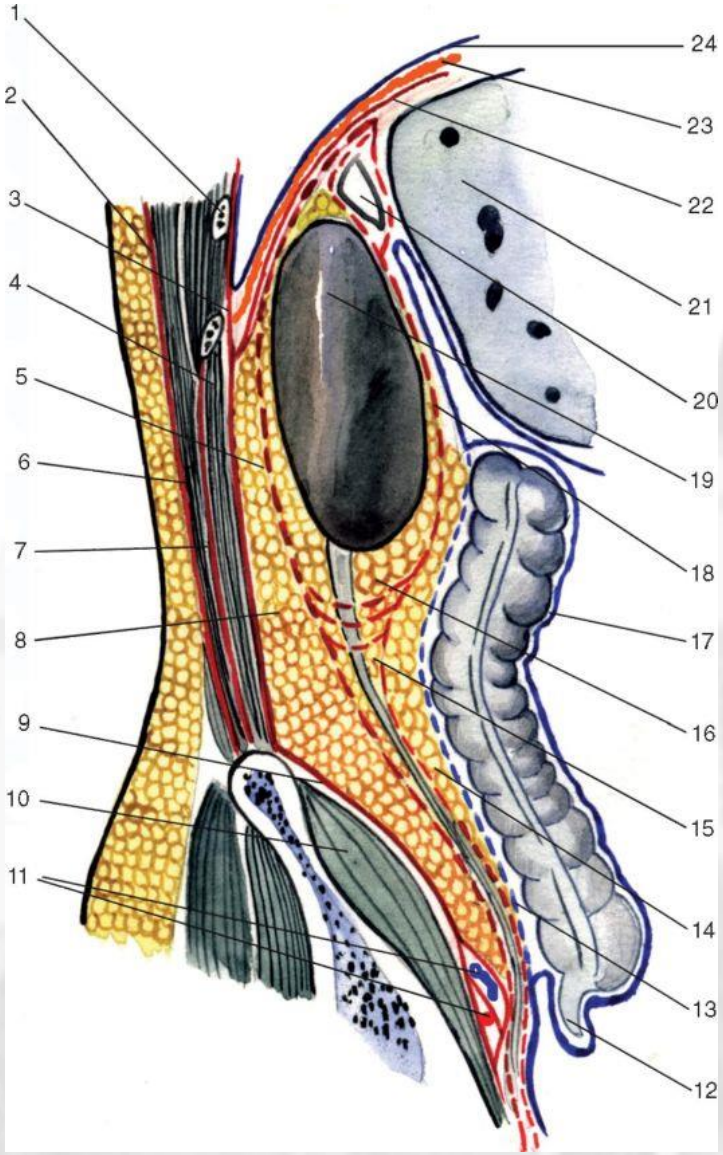
LAYER-BY-LAYER STRUCTURE. SAGITTAL CUT



1 – costa XI;
2 - fascia thoracolumbalis;
3 - fascia endoabdominalis;
4 - m. quadratus lumborum;
5 - fascia retrorenalis;
6 - m. erector spinae;
7 - lamina profunda f. thoracolumbalis;
8 - **spatium retroperitoneale;**
9-10 – fascia iliaca, m. iliacus;
11 - a., v. iliaca communis;
12 - processus vermiformis;
13 - fascia precaecalis (Toldt);
14-16 – **paracolon, paraureter, paranephron**;
17 - peritoneum;
18 - fascia prerenalis;
19, 20 – ren, glandula suprarenalis;
21 - hepar;
22 - fascia diaphragmatica;
23 - diaphragma;
24 - fascia endothoracica

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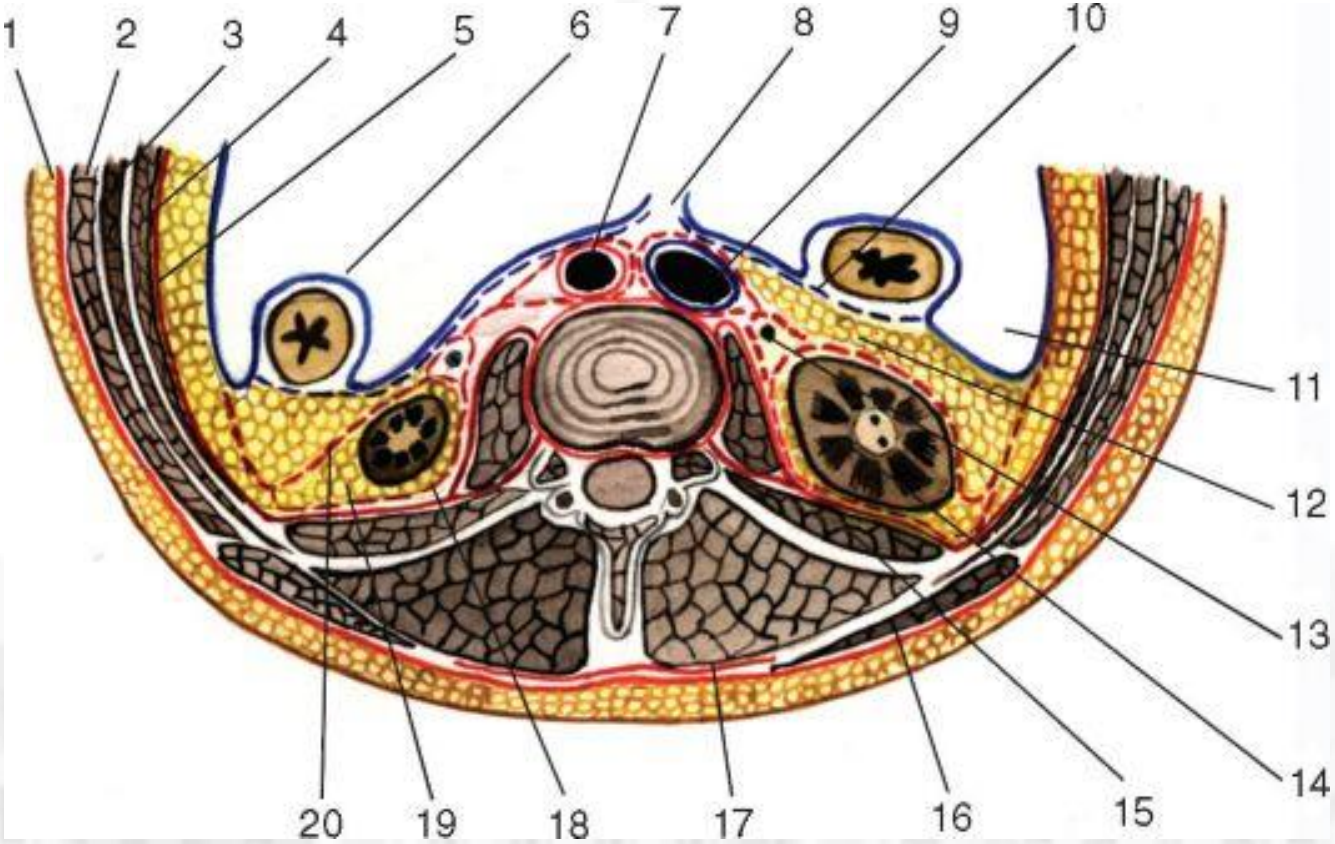
LAYER-BY-LAYER STRUCTURE. HORIZONAL CUT



1 - fascia propria;
2 - m. obliquus externus abdominis;
3 - m. obliquus internus abdominis;
4 - m. transversus abdominis;
5 - fascia endoabdominalis;
6 - peritoneum;
7 - aorta abdominalis;
8 - mesenterium;
9- v. cava inferior;
10 - fascia retrocolica;
11 - sulcus paracolicus;
12 - paracolon;
13, 14 – ureter, ren;
15 - m. quadratus lumborum;
16 - m. latissimus dorsi;
17 - m. erector spinae;
18-20 - fascia retrorenalis, paranephron, fascia prerenalis

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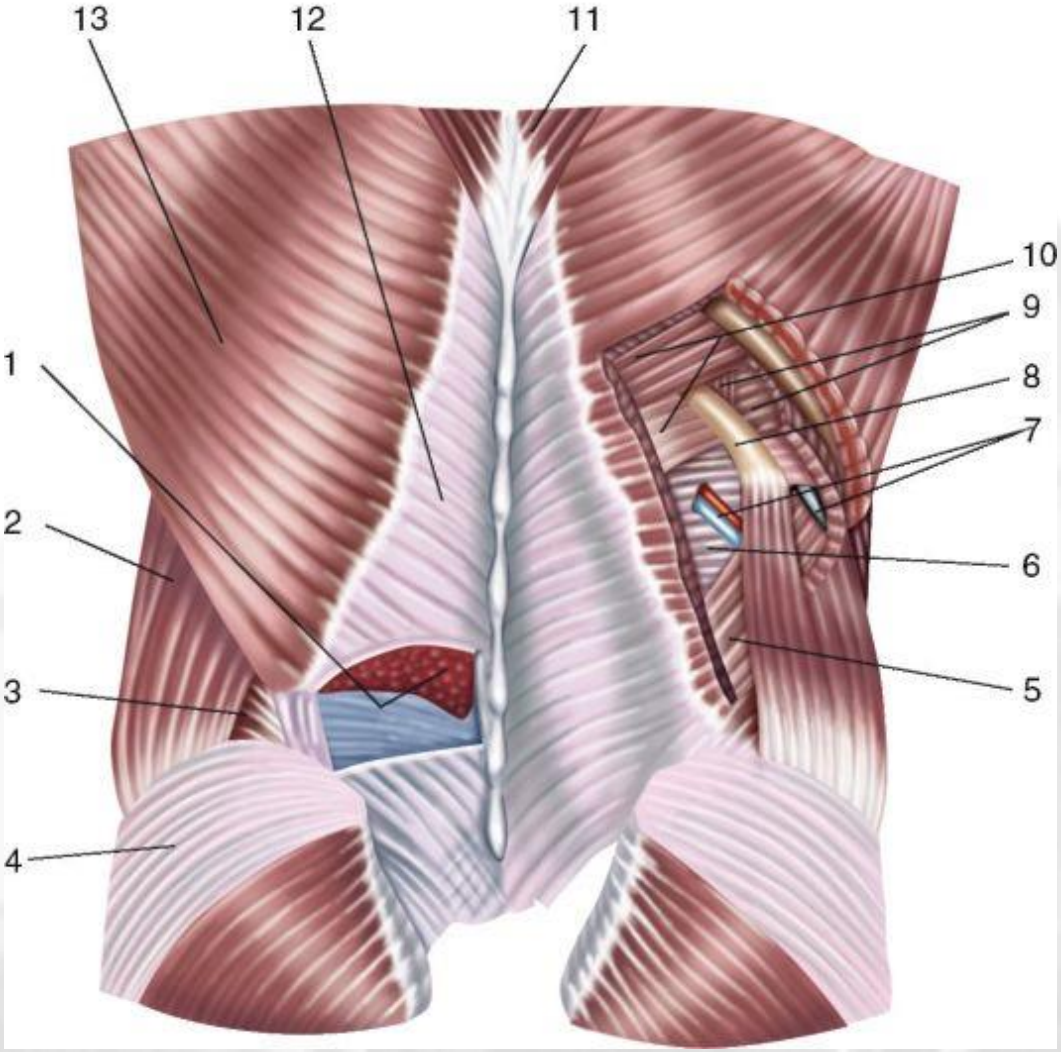
MUSCLES AND WEAK POINTS IN THE LUMBAR REGION



1- m. erector spinae;
2 - m. obliquus externus abdominis;
3 - trigonum lumbale inferius;
4 - m. gluteus medius;
5 - m. obliquus internus abdominis;
6 - aponeurosis m. transversus abdominis (bottom of the upper lumbar triangle);
7 - a., n. intercostalis;
8 - costa XII;
9 - mm. intercostales;
10 - m. serratus posterior inferior;
11 - m. trapezius;
12 - fascia thoracolumbalis;
13 - m. latissimus dorsi

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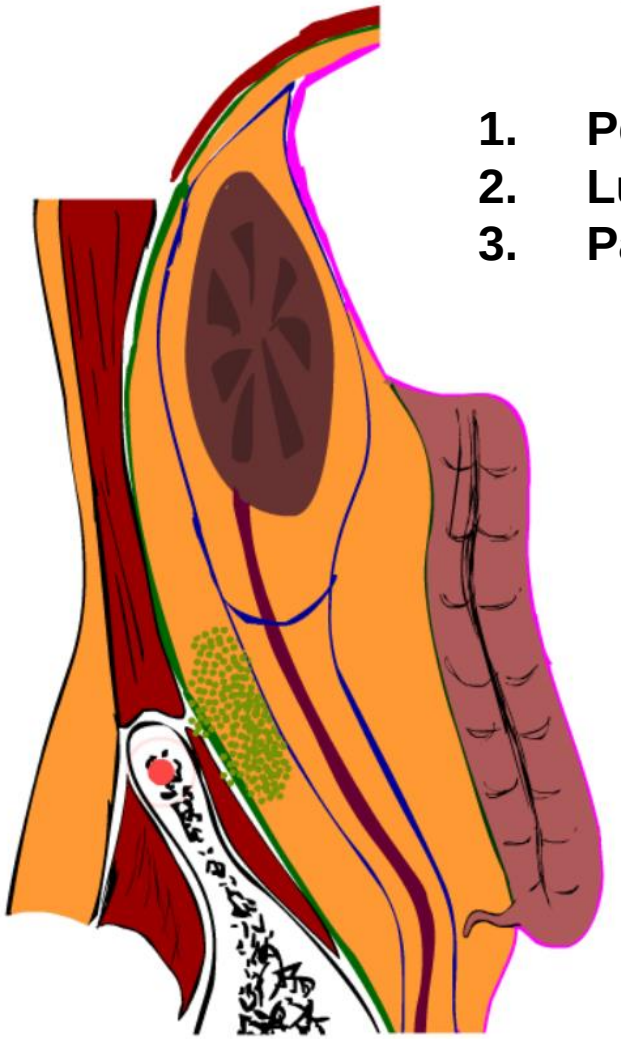
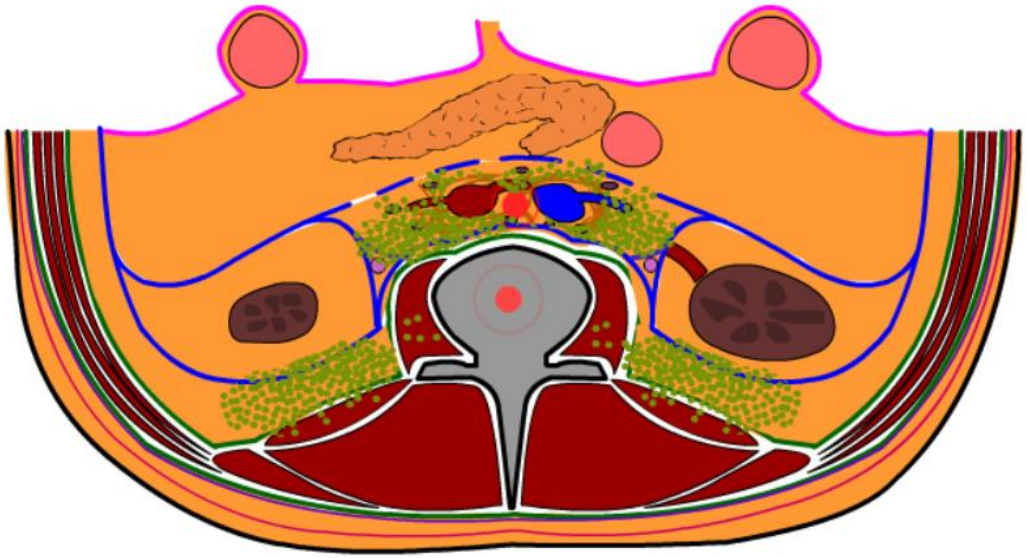
CELLULAR SPACES. SOURCES OF INFECTION

The extraperitoneal proper cellular space;

1. **Pelvic bones;**
2. **Lumbar vertebrae;**
3. **Paraaortic lymph nodes**





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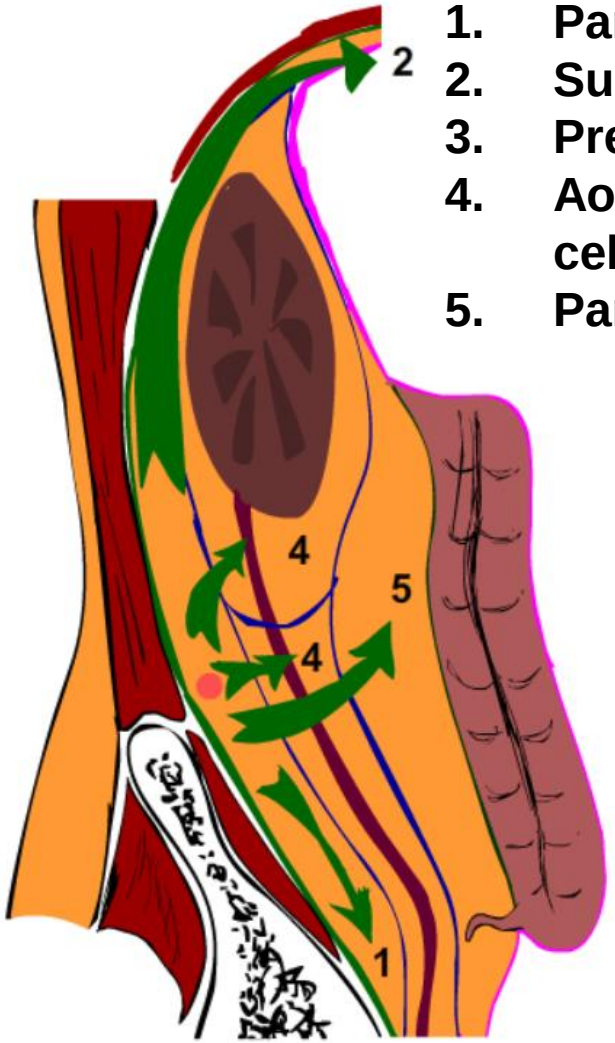
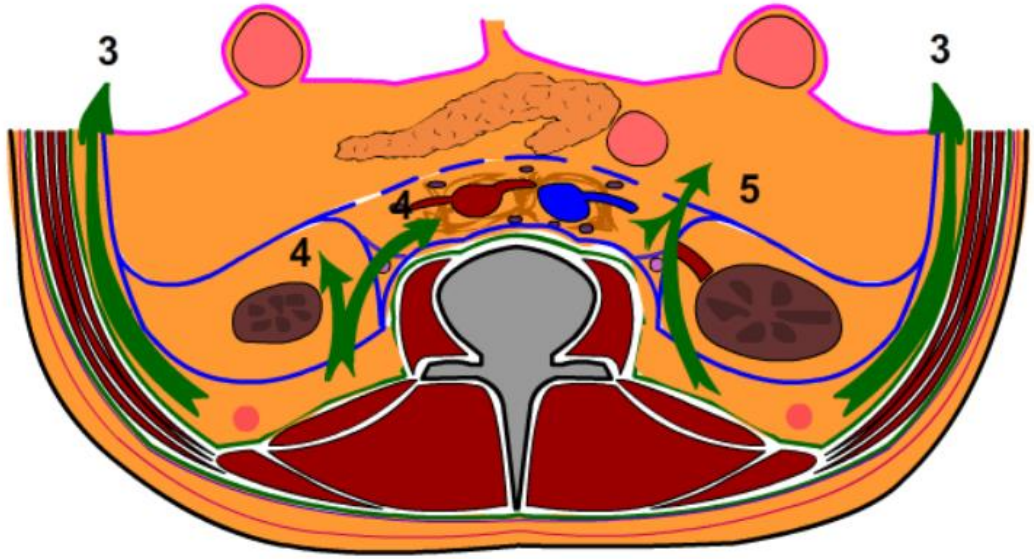
CELLULAR SPACES.
SPREADING OF INFECTION

1. Parietal cellular space of the pelvis;
2. Subphrenic space;
3. Preperitoneal cellular space;
4. Aortic and IVC sheath, perinephric and paraurethral cellular spaces;
5. Paracolic cellular space.





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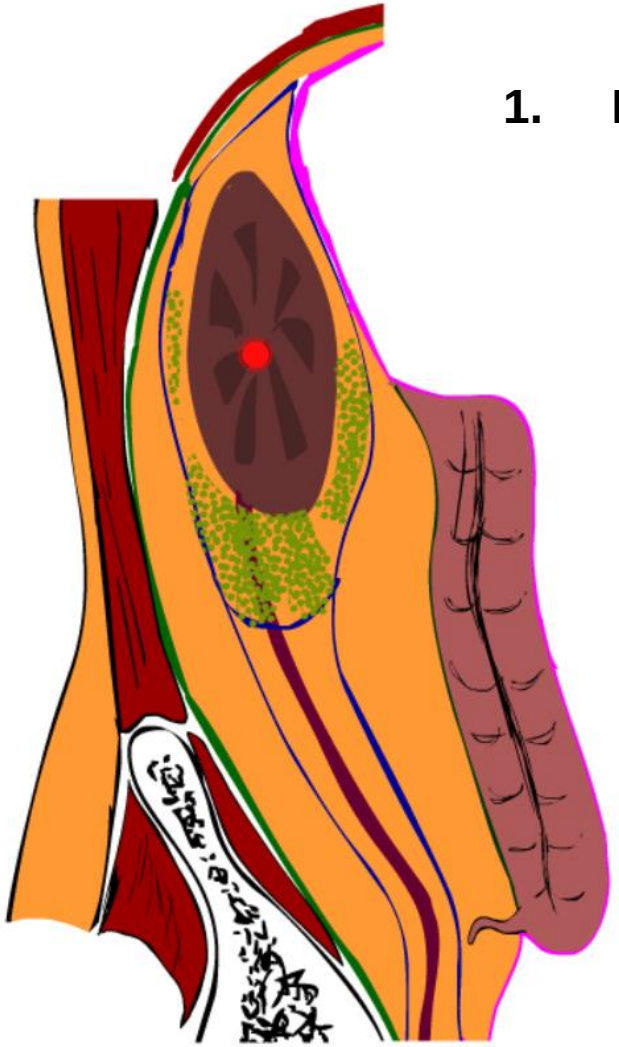
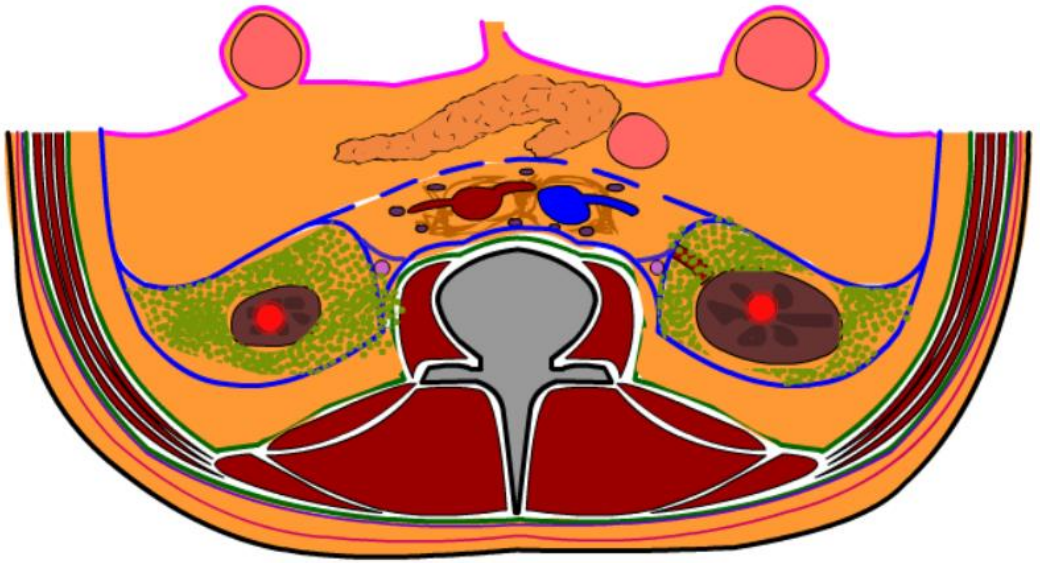
CELLULAR SPACES. SOURCES OF INFECTION

Perirenal cellular space

1. **Kidneys.**





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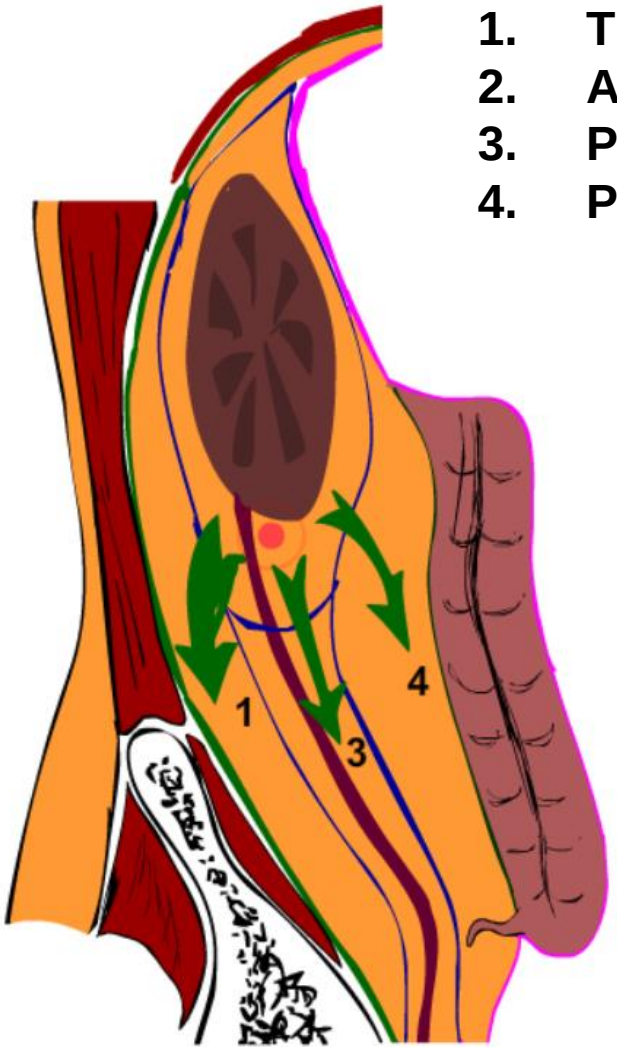
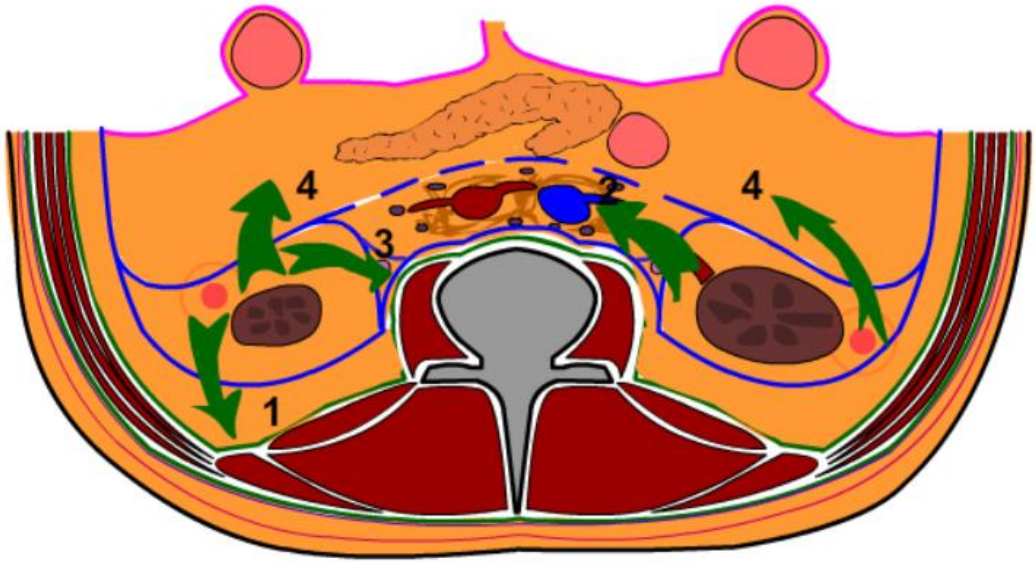
CELLULAR SPACES. SPREADING OF INFECTION

1. **The extraperitoneal proper cellular space;**
2. **Aortic and IVC sheath;**
3. **Periureteral cellular space;**
4. **Paracolic cellular space.**





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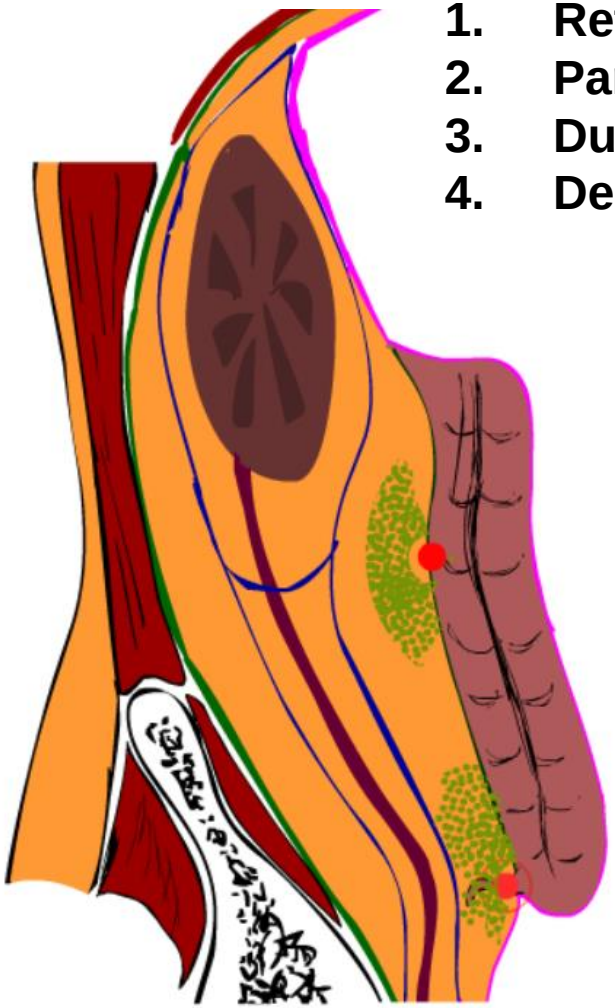
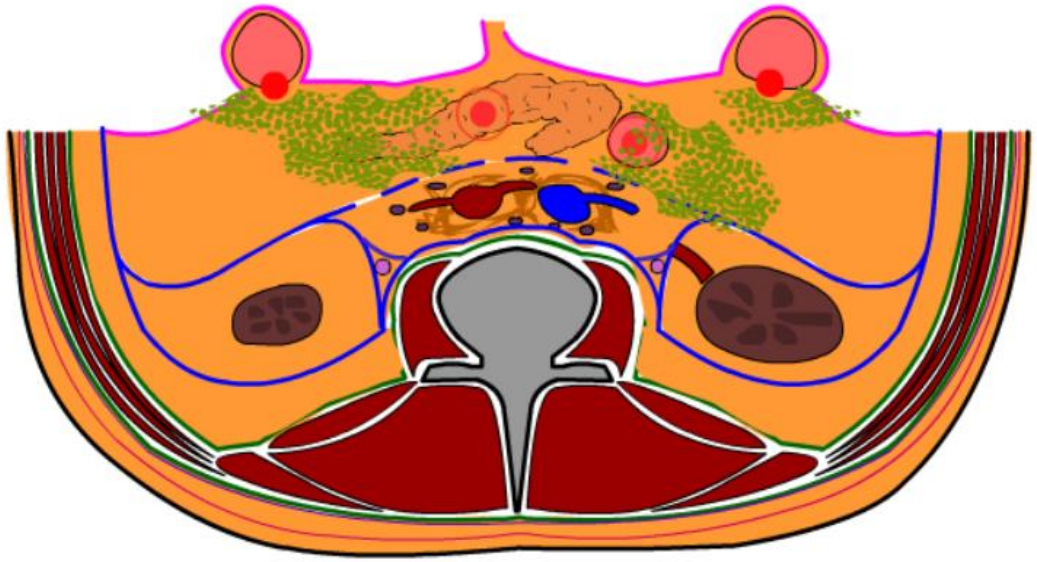
CELLULAR SPACES. SOURCES OF INFECTION

Paracolic cellular space.

1. **Retrocecal appendix;**
2. **Pancreas;**
3. **Duodenum;**
4. **Descending and ascending colon.**





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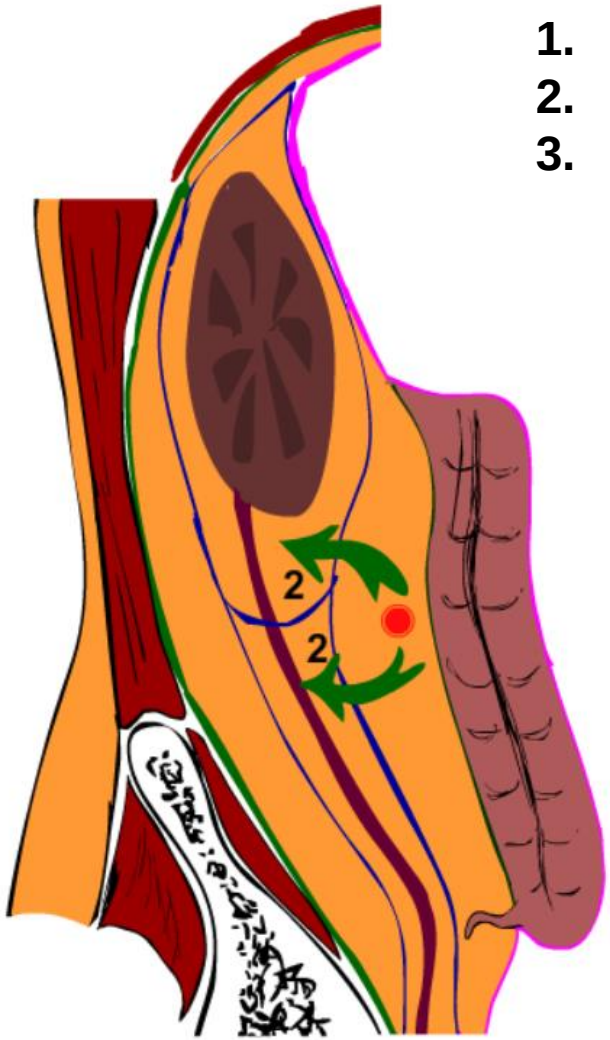
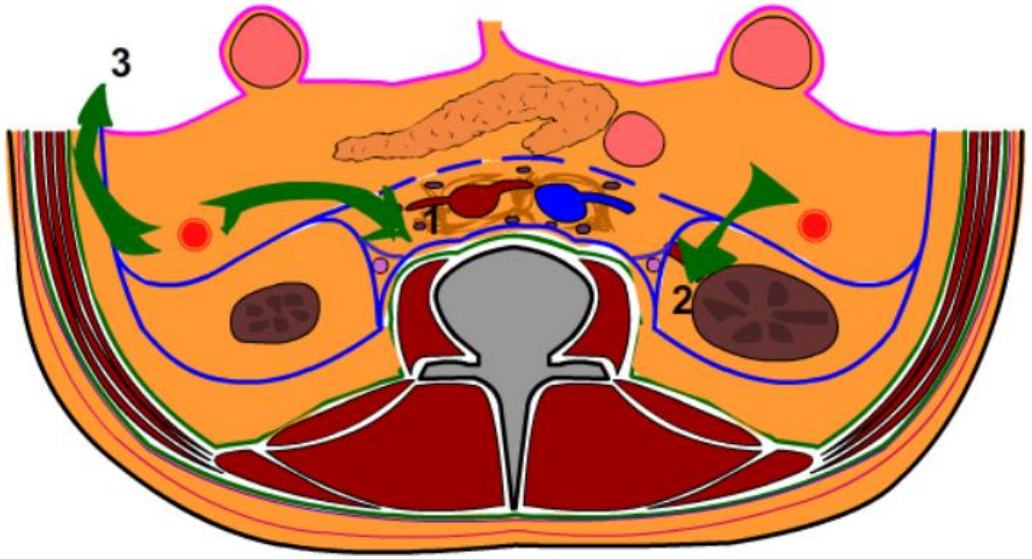
CELLULAR SPACES. SPREADING OF INFECTION

1. **Aortic and IVC sheath;**
2. **Perinephric, periureteral cellular space;**
3. **Preperitoneal cellular space of the anterior abdominal wall.**





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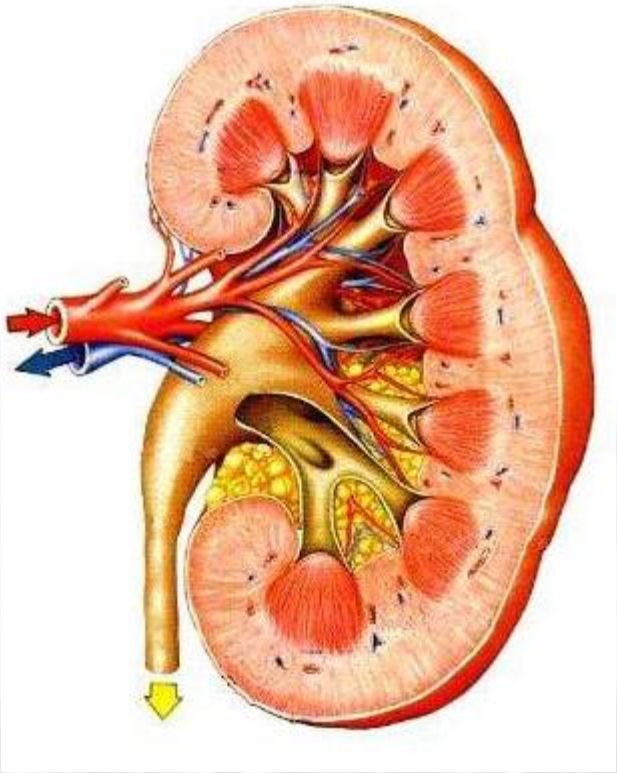
KIDNEYS

Paired organ of the urinary system, providing homeostasis.

Functions:

1. *Excretory;*
2. *Concentration;*
3. *Osmoregulatory;*
4. *Ion-regulating;*
5. *Incretory;*
6. *Hematopoietic.*
7. *Blood pressure regulation;*
8. *Metabolic, etc.*



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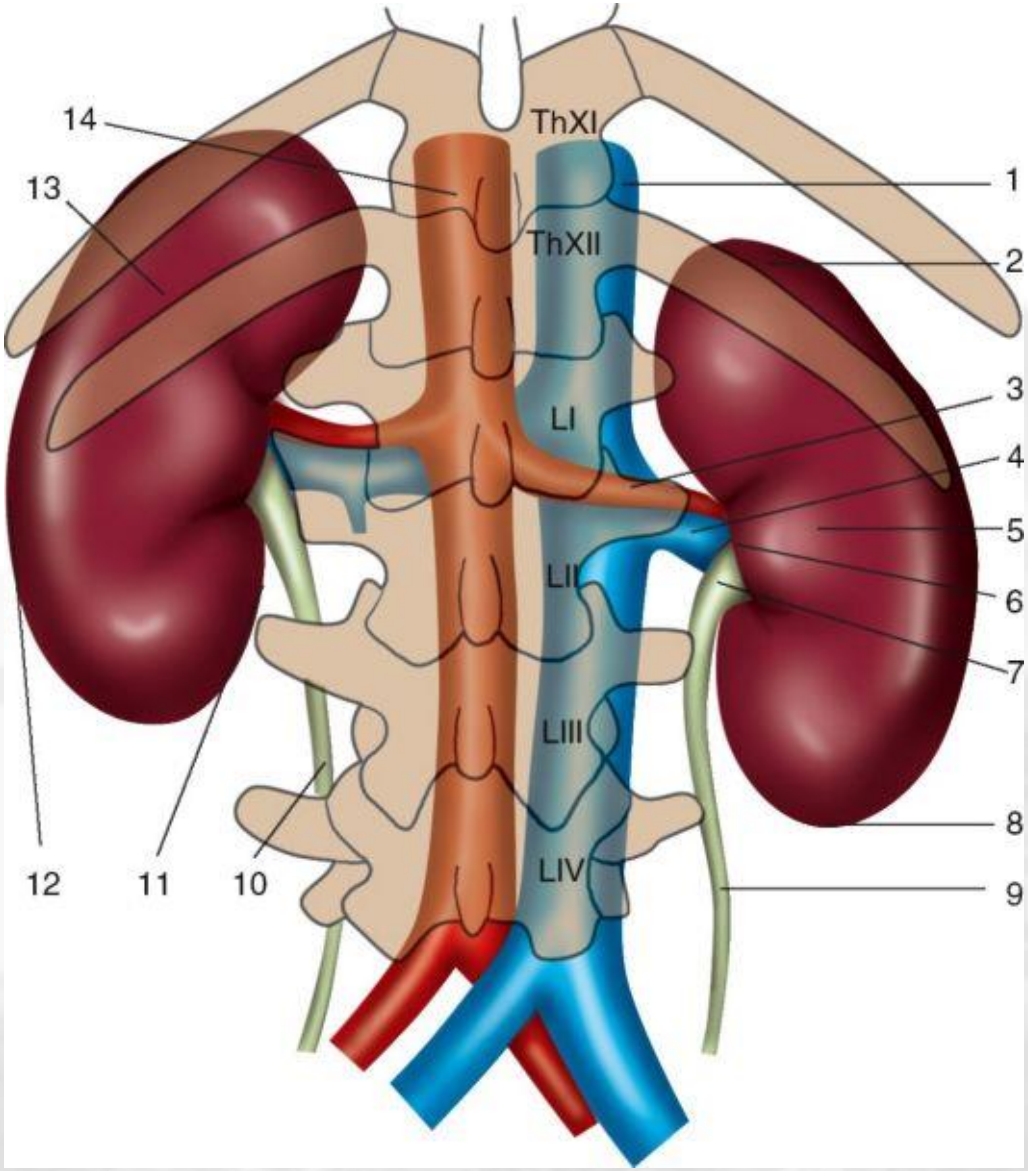
KIDNEYS. SKELETOPYA



Back view:

1 - v. cava inferior;
2 - extremitas superior;
3 - a. renalis dextra;
4 - v. renalis dextra;
5 - ren dexter;
6 - hylum renale;
7 - pelvis renalis;
8 - extremitas inferior;
9 - ureter dexter;
10 - ureter sinister;
11 - margo medialis;
12 - margo lateralis;
13 - ren sinister;
14 - aorta abdominalis

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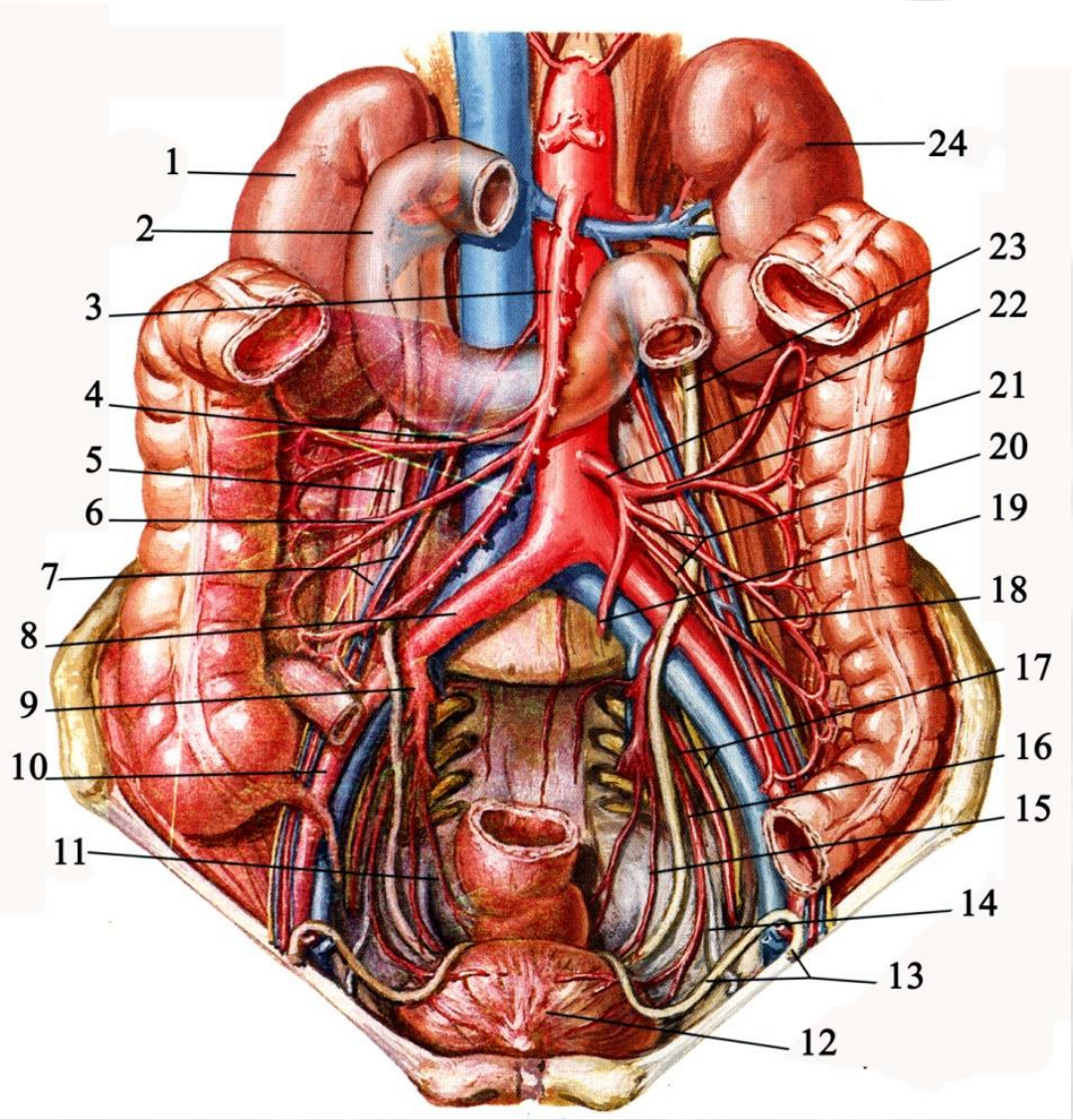
KIDNEYS. SYNTOPIA



At the back are the muscles of the lumbar region.

Front:

a) for the right kidney - right liver's lobe, descending duodenum, ascending colon

b) for the left kidney – stomach, tail of the pancreas, splenic flexure and descending colon, small intestine, spleen.

The upper pole of each kidney is covered by the adrenal gland.

Near the renal hilum there are: for the right kidney – the IVC, for left kidney - aorta.

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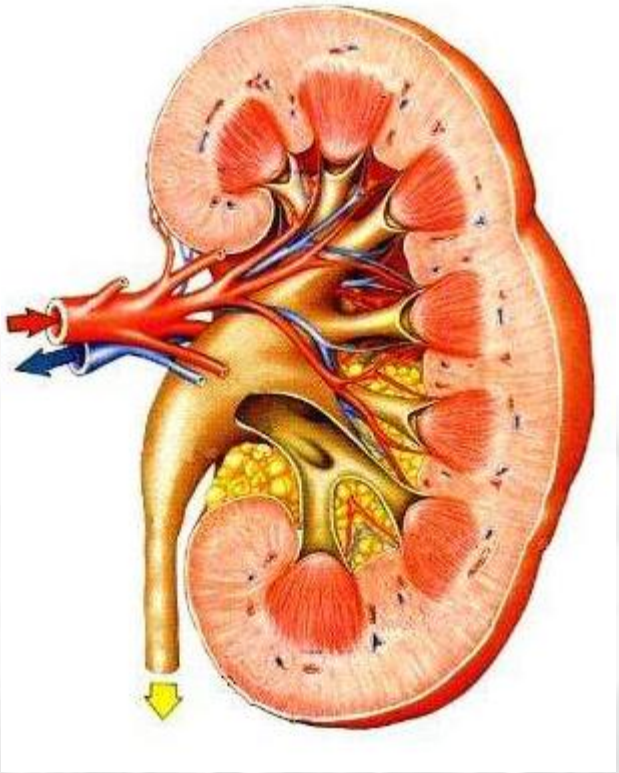
KIDNEYS. FIXATION FACTORS

1. *Intra-abdominal pressure.*
2. *Renal muscle compartment.*
3. *Capsule apparatus.*
4. *Adipose capsule of the kidney.*
5. *Ligamentous apparatus.*
6. *Renal pedicle.*
7. *Supporting power of internal organs.*
8. *Suction effect of the chest cavity.*
9. *Lifestyle**



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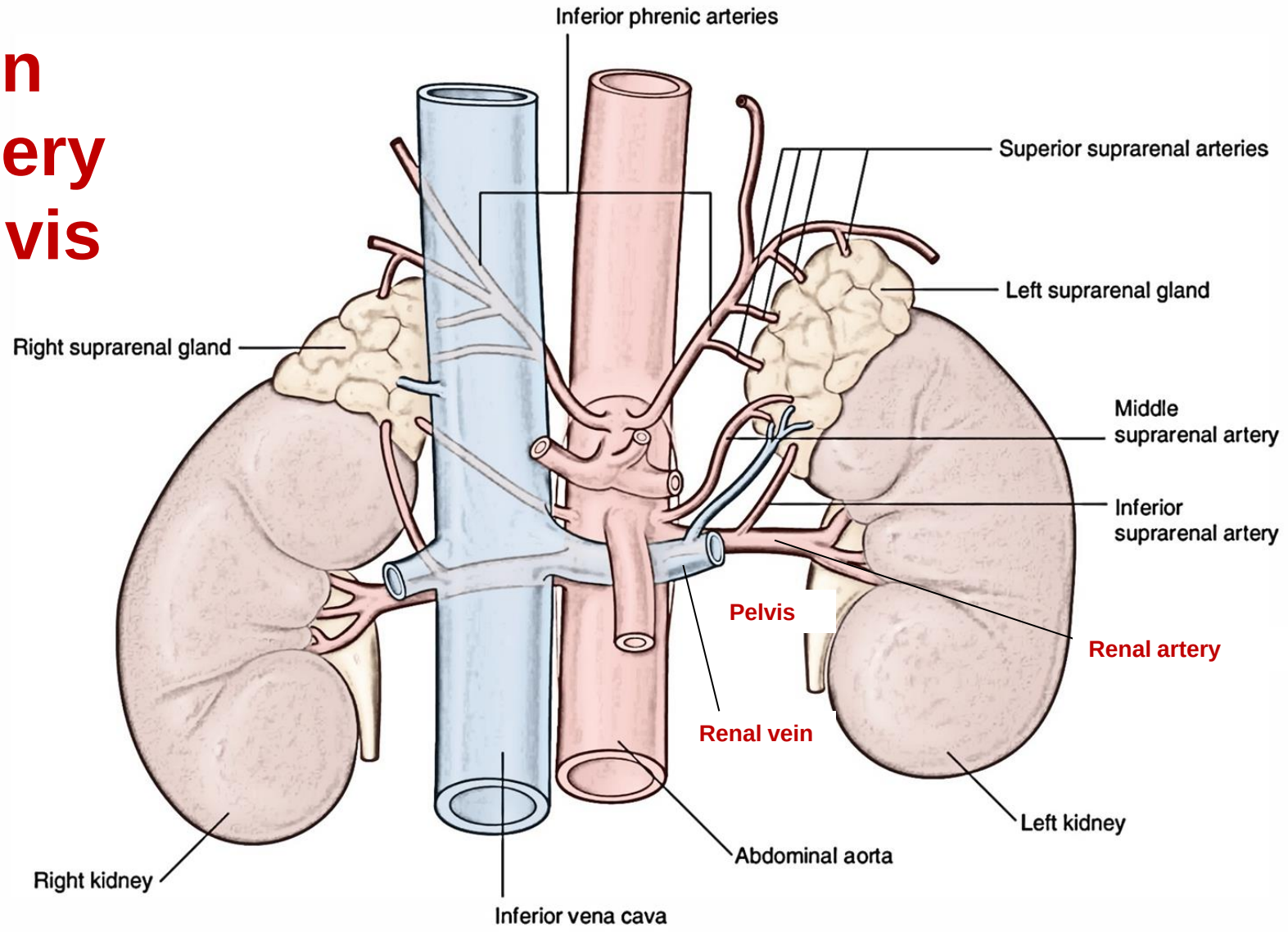
KIDNEYS. BLOOD SUPPLY

Vein
Artery
Pelvis



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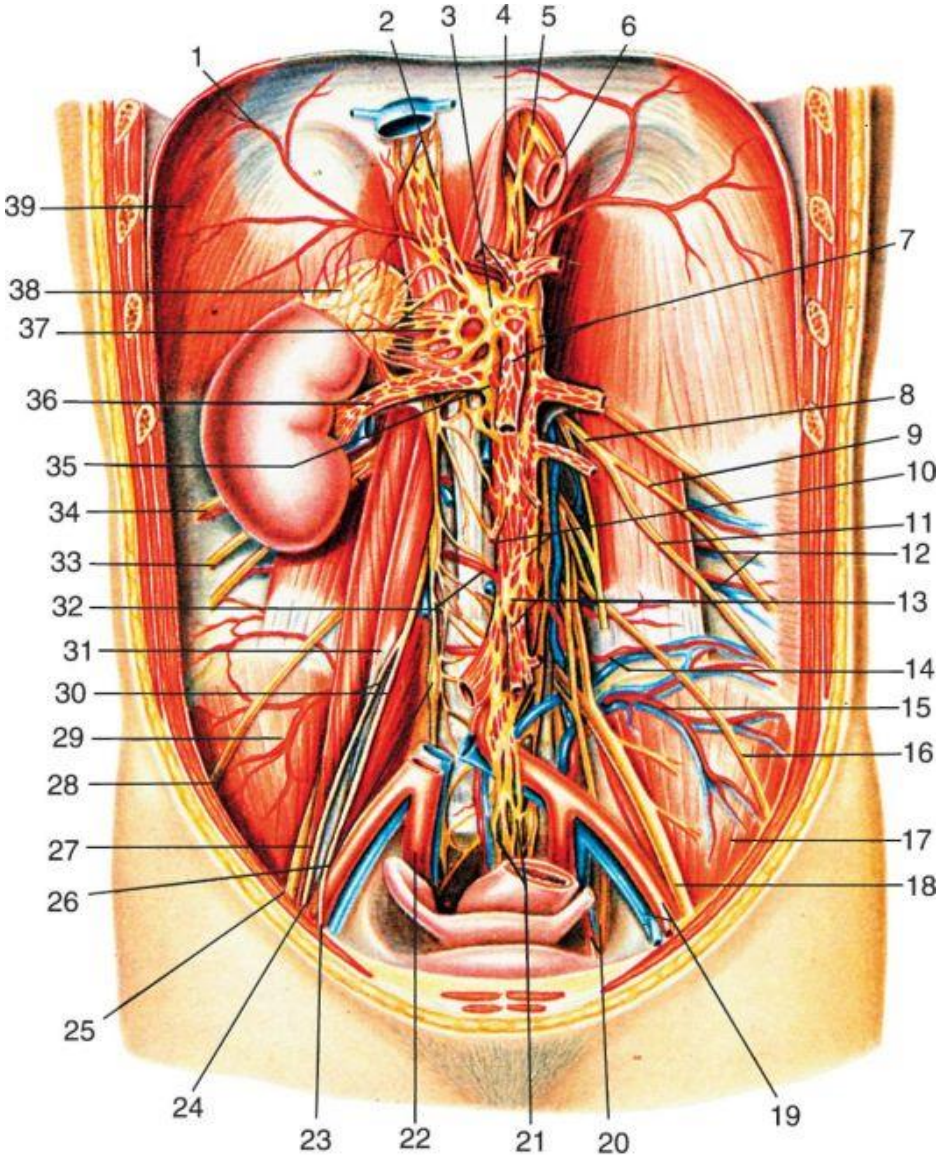
RETROPERITONEAL NERVES



1 - a. phrenica inferior; 2 - plexus phrenicus и ganglion phrenicum; 3 - plexus coeliacus и ganglia coeliaca; 4 - truncus vagalis posterior; 5 - truncus vagalis anterior; 6 - oesophagus; 7 - gangl. mesentericum superius и plexus mesentericus superior; 8 - ствол n. iliohypogastricus и n. ilioinguinalis; 9 - n. iliohypogastricus; 10 - plexus aorticus abdominalis; 11 - n. ilioinguinalis; 12 - aa. и vv. lumbales; 13 - gangl. mesentericum inferius и plexus mesentericus inferior; 14 - a. lumbalis; 15 - a. iliolumbalis; 16 - n. cutaneus femoris lateralis; 17 - m. iliacus; 18 - n. femoralis; 19 - a. и v. iliacae externae; 20 - n. obturatorius и a. obturatoria; 21 - plexus hypogastricus superior; 22 - a. iliaca interna; 23 - r. genitalis n. genitofemoralis; 24 - truncus sympathicus 25 - n. femoralis; 26 - r. femoralis n. genitofemoralis; 27 - m. psoas major; 28 - n. cutaneus femoris lateralis; 29 - a. iliolumbalis; 30 - n. genitofemoralis; 31 - m. psoas minor; 32 - a. lumbalis; 33 - n. iliohypogastricus; 34 - n. subcostalis; 35 - gangl. aorticorenale; 36 - a. renalis и plexus renalis; 37 - plexus suprarenalis; 38 - glandula suprarenalis; 39 - diaphragma

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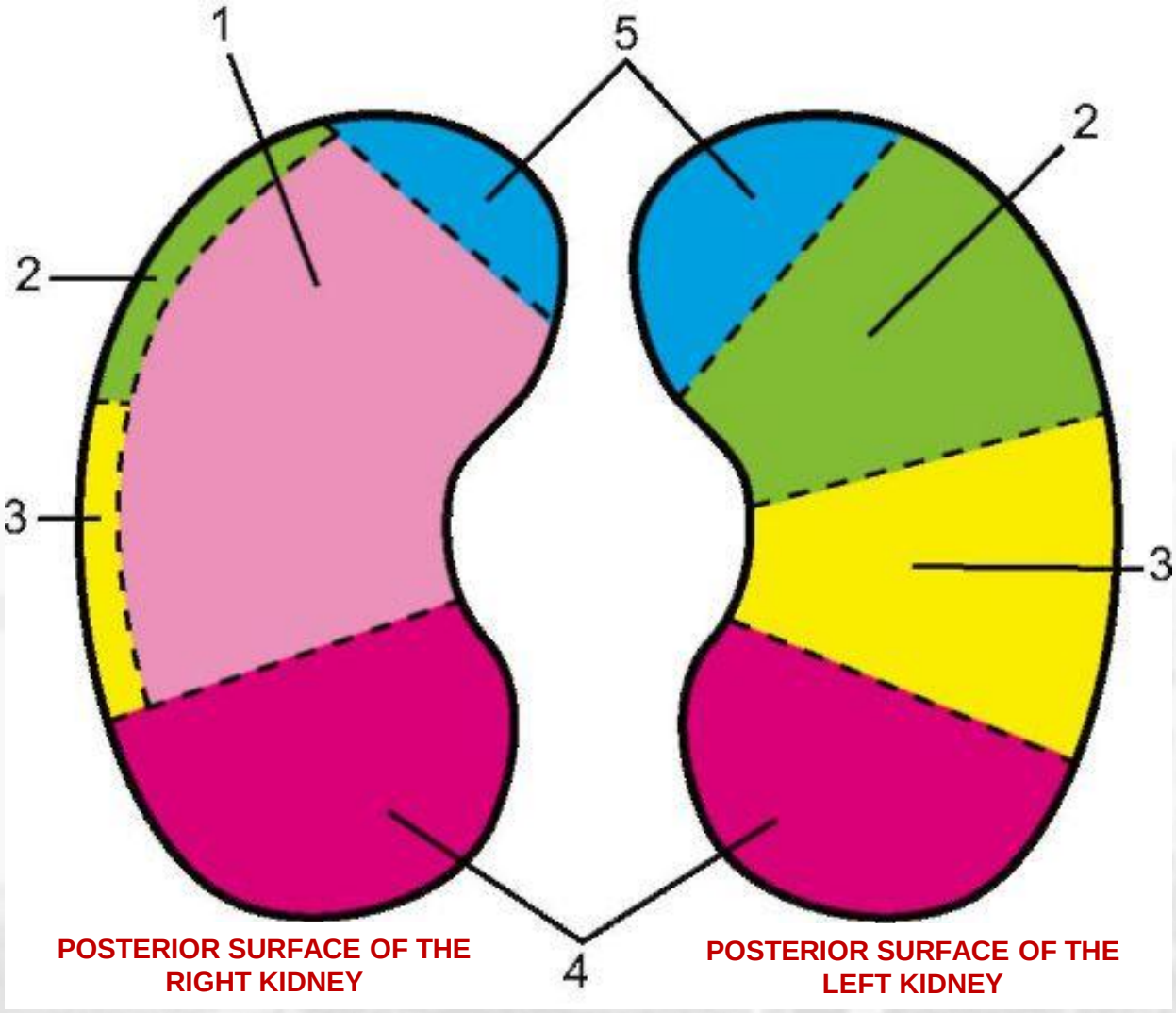
RENAL SEGMENTS

(A SCHEME):



POSTERIOR SURFACE OF THE RIGHT KIDNEY

POSTERIOR SURFACE OF THE LEFT KIDNEY

1 - segmentum posterius;
2 - segmentum anterius superius;
3 - segmentum anterius inferius;
4 - segmentum inferius;
5 - segmentum superius

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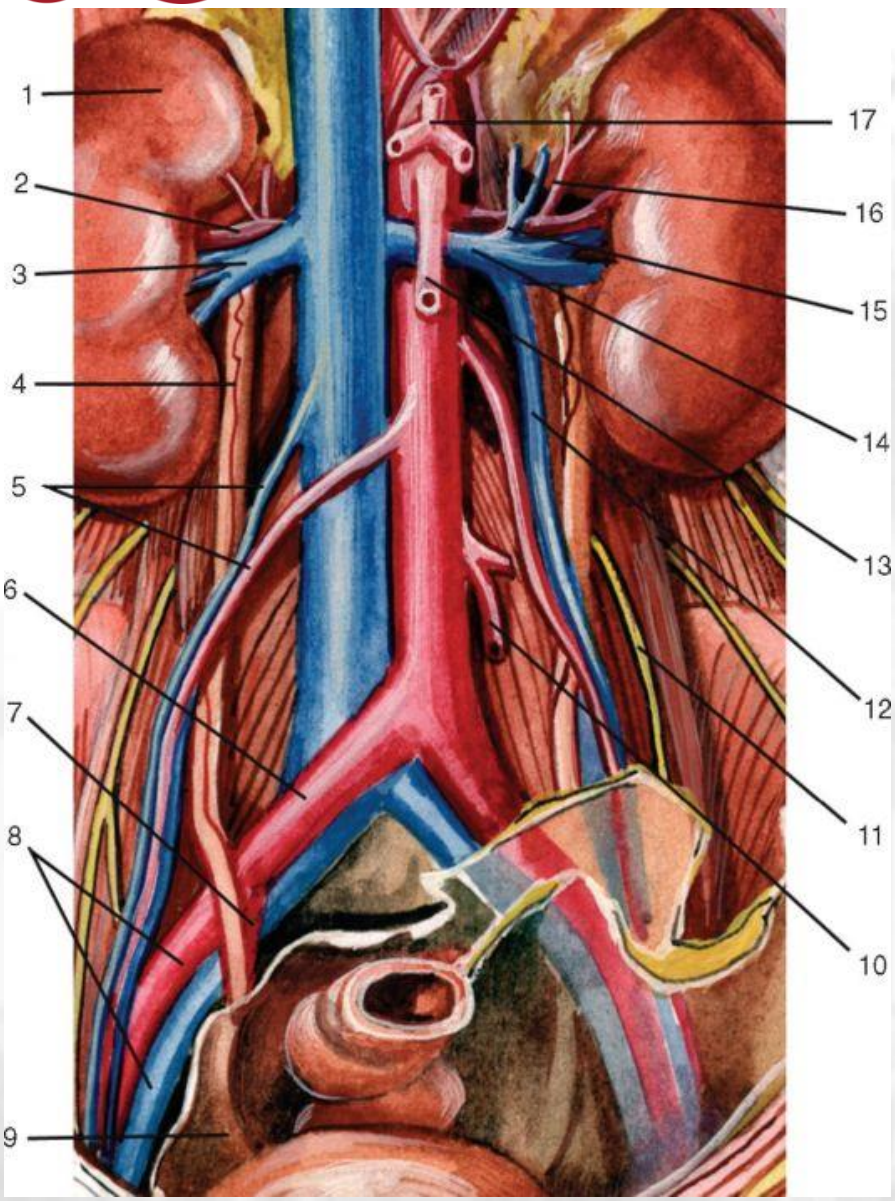
URETERS. SYNTOPIA



1 - ren dexter;
2, 3 - a. et v. renalis dextra;
4 - ureter dexter;
5 - a., v. testicularis;
6 - a. iliaca communis;
7 - a. iliaca interna;
8 - a., v. iliaca externa;
9 - the contour of the ureter under the peritoneum (pelvic region);
10 - a. mesenterica inferior;
11 - n. genitofemoralis;
12 - v. testicularis sinistra;
13 - a. mesenterica superior;
14 - v. renalis sinistra;
15 - v. suprarenalis;
16 - a. suprarenalis;
17 - truncus coeliacus

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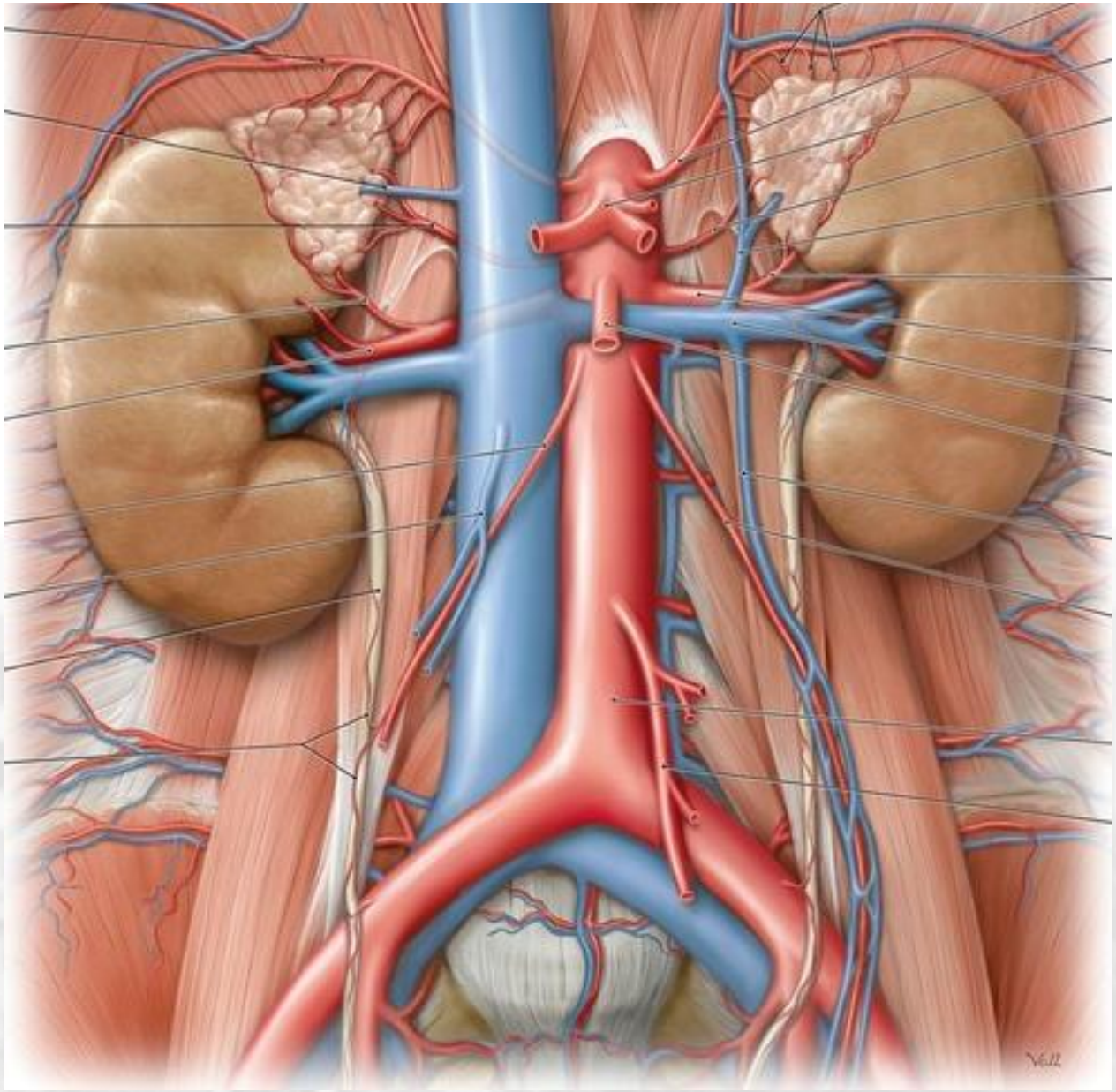
URETERS. BLOOD SUPPLY



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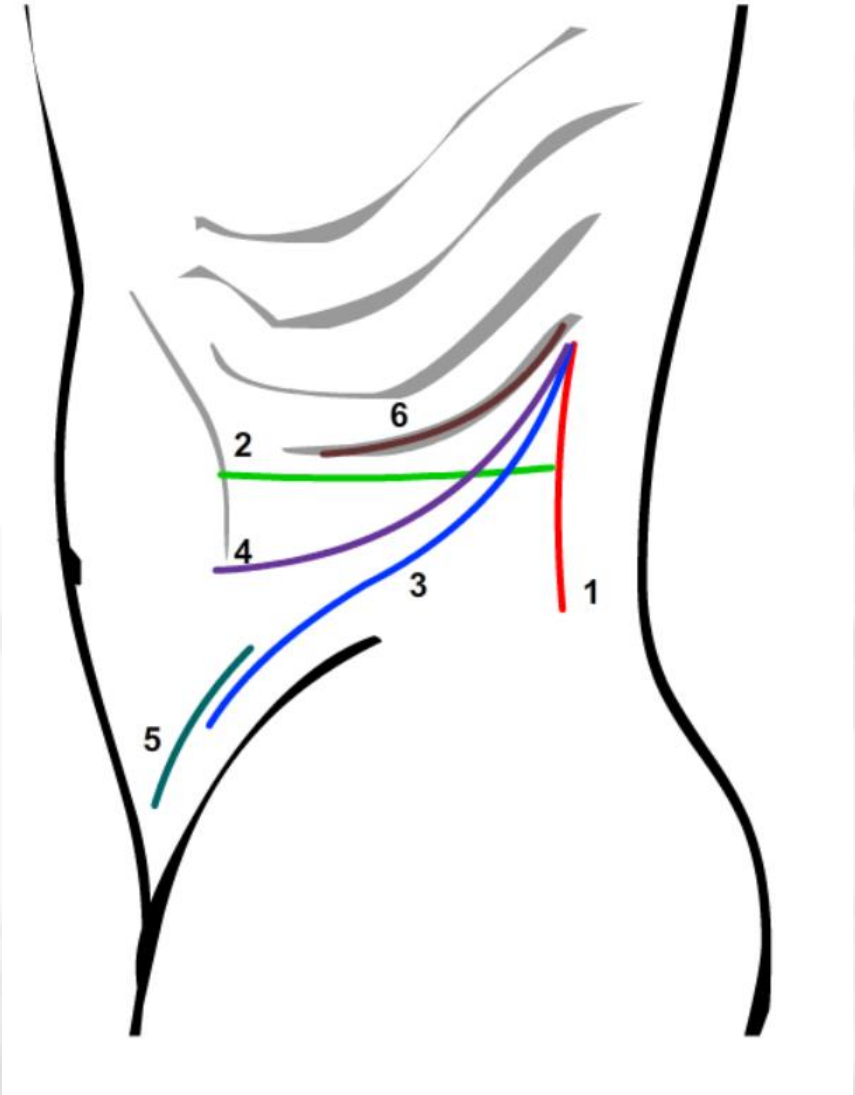
OPERATIVE ACCESS TO RETROPERITONEAL ORGANS



1. Simon's access;
2. Pean's access;
3. Bergman-Israel Access;
4. Fedorov's access;
5. Pirogov’s access;
6. Zalewski's access.

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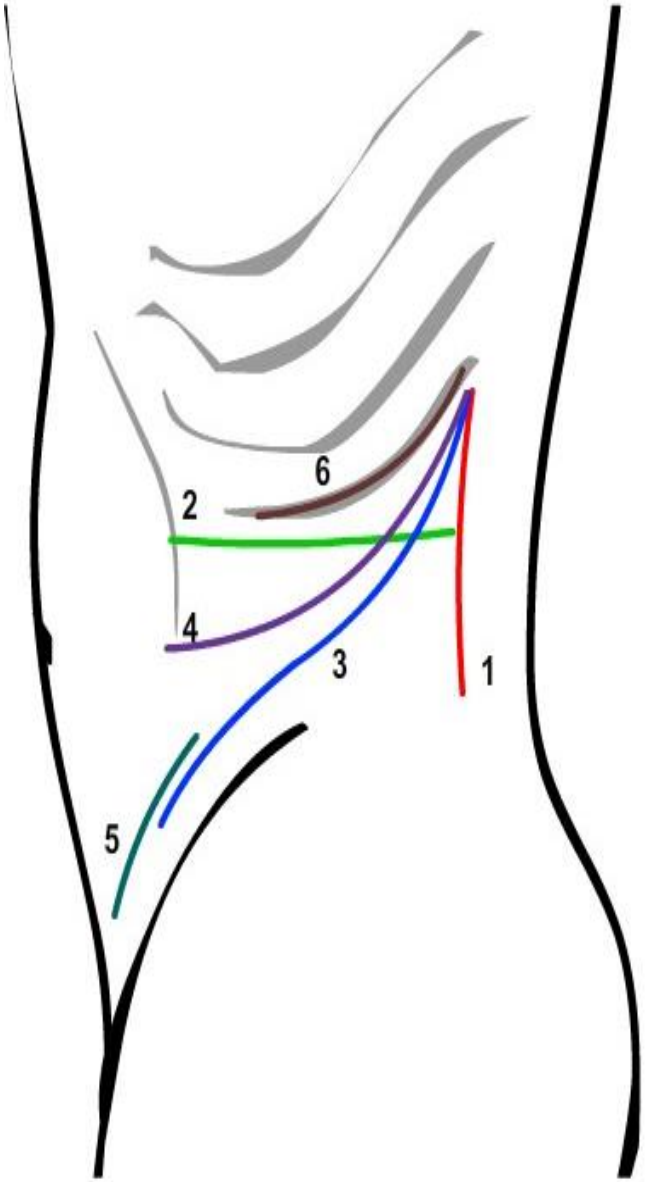
OPERATIVE ACCESS TO RETROPERITONEAL ORGANS



1. Simon's incision (along the outer edge of the back straightener)

2. Pean’s incision (transversely from the outer edge of the rectus abdominis muscle towards the spine)

3. A Bergman-Israel incision (from the angle formed by the back straightener and the XII rib, obliquely down and anteriorly towards the anterior-superior iliac spine, retreating inside and up from it by 3-4 cm)

4. Fedorov’s incision (from the angle formed by the back straightener and the XII ribs, in the oblique direction towards the navel to the outer edge of the rectus abdominous muscle)

5. Pirogov's incision (parallel and 4 cm above the inguinal fold)

6. Zalevsky's incision (dissection of the XII rib along the milling cutter)

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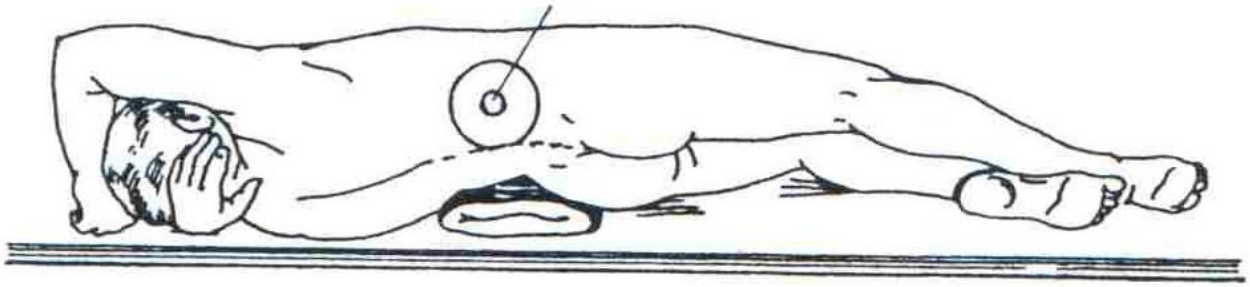
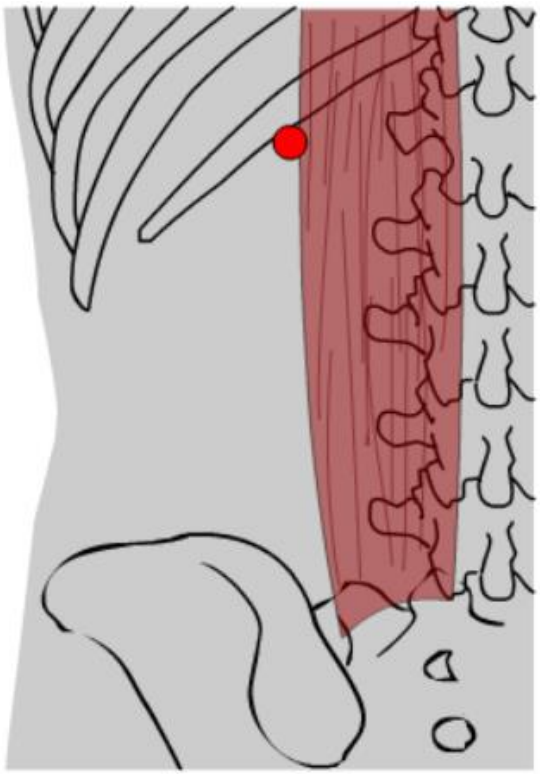
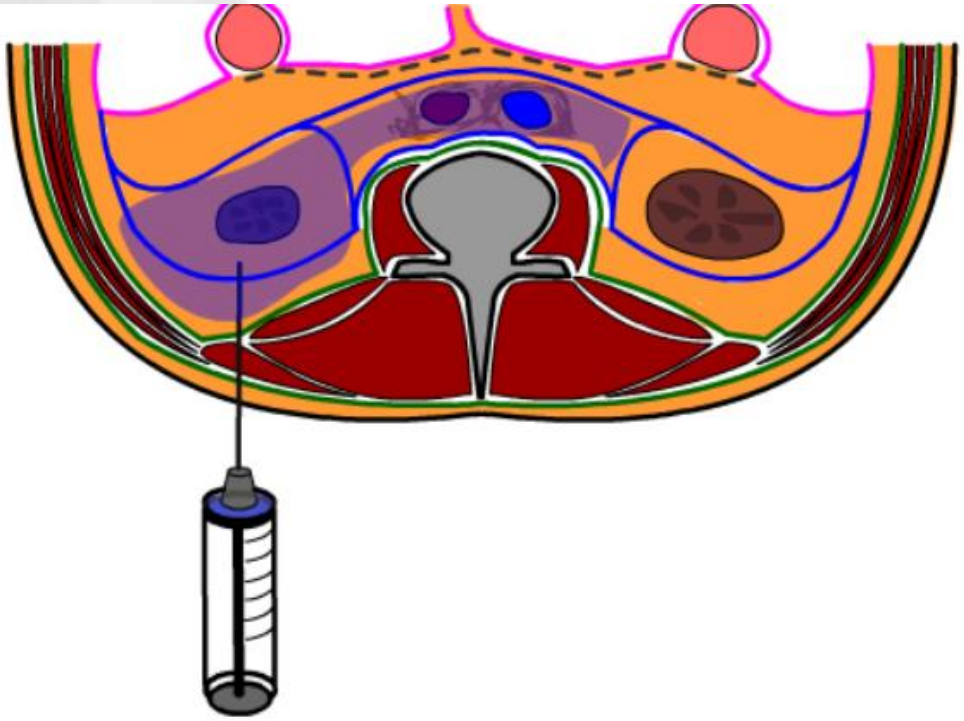
PARINEPHRAL BLOCK BY A.V. VISHNEVSKY







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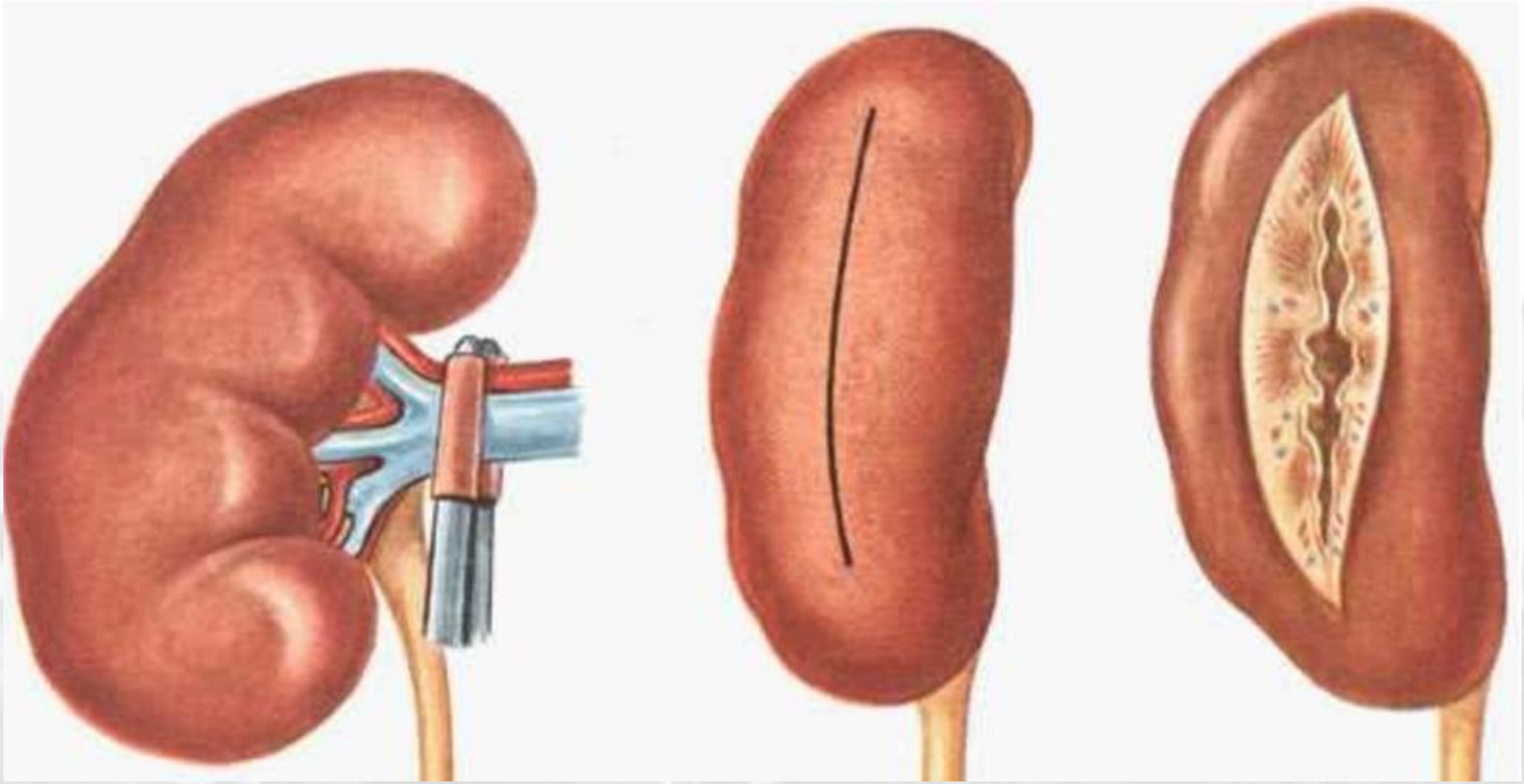
NEPHROTOMY

Indications: kidney carbuncle, hydronephrosis, pyonephrosis, coral kidney stones.



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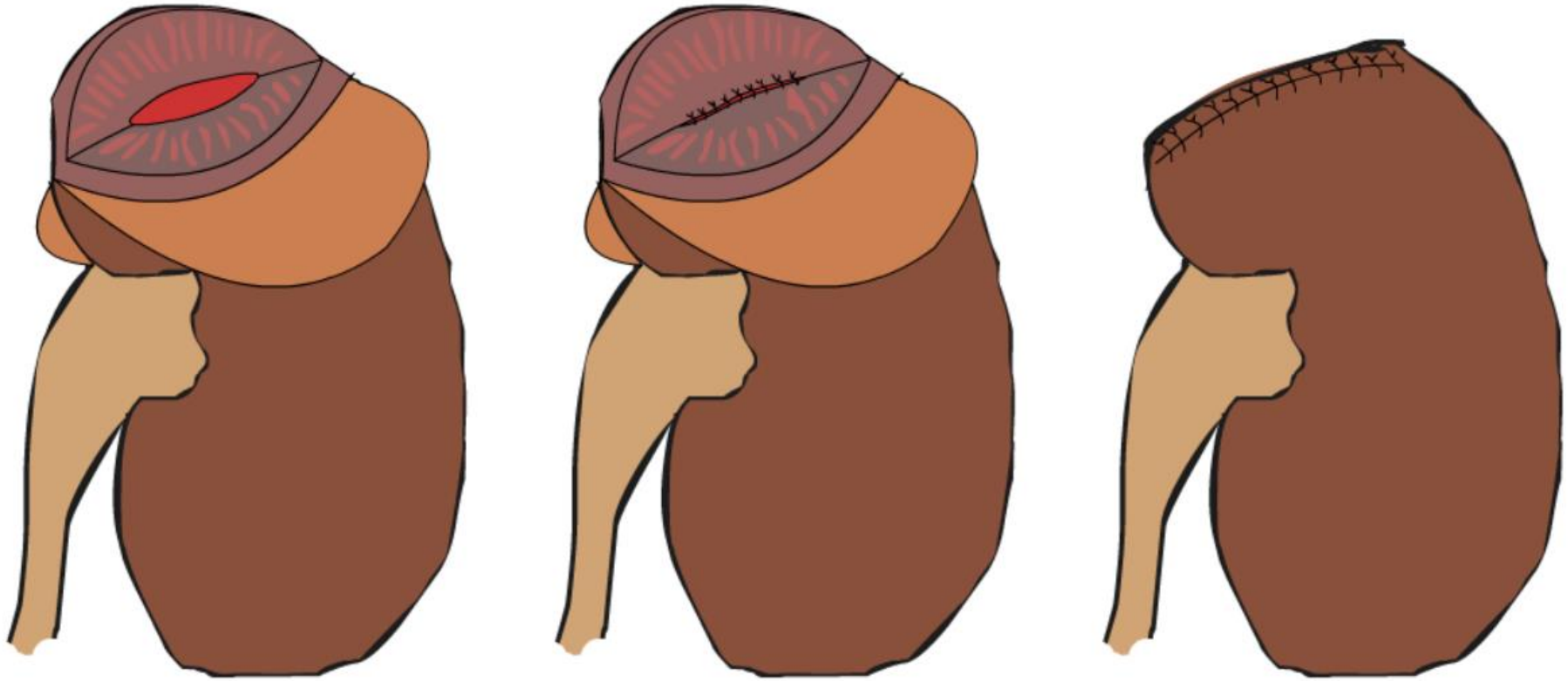
KIDNEY RESECTION

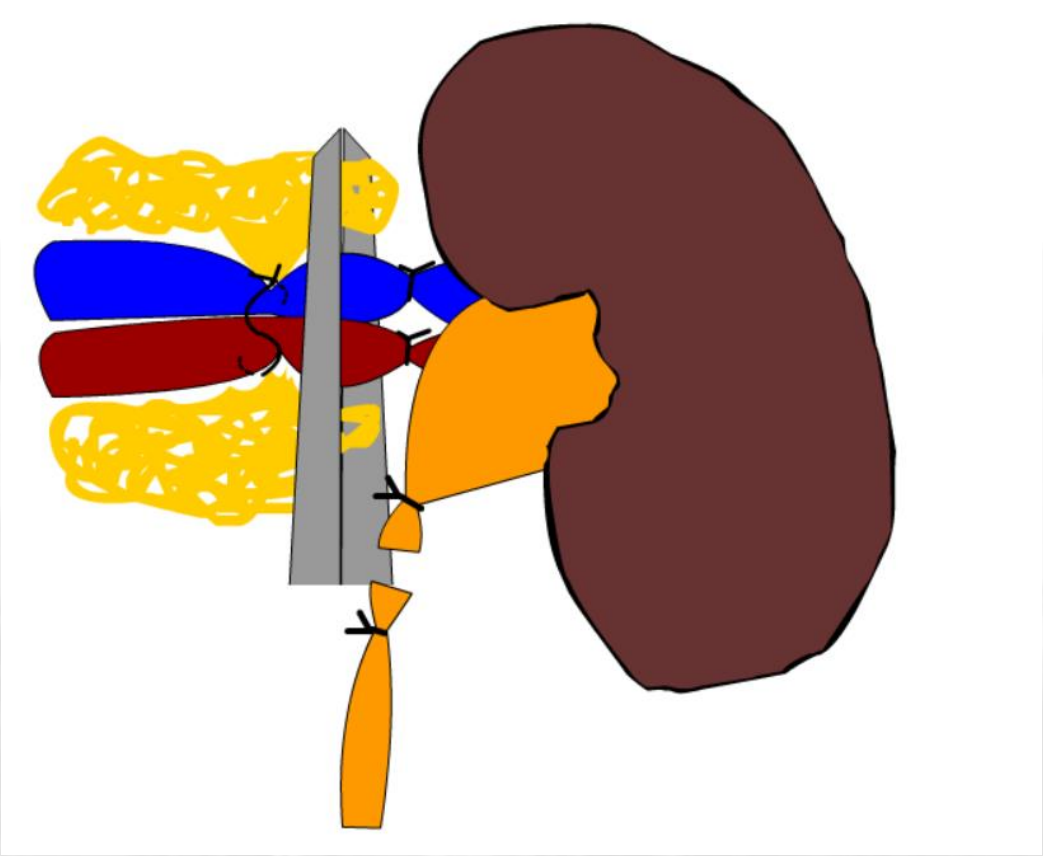
Indications: simple solitary cysts, tuberculous lesions, space-occupying lesions, trauma, renal infarction, parasitic cysts.



КРАСНОЯРСКИЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ
1942/2022

NEPHRECTOMY

Indications: kidney injuries with crushing of the parenchyma, separation from the renal pedicle, cancer, urolithiasis, complicated by the development of pyonephrosis or hydronephrosis, non-functioning kidney, kidney aplasia.



КРАСНОЯРСКИЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ
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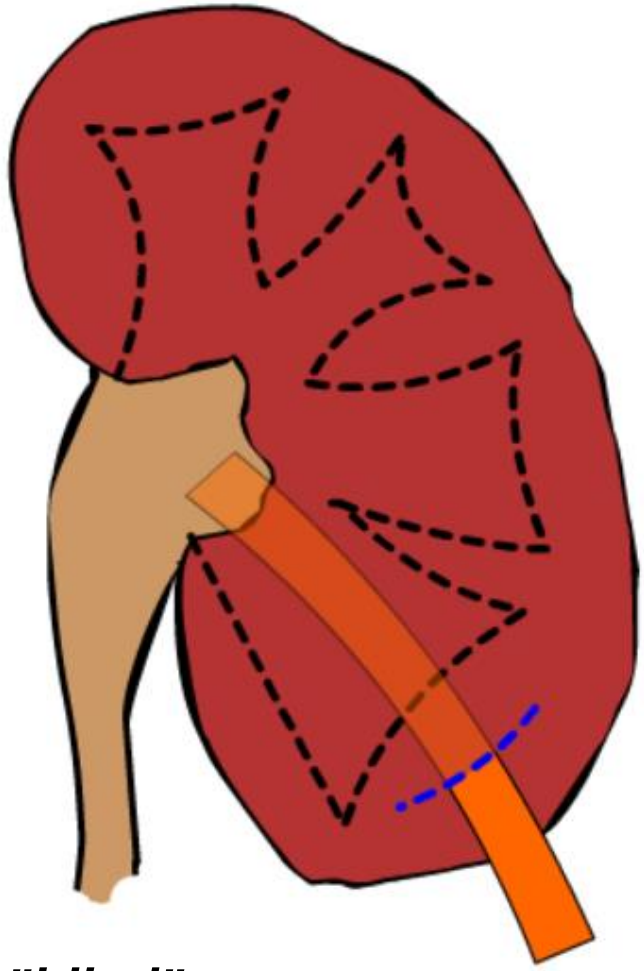
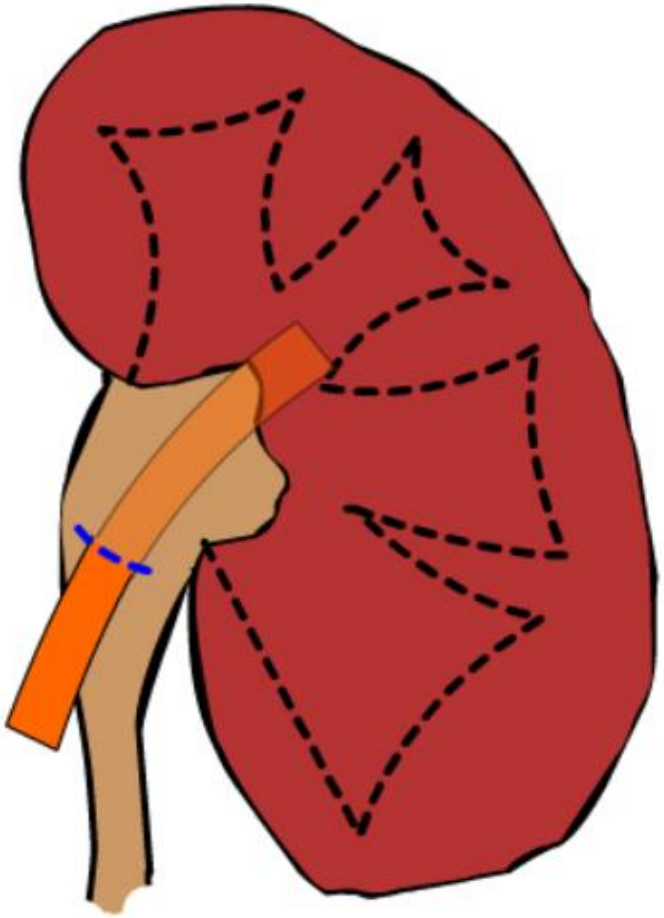
NEPHROSTOMY



Open "blind"



Open classic

КРАСНОЯРСКИЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ
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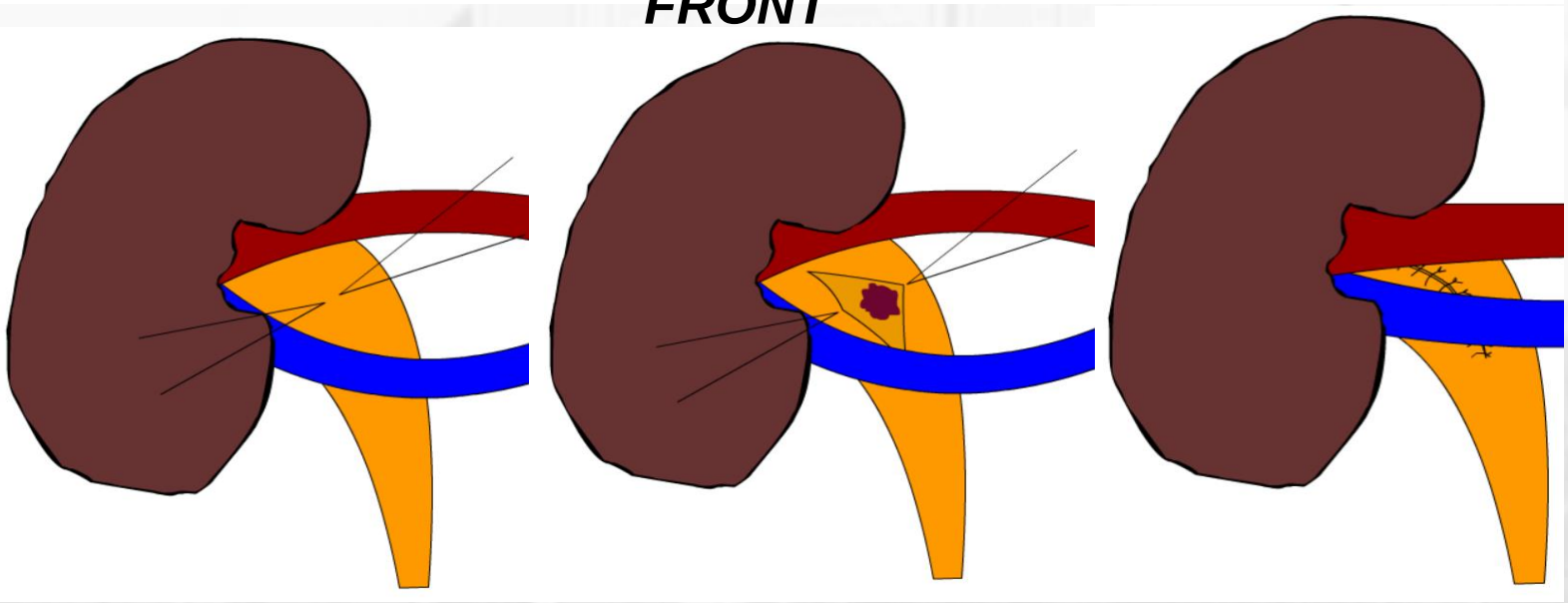
PYELOTOMY

REAR

FRONT



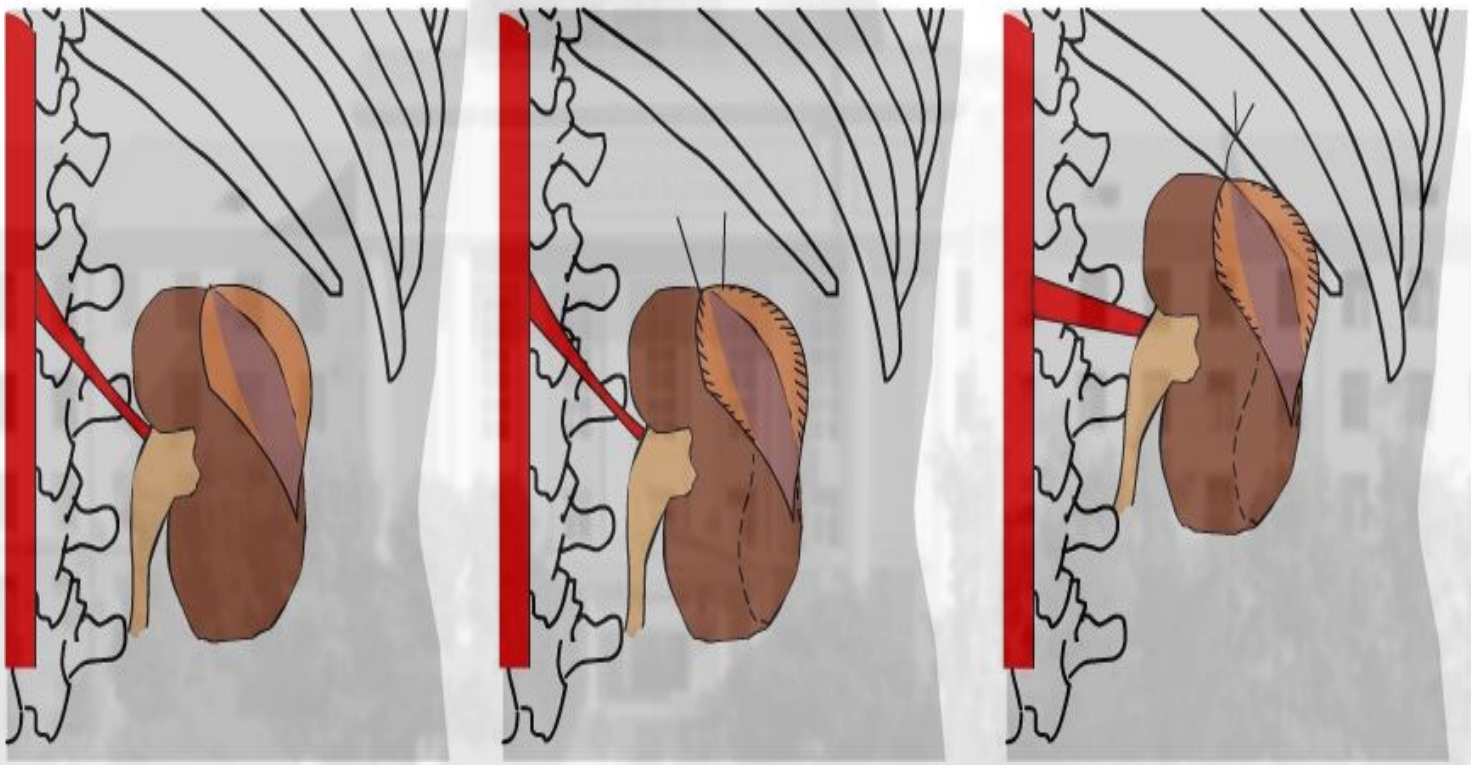
КРАСНОЯРСКИЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ
1942/2022

NEPHROPEXY

Surgical fixation of a pathologically mobile or lowered kidney (Nephroptosis).

Nephropexy by S.P. Fedorov.

1. Along the outer (convex) edge of the kidney, not reaching 3-4 cm to the lower pole, the fibrous capsule is longitudinally dissected and stupidly exfoliated from the parenchyma.
2. The edge of the capsule is stitched with a winding seam, at the lower pole the seam passes through the capsule.
3. The ends of the threads are held and tightened over the XII rib.



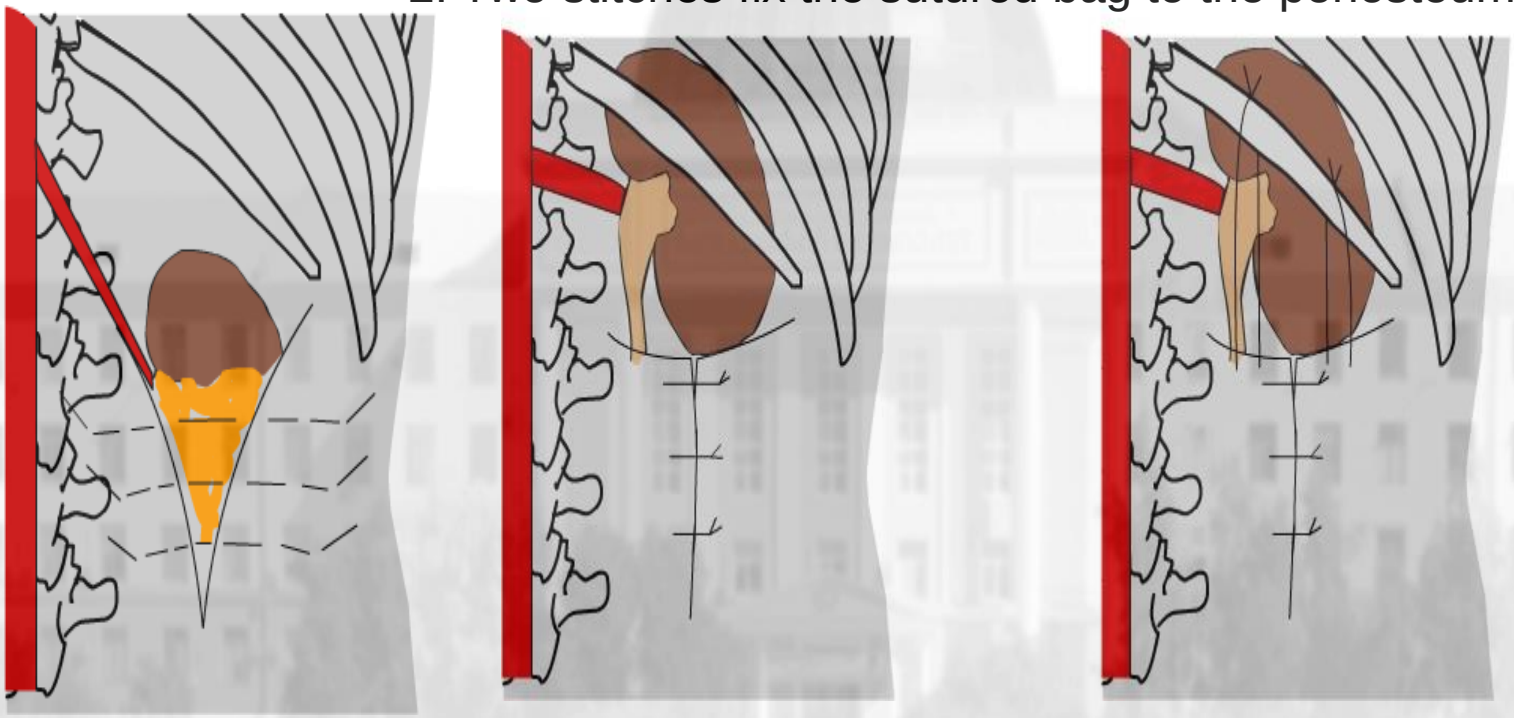
КРАСНОЯРСКИЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ
1942/2022

NEPHROPEXY

Surgical fixation of a pathologically mobile or lowered kidney (nephroptosis).

Nephropexy by V.A. Gorash.

1. The kidney is placed in the hypochondrium, warming sutures are applied under the lower pole to the paranephral fiber together with the facial capsule of the kidney.
2. Two stitches fix the sutured bag to the periosteum of the XII rib.



КРАСНОЯРСКИЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ
1942/2022

NEPHROPEXY

Surgical fixation of a pathologically mobile or lowered kidney (nephroptosis).

Nephropexy by Rivoir-A.Ya. To the witness-N.A. Lopatkin.

1. A flap is cut out of m. Sos.
2. A subcapsular tunnel forms in the lower third of the kidney.
3. Them. Psoas flap is carried through the tunnel and sewn to the fibrous capsule of the kidney.

КРАСНОЯРСКИЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ
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KIDNEY TRANSPLANTATION

Emerich Ullman (1902) and Alexis Carrel (1914) *– auto- and allotransplantation of a kidney on a vascular pedicle in dogs.*

Mathieu Jabouley (1906) *- transplanted pig and goat kidneys into the limbs of people suffering from chronic renal failure; each kidney functioned for 1 hour.*

Yu.Yu. Voronoi (1933) *- the world's first allotransplantation of a cadaveric kidney to a person.*

S. Dubois (1951) *- developed a technique for transplanting a kidney onto the iliac vessels with implantation of the ureter into the bladder.*

Joseph Murray (1954) *- first reported the transplantation of a cadaveric kidney into a patient with chronic renal failure.*

In Russia, the first successful kidney transplantation in the clinic was performed in 1965 at the Russian Scientific Center for Surgery ***by B.V. Petrovsky.***

КРАСНОЯРСКИЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ
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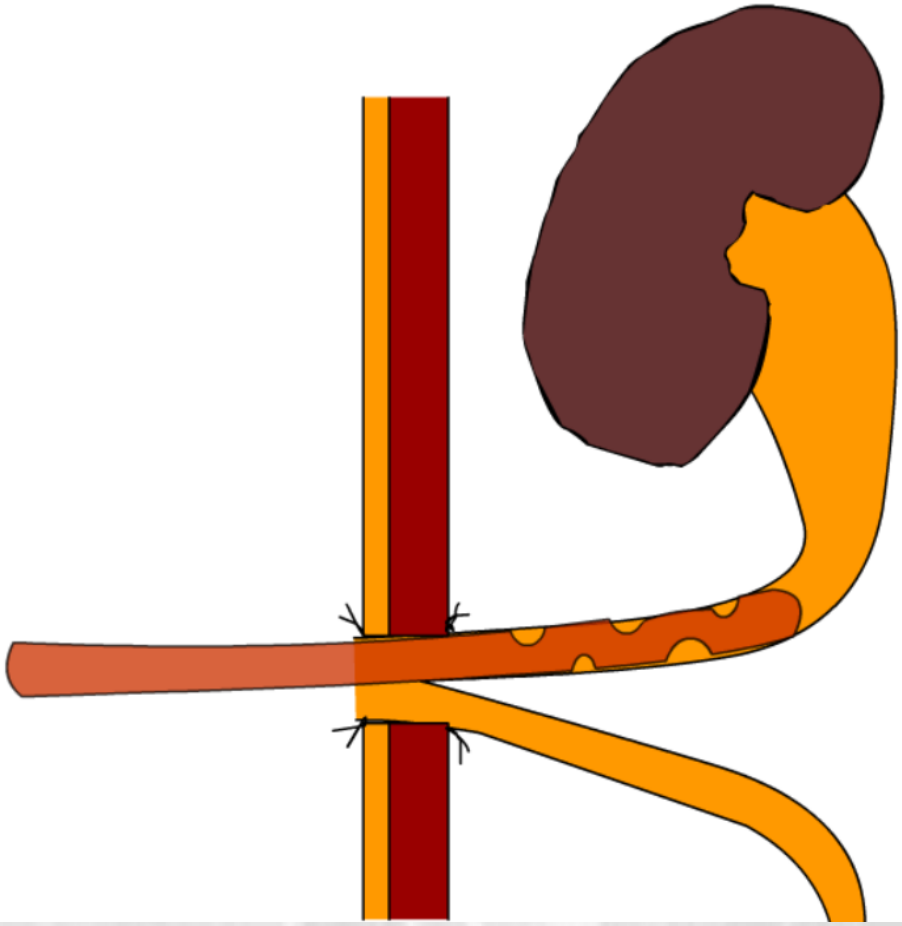
URETEROSTOMY

1. With the inclusion of S. P. Fedorov or Israel, the retroperitoneal space is opened and the upper part of the ureter is isolated. After that, the ureter wall is dissected.
2. A catheter is inserted into the pelvis through the ureter wound, the ureter wall is sewn to the lumbar muscles and skin.



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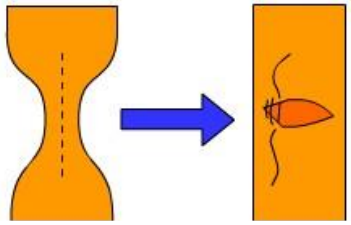
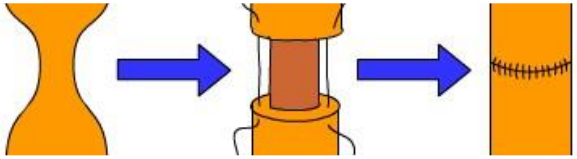
URETERAL RESECTION AND SUTURE

Dilation of the narrowed area of the ureter.

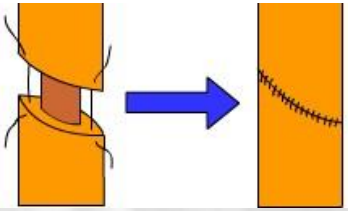
1. Dissection of the narrowing in the longitudinal direction and suturing of the dissected section in the transverse direction.



2. ureteral resection and end-to-end stitching of ureteral segments on a catheter.



3. Resection of the ureter, to increase its lumen, the ureter is excised in an oblique direction.



КРАСНОЯРСКИЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ
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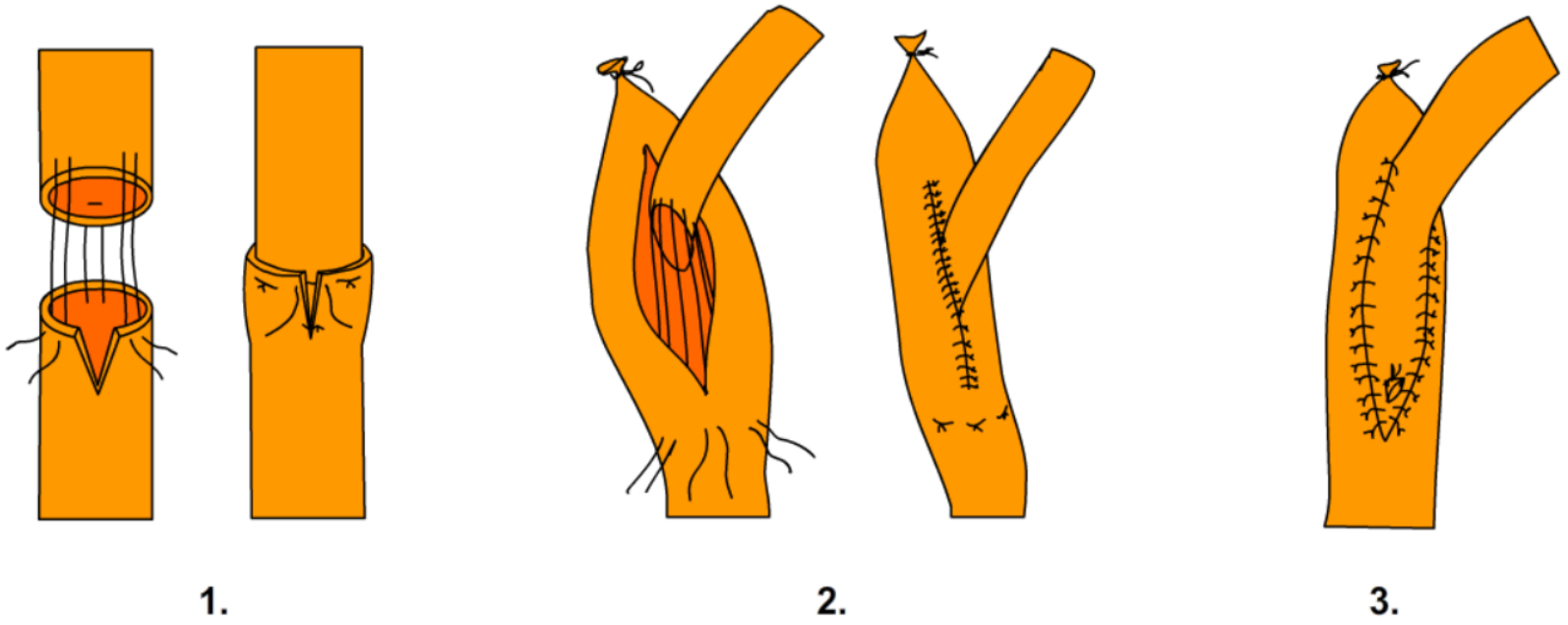
URETERAL RESECTION AND SUTURE

1. Ureteral suture with the introduction of the proximal segment into the distal one by the type of downpipe.
2. End-to-side anastomosis of the ureter.
3. Anastomosis of the ureter side to side.



КРАСНОЯРСКИЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ
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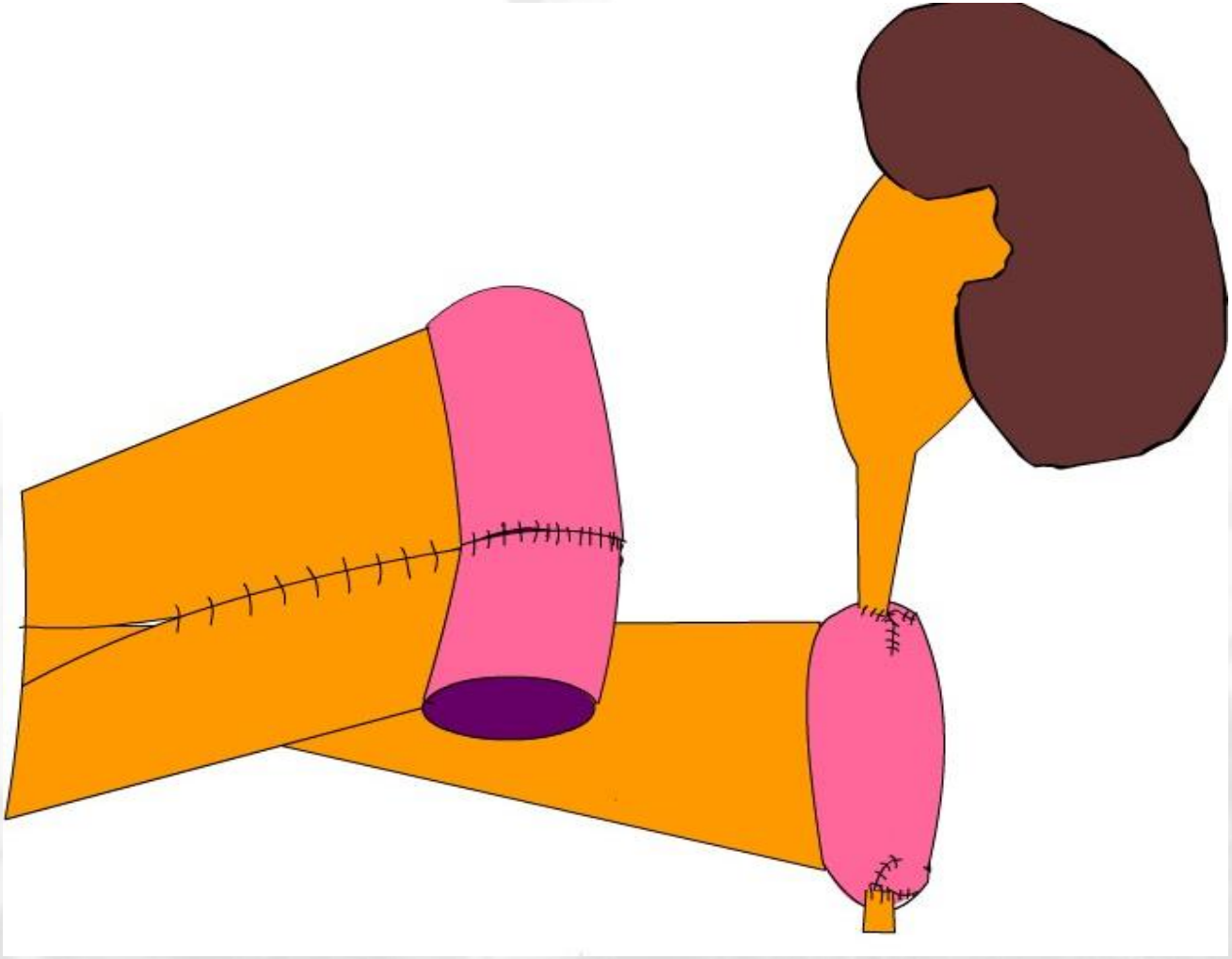
PARTIAL REPLACEMENT OF THE URETER WITH A SEGMENT OF THE SMALL INTESTINE



КРАСНОЯРСКИЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ
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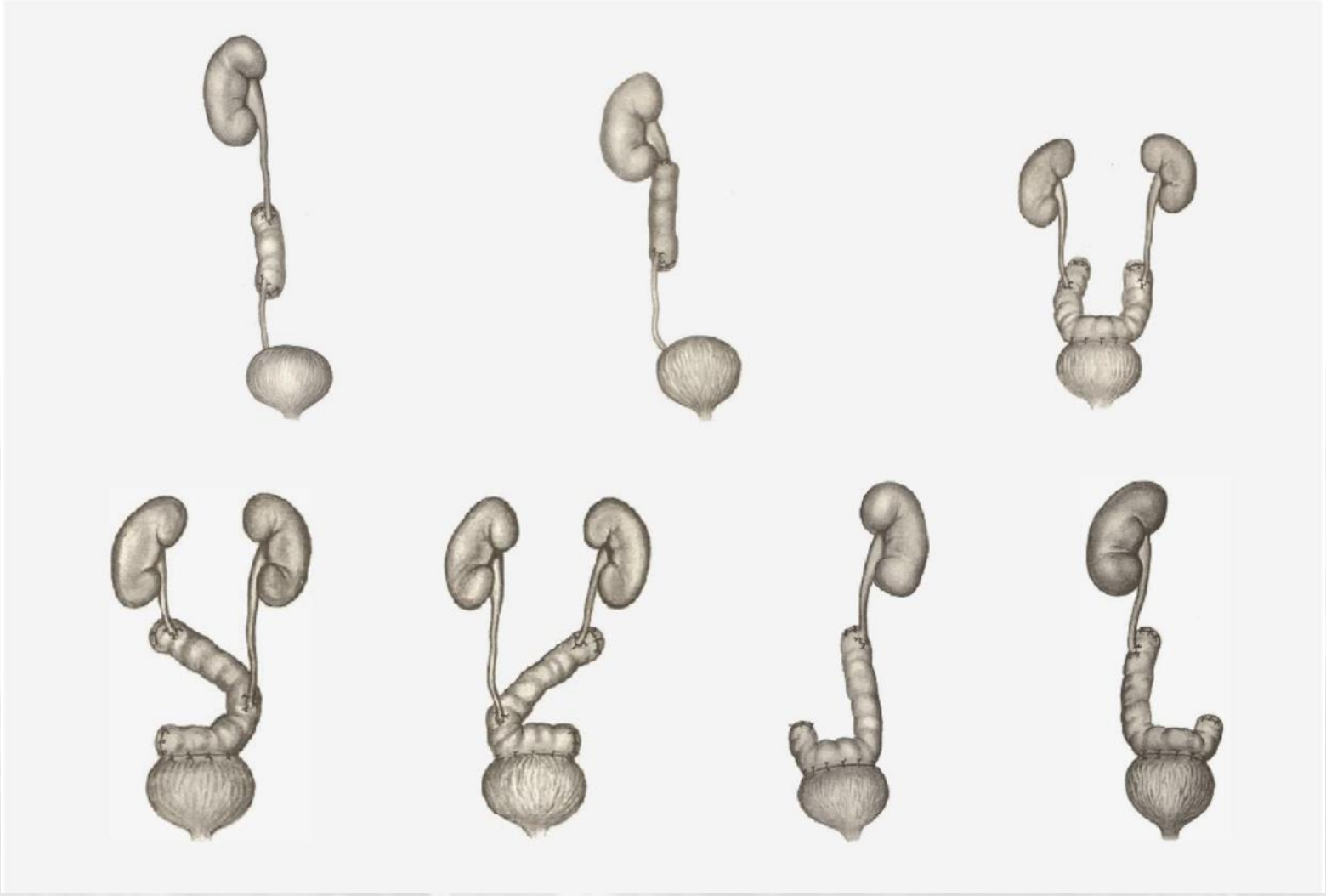
VARIANTS FOR REPLACING THE URETER WITH A SEGMENT OF THE INTESTINE



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THANK YOU FOR YOUR ATTENTION!