

Concretions

Concrements are solid formations ("stones") formed in organ ducts, especially in the places of their expansion (gallbladder, renal pelvis, bladder, etc.). Concrements can occur in the body in different numbers (single, multiple). Their size can range from a grain of sand to an object several centimeters in size. Their chemical composition depends on the place where they are formed.

"Lithiasis" is defined by the presence of stones in the body. Several types of lithiasis are known according to the place where the concretions occur.

True concretions

- **Cholelithiasis** (gallstones) - cholecystolithiasis + choledocholithiasis - mainly affects women;
- **Choledocholithiasis** - bile ducts (in ductus choledochus);
- **Nephrolithiasis** - in the renal pelvis;
- **Urolithiasis** (urinary stones) - pyelolithiasis + ureterolithiasis + urocystolithiasis - mainly in men;
- **Pancreatolithiasis** - ducts of the pancreas;
- **Sialolithiasis** - pancreas, salivary glands;
- **Prostatolithiasis** - prostate.

The shape of the concretion is usually spherical or elliptical if it is deposited loosely. If the formation completely fills the cavity in which it was formed, it also copies its shape. If there are several stones in one cavity pressing against each other with surfaces in contact, the stones will become flattened, the formation of so-called "faceted concretions".

Composition of urinary stones

- *Uricite* - uric acid,
- *whewellite* - calcium oxalate·H₂O,
- *weddellite* - calcium oxalate·2H₂O,
- *apatite* - calcium phosphate,
- *dahllite* - carbonate apatite,
- *brushite* - calcium hydrophosphate·2H₂O,
- *struvite* - magnesium ammonium phosphate·6H₂O^[1].

False concretions

- **Condensed content:**
 - *coprolith* - intestine, especially appendix and diverticles;
 - *corpora amylacea* - prostate, lungs, brain - concentrically layered bodies (stained blue-green with iodine, similar to starch, PAS+), formed by condensation of proteins from the prostatic secretion on the surface of exfoliated epithelia.
- **Foreign bodies:**
 - *broncholith* - bronchus;
 - *rhinolith* - nasal cavity;
 - *phlebolith* - calcified thrombus;
 - *trichobezoar* - stomach, from swallowed hair.
- **Microscopic vascular calcification:**
 - psammomatous bodies (chalcospherites, dystrophic calcification).

Formation of concretions and its causes

- The substance of which the concretion is composed is referred to as **stone-forming**.
- Under normal conditions, this substance is dispersed in solution and a protective colloid prevents precipitation.
- When the colloid condenses, the solution becomes supersaturated and the stone-forming substance precipitates from the solution to form a concretion.
- Condensation of colloid occurs on any wettable surface (the normal mucous membrane of the drainage tract is considered non-wettable) - e.g. foreign body, necrotic tissue, exfoliated epithelia, coagulum, cluster of bacteria or parasite eggs, etc.



Cholelithiasis



Sialolithiasis



Coprolite

- The formed concretion itself then represents a wetting surface, and other layers are deposited on its surface, thereby increasing the concretion.

Causes of stones:

- Increased concentration of stone-forming substance (diathesis concretions);
- disorder of the colloidal environment (inflammatory stones);
- changing the pH of the environment.

Increase in concentration of stone-forming substance

The increase in the concentration of the substance inducing the formation of stones is mostly caused endogenously (*metabolism disorders - diathesis*), but exogenous factors can also be involved (dehydration with thickening of urine in urolithiasis, diet with excess cholesterol in cholelithiasis, increased formation of bilirubin in hemolysis).

- Cholelithiasis - cholesterol and pigment (black and brown) stones.
- Urolithiasis - oxalate, urate, xanthine, cystine, phosphate, calcium stones.

Colloidal medium disorder

It arises during inflammation either by mixing colloid with exudate or by the influence of exfoliated epithelia, bacterial colonies, necrotic tissue, etc., which represent a wetting surface.

- Mixed gallstones.

Changing the pH of the environment

- It changes the solubility of stone-forming substances.
- Most often in urolithiasis, caused by an ascending infection with bacteria (especially the genus *Proteus*), which split urea to form ammonia (alkalization of the environment - increase in solubility of urates, decrease in solubility of calcium salts - in inflammatory urinary tracts there are concretions composed of phosphate and carbonate calcium).
- On the contrary, infection often occurs as a result of diathesis urolithiasis - then calcium salts can settle on other nuclei (e.g. urate) and mixed stones are formed.

Complications of calculi

In general, manifestations and complications of stones in the body are referred to as lithiasis.

- **clogging of the cavity in which they arose** - stagnation of contents (cholestasis, hydronephrosis), possibility of ascending infection - purulent cholangitis to liver abscess in case of cholelithiasis, purulent [[pyelonephritis]] in urolithiasis,
- **pressure necrosis of the mucous membrane** - decubitus in the gallbladder and bile ducts are common, the formation of an ulcer - perforation - the formation of chemical peritonitis, or penetration (penetration through fibrous adhesions into the surrounding organs - a gallstone can get into the small intestine, get stuck in the ileocecal orifice and cause ileus),
- **formation of colic** (renal colic, biliary colic, intestinal colic) - through peristalsis, stones can get into narrow ducts and completely block them. Colic is paroxysmal pain caused by alternating contraction and relaxation of smooth muscle, the goal of which is to overcome an obstacle.

Links

Related Articles

- Urolithiasis
- Cholelithiasis
- Sialolithiasis

References

1. BARTONÍČKOVÁ, K. Urolitiáza. *Postgraduální medicína* [online]. 2006, roč. -, vol. 2, s. -, dostupné také z <<https://zdravi.euro.cz/clanek/postgradualni-medicina/urolitiaza-172263>>

Source

- PASTOR, J. *Langenbeck's medical web page* [online]. [cit. 17.08.2009]. <<https://www.freewebs.com/langenbeck/>>

References

- STŘÍTESKÝ, Jan. *Patologie*. 1. vydání. Olomouc : Epava, 2001. 338 s. ISBN 80-86297-06-3