

Urinary tract

A system of organs located outside the kidneys that are used to carry final urine out of the body.

Wall construction

- Mucous membrane, *Tunica mucosa* – on the surface it has a transitional epithelium (typical of the urinary tract), which begins at the periphery of the papillae. When the urinary tract is not filled, the epithelium is tall and becomes flattened when filled;
- submucosal tissue in which blood vessels and nerves run;
- *Tunica muscularis* – ligament with collagen and elastic fibrils and smooth muscle (outside the sphincter urethrae muscle), which ensures the movement of urine into the pelvis;
- *Tunica Adventitia* – sparse collagenous tissue;
- part of the bladder is covered by the peritoneum.

All three layers participate in the connection with the kidney tissue. The epithelium smoothly transitions into a single-layer epithelium of the papilla, the middle layer adheres to the interstitium of the kidney, and the adventitia is firmly connected to the fibrous surface of the kidney.

The circular muscle above the papilla is called the *sphincter papillae* muscle, or *the sphincter of Disse*, and it helps expel urine into the calyces.

Calices Renales

The urinary tract continues as the so-called renal calices. It is impossible to forget that nothing is absorbed here, urine is only collected from the papillae and is led to the renal pelvis.

We know two types of calices:

1. *Calices renales minores* – there are 7–14 of them, they are cup-shaped, they are connected to the tissue around the papilla, and converge into calices renales majores;
2. *Calices renales majores* – there are usually three of them (*superior, medius, inferior*), and they lead urine to the renal pelvis.

The shape of the calyces is individual, passing between two extreme forms, ampullary and dendritic. **The ampullary** is characterized by a wide, rounded pan, whereas the **dendritic** form contains a slender pan and long calyx stems.

The calyces begin as calices minores, are about 1 cm long, and are mounted one at a time on one papilla of the pyramid. The number of calyces is reduced in the lateral direction - each time 2-3 small calyces merge into one larger calix major. Three to four large calyces are collected in a pan.

Pelvis Renalis (Pyelos)

A triangular, expanded, anteroposteriorly flattened hollow structure into which the calyces enter and the *ureter exits*. Its wider part connects to calices renales. It has a volume of 3–8 cm³, but already at a volume of 5 cm³ it causes pain – the so-called surgical capacity of the pelvis.

Renal pelvis and calice types

- **dendritic renal pelvis type** – slender pan, long and branched calyces;
- **ampullary renal pelvis type** – wide pan, short and sparsely branched calyx.

Vessels

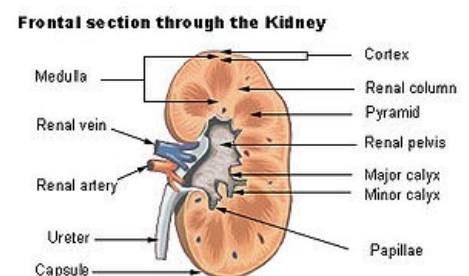
Calyces and pan are supplied by branches of the renal vessels.

Nerves

They come from the renal plexus.

Position and projection of the pan

It projects into the area of the processus costales L1–L2, in front of the pelvis is the pars descendens duodeni on the right, cauda pancreatis on the left.



Frontal section of kidney and pelvis

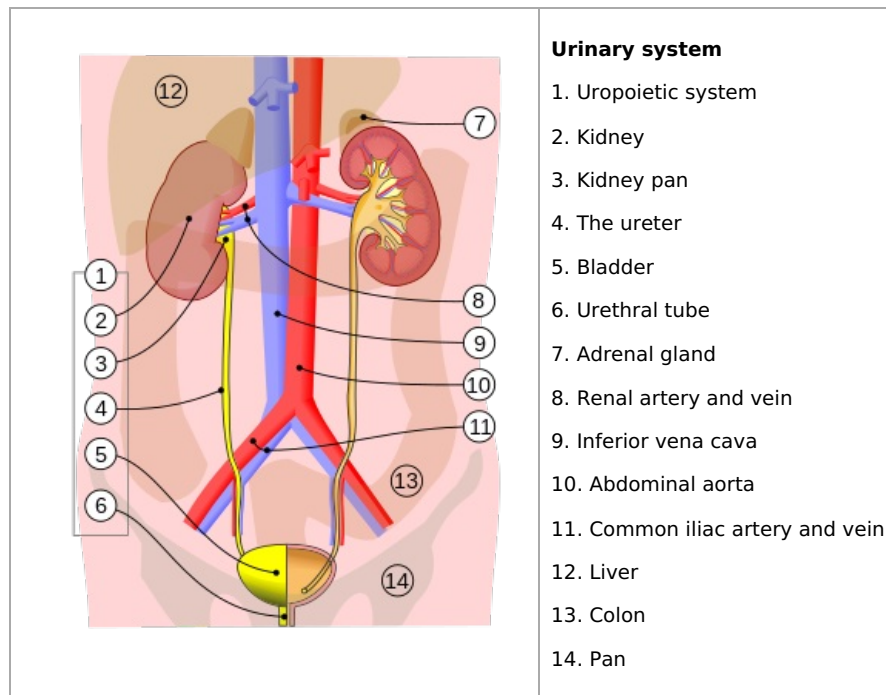
Both the pelvis and the calyces can be examined using an X-ray technique called pyelography, either excretory or ascending (the contrast material comes from the bladder).

Ureter

A paired tubular organ connected to the kidney. It opens through an oblique slit mouth into the **ostium ureteris** into the bladder at the **trigonum vesicae**. The length is 20–30 cm for an adult (newborn 5 cm). Ace-shaped course, width 0.5 cm.

Parts

1. **pars abdominalis** – runs in the retroperitoneum on the front surface musculus psoas major;
2. **pars pelvica** – runs in the small pelvis;
3. **pars intramuralis** – very short (1–2 cm), runs in the wall of the bladder.



The ureter crosses the

- *a. et v. testicularis/ovarica* – they run on the front wall of the psoas major muscle;
- *n. genitofemoralis* – near the crossing with *a. testicularis* – the nerve is behind the ureter;
- *and et v. iliaca communis* on the left and *a. et v. iliaca externa* on the right;
- in a woman, laterally from the cervix, it crosses with the uterine *artery* – runs under – "water flows under the bridge";
- in men, behind the base of the bladder, it crosses with the vas deferens – *ductus deferens*, and also runs under it.

Physiological narrowing of the ureter

- at the transition of the pelvis into the ureter – pelviureteric transition;
- during course over vasa iliaca;
- at the point where the ureter opens into the bladder.

Wall construction

- mucous membrane covered with urothelium, macroscopically visible algae determining the star-shaped lumen;
- smooth muscle in two layers;
 - outer circular;
 - inner longitudinal;
- tunica adventitia.

Relationship to peritoneum

- *pars abdominalis* – in the retroperitoneum;
- *pars pelvina* and *pars intramuralis* – subperitoneally.

Vessels

- arteries – yr. ureters from the renal artery, testicular artery (ovary), iliac artery, vesical artery, ductus deferentis (uterine);
 - the veins of the same names go to the vena cava inferior;
- lymphatic drainage – nodi lymphatici iliaci interni a communes, lumbales.

Nerves

- sympathetic, parasympathetic and sensory nerves arise from the ureteric plexus.

Links

Related Articles

- Radiodiagnostic examination of the urinary tract
- Excretory system: Kidneys, Ureter, Bladder
- Portal: Exclusion system

References

- ČIHÁK, Radomír – GRIM, Miloš. *Anatomie 2*. 2. edition. Praha : Grada Publishing, 2009. ISBN 80-247-0143-X.