

Paranasal sinuses

The sinuses (sinus paranasales) surround the nasal cavity in the skull. They are paired. The paranasal sinuses are connected to the nasal cavity by a narrow duct, which can become obstructed in the event of a more extensive untreated infection, which can lead to a disease called sinusitis.

They are located:

- in the maxilla (sinus maxillaris),
- in the frontal bone (sinus frontalis),
- in the olfactory bone (sinus ethmoidales),
- in the cuneiform bone (sinus sphenoidales).

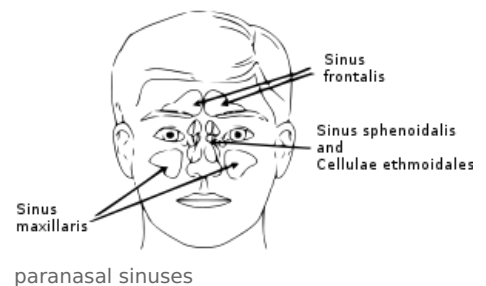
They are formed prenatally as tiny projections of the nasal epithelium into the surrounding cartilage, but their development takes place postnatally and they acquire their final form in adulthood. They are completely lined by mucosa with a multi-rowed cylindrical epithelium. Compared to the epithelium of the nasal cavity, it contains fewer goblet cells and glands. The function of the paranasal sinuses is obscure, but they probably form to lighten the skull, and also function as resonant spaces in the production of the voice, and may be partly involved in humidifying the inspired air.



CT scan of paranasal sinuses

Functions of paranasal sinuses

Paranasal sinuses **significantly increase the volume of the nasal cavity**. Their importance lies in the treatment of the inhaled air, which is partially heated, freed from impurities and humidified. The other importance of the paranasal sinuses lies mainly in the **formation of the voice**, which is characteristic of each person due to the different extent of the sinuses and their individual shape. In pathology, the paranasal sinuses play a large part in the development of **infections**. Due to their close contact with surrounding structures such as the dental alveoli, the orbit and especially the cranial cavity, infection can spread from the sinuses to these structures and, in extreme cases, cause meningitis.



Sinus maxillaris

Sinus maxillaris is the largest paranasal sinus - the volume of the sinuses of both sides is about 25 cm³. It is located in the corpus maxillae and at the beginning of the maxillae processes and its lower surface extends to the vicinity of the alveoli of the 1st and 2nd molars in the maxilla - the roots of the molars can penetrate into the sinus (→ dangerous during extraction - spreading infection from the oral cavity to the sinus).

It enters the nasal cavity at the **hiatus semilunaris** - it has the shape of a narrow slit, extends in a dorsocaudal direction, and enters the middle nasal passage. Other sinuses are also open to the anterior margin of the hiatus - sinus ethmoidales anteriores (called infundibulum ethmoidale) and sinus frontalis (variable).

Sinus frontalis

It is located in the frontal bone, from the site of the glabella extends individually high into the scales. It is annularly divided and its volume is about 15 cm³. Its division by the septum sinuum frontalis is often asymmetrical.

The sinus frontal enter to the nasal cavity is variable - **infundibulum frontoethmoidale** is a common outlet with cellulae ethmoidales anteriores. Another possibility is the **ductus nasofrontalis** located in the meatus nasi medius anterior to the hiatus maxillaris (semilunaris).

Sinus ethmoidales

On both sides of the olfactory bone is a larger number of tubules (3-18) - **cellulae ethmoidales** - which are then connected into groups.

The **cellulae ethmoidales anteriores** are anterior olfactory chambers. Its lateral wall extends to the wall of the orbit, from which it is separated by the *lamina papyracea*, reflecting its reduced width, which therefore poses a great danger for the passage of infection from the sinuses to the orbit. The anterior chutes constitute 1/2 to 2/3 of all the sinuses of the olfactory bone. They are located from the wall of the nasal cavity to the lamina orbitalis ossis ethmoidalis and form two bullae - bulla frontalis et bulla ethmoidalis. Usually they mouth in the infundibulum ethmoidale.

Cellulae ethmoidales mediae are invariably independent. They are some of the cavities from the posterior margin of the anterior chutes, which give off independently into the middle nasal passage.

The ***cellulae ethmoidales posteriores*** are two to three cavities that exit separately into the upper nasal passage.

Sinus sphenoidales

The wedge bone cavities are paired cavities separated by a sagittal septum - **septum sinuum sphenoidalium** - often asymmetrical. Their total volume is about 6 cm³.

The sinus sphenoidales enter the **apertura sinus sphenoidalis** - the opening to the recessus sphenothmoidalis (in the upper nasal passage).

Vascular and nerve supply

Arteries

- a. ophtalmica
 - a. ethmoidalis anterior
 - a. ethmoidalis posterior
- a. maxillaris
 - a. sphenopalatina
 - aa. nasales posteriores
 - rr. septales posteriores
 - a. infraorbitalis
 - a. alveolaris superior posterior

Veins

- *plexus cavernosi concharum* → *plexus pterygoideus* → *plexus pharyngeus*

Lymphatic drainage

- *nodi lymphatici retropharyngei*
- *nodi lymphatici cervicales profundi*

Nerves

- *n. ophthalmicus*
 - *n. ethmoidalis anterior*
 - *rr. nasales interni*
 - *rr. nasales laterales*
 - *rr. nasales mediales*
 - *r. nasalis externus*
 - *n. ethmoidalis posterior*
- *n. maxillaris*
 - *rr. nasales posteriores superiores mediales*
 - *rr. nasales posteriores superiores laterales*
 - *n. nasopalatinus*
- *n. olfactorius + n. terminalis (vomeronasalis)*

Links

Related articles

- nasal cavity
- cranial nerves
- Airway resistance and its measurement
- Skull fractures

Sources

- ČIHÁK, Radomír. *Anatomie 2*. 1. vydání. Praha : Avicenum, 1988. ISBN 80-247-0143-X.