

# Nasal cavity

The **nasal cavity** provides our sense of smell. It is one of the 5 senses that provide us with perceptions from the environment. At the same time, it is also an entrance for air, which continues further through the respiratory tract.

## Anatomical structure of the external nose

The *external nose* (*nasus externus*) has the shape of a triangular pyramid protruding from the face. On it we recognize the *radix nasi* (nasal root), which is formed by the *ossa nasalia*. These join here with the *os frontale* at the *sutura frontonasalis*. Then **dorsum nasi** (back of the nose), it forms the front side from the *radix nasi* forward downwards.

**Apex nasi** (tip of the nose) terminates the bridge of our nose. **Alae nasi** (nasal wings) form the side walls of our external nose and surround it with their caudal edges. An important part is the **nares** (nostrils, nostrils). These are paired and separated by a sagittal plate called the **septum nasi** (nasal septum).

**Apertura piriformis nasi** is the bony border of the nose. Caudal from it, at the junction of the bodies of both maxillae, the **spina nasalis anterior** protrudes forward.

The **Ossa nasalia** (nasal bones) are above the aperture, connected to the *processus frontales maxillarum* of the frontal bones in the middle line – the *sutura internasalis*.

**Cartilagine nasi** (nasal cartilages) are hyaline cartilages. This includes the **cartilago nasi lateralis**, which reinforces the nasal bridge and parts of the side walls. It is always connected to the cartilage of the septum. Also **cartilago septi nasi**, which complements the bony septum of the nose anteriorly and caudally. It is formed by the vomer at the back and the lamina perpendicularis ossis ethmoidalis *at the front*.

**Cartilago alaris major** is a paired cartilage surrounding the nostril. It has two branches: "*crus mediale*" - attached to the septum, "*crus laterale*" - hugging the nostril. **Cartilagine alares minores** are tiny cartilages in the wing of the nose. They supplement the cartilago alaris major. Further **cartilagine nasales accessoriae**, these are additional non-constant small cartilages between cartilago septi nasi and cartilago alaris major. And **cartilago vomeronasalis** (Jacobson's cartilage), a small cartilaginous plate attached on both sides to the cartilage of the septum. It lies close behind the "*spina nasalis anterior*", in its place the vomeronasal (Jacobson's) organ arises in the embryonic period.

The **skin of the external nose** is thin and contains the mouth of sebaceous glands. **Subcutaneous tissue** contains mimic muscles.

## Vessels and nerves of the external nose

### Arteries

The supplying arteries are the **a. facialis**, which gives off a branch of the *a. angularis*. *A. ophthalmica* gives off branches of *a. supratrochlearis*, *a. infratrochlearis*. And the last, *a. maxillaris*, whose branch is the *a. infraorbitalis*.

### Veins

The main vein is **v. facialis**.

### Disappearing vessels

The lymph nodes of the nose are **nodi lymphatici submandibulares**.

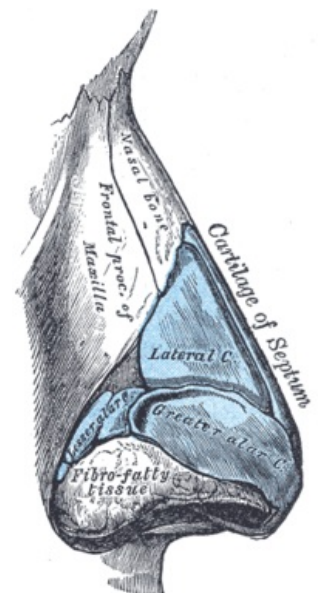
### Nerves

The nose is innervated by branches from **n. facialis**. Sensitive innervation is from V1 and V2 **trigeminus**.

## Anatomical structure of the nasal cavity

The *nasal cavity* (*cavitas nasi*) consists of the external nasal cavity and the bony nasal cavity. It is completely divided by the nasal septum into right and left parts. We distinguish the *vestibulum nasi* (the vestibule of the nasal cavity) and the *cavitas nasi propria* (proper nasal cavity).

## Vestibulum nasi - vestibule of the nasal cavity



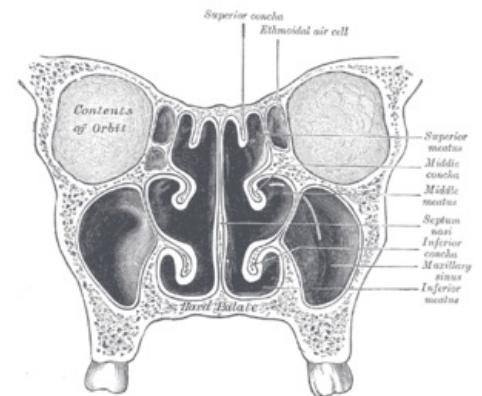
Nasal cartilages

The *Vestibulum nasi* extends from the nostrils to the *cartilago alaris major*. **Limen nasi** is an arched edge that protrudes along the upper edge of the *cartilago alaris major* into the nasal cavity. It is the border of the vestibule against the nasal cavity itself. The vestibule is lined with multi-layered squamous epithelium cornified, with the exception of the *limen nasi*, where the epithelium is non-keratinous. There are **vibrissae**, which are stiff hairs around the perimeter that prevent dust particles from entering the nasal cavity. **Recessus apicis nasi** is the recess of the vestibule forward to the tip of the nose.

## Cavitas nasi propria - nasal cavity proper

The nasal cavity itself is divided into right and left parts by a septum. The parts according to the involved tissue are **pars ossea** (*septi nasi*), *this is formed by the vomer* (dorsocaudally), *the lamina perpendicularis ossis ethmoidalis* (ventrocranially). **Pars cartilaginea** - *cartilago septi nasi* (and its *processus posterior*) and **pars membranacea**, which is a fibrous section, in height of *cartilago alaris nasi*. It ends as a skin-covered part between the nostrils (*pars cutanea septi*). A common phenomenon is *deviatio septi nasi*, when the septum is deviated to one side. The **Ceiling** consists of (from front to back):

- *cartilago nasi lateralis*,
- *os nasale*,
- *os frontale*,
- *lamina cribrosa ossis ethmoidalis*,
- *corpus ossis sphenoidalis*.



Section of nasal cavity

The *'scum* consists of (from front to back):

- *premaxilla*,
- *processus palatinus maxillae*,
- *lamina horizontalis ossis palatini*.

The **Lateral wall** consists of (from front to back):

- lateral wall of the external nose,
- *processus frontalis maxillae* and *facies nasalis* of the body of the maxilla,
- *os lacrimale*,
- medial wall of the labyrinth of the olfactory bonei (above the body of the maxilla),
- *inferior nasal concha*,
- *lamina perpendicularis ossis palatini*,
- *lamina medialis processus pterygoidei*,

From the lateral wall of the nasal cavity, three *conchae nasales* (nasal shells) arch over each other against the cavity:

1. **concha nasalis superior** (upper nasal shell) - the smallest, dorsally,
2. **concha nasalis media** (middle nasal shell) - part of the olfactory bone,
3. **concha nasalis inferior** (lower nasal shell) - a separate bone, starts at the level of the *limen nasi*, extends backwards to the choana,

Other formations are the remains of extinct other shells. These are:

- **bullae ethmoidalis** - an elevation covered by the *concha nasalis media*, one of the olfactory sockets of the *os ethmoidale* arches into it, just above the *hiatus semilunaris* (passage into the cavity of the upper jaw - *sinus maxillaris*),
- **processus uncinatus conchae mediae** - connects the middle concha with the lower,
- **agger nasi** - protrusion of the side wall of the nose in front of the gap of the middle shell.

## Spaces and passages of the nasal cavity

The **Nares** (nostrils), or nostrils, form the entrance to the *vestibulum nasi*. **Choanae** (choanas, internal nostrils) are openings at the back end of the nasal cavity through which the nasal cavity is connected to the nasopharynx. The right and left are separated by the vomer, which further borders the *corpus ossis sphenoidalis* *at the top*, *the processus pterygoidei (laminae mediales)* at the sides, and the *laminae horizontales* *at the bottom of the palatal bones*. *The soft palate is attached to the posterior edge of the laminae horizontales*.

Between the nasal shells are the nasal passages:

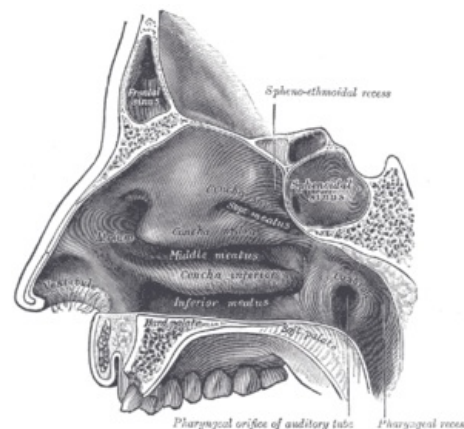
- **meatus nasi superior** (upper nasal passage) - above the middle shell, between it and the ceiling of the nasal cavity;
- **meatus nasi medius** (middle nasal passage) - between the middle and lower shell;
- **meatus nasi inferior** (lower nasal passage) - under the lower shell, between it and the base of the nasal cavity;

- **meatus nasi communis** – a continuous passage through the nose medially from the shells, between them and the *septum nasi*;
- **meatus nasopharyngeus** – the space behind the shells near the choans, where all the nasal passages open;
- *recessus sphenothmoidalis* – the fold of the upper passage in front of the front side of the body of the sphenoid bone.

## Mucous membrane of the nasal cavity

It covers the walls, covers the nasal septum and concha. It starts at the *limen nasi*, at the choanae it passes in the mucosa nasopharynx and continues into the secondary nasal cavities. According to the appearance of the mucous membrane while alive, we have:

**Regio olfactoria (olfactory district).** The mucosa here is paler and is located on the upper shells and mid-shell gap. The **Epithelium** of the olfactory mucosa contains basal low cells of a conical shape, as well as cylindrical supporting cells - microvilli and olfactory cells - bipolar neurons, they have 6-8 cilia, receptor part and neurite. It passes through the lamina cribrosa and enters the olfactory bulb of the forebrain. *Fila olfactoria* is a set of fibers of olfactory cells, it represents the 1st cranial nerve - **n. olfactorius**. The *Glandulae olfactoriae* are serous tuboalveolar and extend beneath the epithelium in the *regio olfactoria*. The *Organum vomeronasale* (Jacobson's organ) is a stunted canal in the septum.



Lateral wall of nasal cavity.

**Regio respiratoria** makes up the other area of the nasal mucosa. It is thicker (especially on the shells), grey-pink and has no sensory cells. Here we can find the *plexus cavernosi concharum*, it is a rich venous plexus, the most noticeable ones are on the lower nasal shell, they warm the air. **Epithelium** is multi-row ciliated (typical of the respiratory tract). In it goblet cells. These produce mucus on the epithelial surface, the *glandulae nasales*, which are mixed tubulaveolar mucus-producing glands. Dust particles are caught on the mucus, they are then transported to the nasopharynx, further enriching the air with water vapor - the air is preheated on the mucous membrane of the shell. The mucous membrane is connected by the mucous membrane directly to the periosteum and perichondrium of the skeleton of the external nose and nasal cavity. From the nasal cavity it passes into the so-called ancillary nasal cavities. *Ductus incisivus* is an inconstant paired blind mucosal duct at the septum.

## Vessels and nerves of the nasal cavity

### Arterial supply

It is carried out thanks to **a. ophthalmica**, specifically its branches *a. ethmoidalis anterior et posterior* and **a. maxillaris**, which supplies the nasal cavity with arteries *a. sphenopalatina* – *aa. nasales posteriores, laterales et septi*.

### Veins

Here we have a rich plexus in the shells - the *plexus cavernosi concharum*, which drains blood to the *plexus pterygoideus* and subsequently to the *plexus pharyngeus*.

### Nerves

Sensitive innervation of the mucous membrane of the nasal cavity is ensured by the first branch of the trigeminum via the *n. ethmoidalis anterior et posterior*, the second branch of the trigeminum, specifically the *rami nasales posteriores*. Autonomic fibers are from **ganglion pterygopalatinum** and here we also have innervation from **n. olfactorius** and **n. vomeronasalis**.

### Lymphatic vessels

The lymphatic drainage is conducted from the *regio olfactoria* to the *nodi lymphatici retropharyngei* and the *nodi lymphatici cervicales profundi*.

## Links

### Related Articles

- Tumors of the nose and paranasal sinuses

### External links

- HORKÝ, Drahomir – NOVÁKOVÁ, Květoslava. *Morfologie orofaciálního systému pro studenty zubního lékařství* [online] . 2. edition. 2011. Available from <<https://mefanet.upol.cz/clanky.php?aid=58>>. ISBN 978-80-244-2702-7.

## Used literature

- ČIHÁK, Radomír – GRIM, Miloš. *Anatomie*. 2. upr. a dopl edition. Grada Publishing, 2002. ISBN 80-247-0143-X.