

Surgical Anatomy of the Nasal Cavity and Paranasal Sinuses

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KEYWORDS

- Paranasal sinuses • Nasal anatomy • Sinus anatomy
- Maxillary sinus • Ethmoid sinus • Frontal sinus
- Sphenoid sinus • Surgical anatomy

The oral cavity and its bony components (maxilla and mandible), along with the nose and its related sinuses, constitute most of the face. Because of their proximity, disease in one may affect the other, whereas trauma of the midface will involve bones common to the oral cavity, nose, and paranasal sinuses. The two serve important life-supporting functions, being the portals for nutrition and respiration. The nasal cavity receives air and conditions the air that is passed on to the other areas of the respiratory tract. The paranasal sinuses are pneumatic cavities lined by mucous membrane and communicate directly with the nasal cavity. The paranasal sinuses are the frontal sinus, ethmoid cells, maxillary sinus, and sphenoid sinus. This article presents a brief but relevant view of the surgical anatomy of the nasal cavity and paranasal sinuses that will be germane to the topics discussed in other articles elsewhere in this issue.

THE NASAL CAVITY

The nasal cavities are located in the middle of the face between the frontal sinus above, the oral cavity below, and the orbits and maxillary sinuses to the sides (Figs. 1 and 2). The nasal cavity is

encased in a pyramidal-shaped osseo-cartilaginous framework and is divided into two compartments by the nasal septum. The osseous portion consists of two nasal bones that articulate with the nasal process of the frontal bone superiorly and fuses with the maxilla laterally. Their lower borders are beveled on their inner surfaces where they articulate with the upper lateral nasal cartilages. The upper lateral nasal cartilages project up below the nasal bones and are attached to them with dense connective tissue.

The cartilaginous portion of the framework consists of two components: the upper lateral and lower lateral nasal cartilages.

Upper Lateral Nasal Cartilages

The upper lateral nasal cartilage is roughly triangular-shaped. Its superior edge is thin and articulates with the nasal bones via dense connective tissue and fuses to the maxilla. The inferior border is also thin and inserts below the border of the lower lateral cartilage (this is not always a consistent relationship, however).¹ This inferior end is free and is the site of the intercartilaginous incision during rhinoplasty. The medial border is thick and continuous with the septal cartilage.

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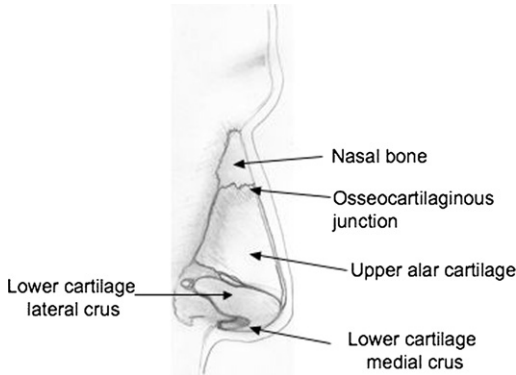


Fig. 1. Sagittal view of the nasal cartilages.

The upper lateral cartilage is fused to the dorsal septum in the midline, where the angle formed between them is normally 10° to 15° . The angle formed by the septum and upper lateral cartilage constitutes the internal valve. This angle between the septum and upper lateral cartilage is important during respiration, and obstruction of the angle by scar tissue or trauma will produce symptoms of nasal obstruction. The total composition of the internal nasal valve encompasses the area bounded by the angle of the upper lateral cartilage and septum, the nasal floor, and the superior portion of the inferior turbinate.

Lower Lateral Nasal Cartilages

Two lower lateral nasal cartilages, each having medial and lateral crus, form the shape of the nasal tip and maintain the patency of the nostrils. The upper border of the lateral crus is in contact with the upper lateral cartilage. Laterally, the extension is variable, but it is always connected to the maxilla with a thick fibrous membrane, with several lesser alar cartilages embedded in it. The lower border is free but does not reach the clinical border of the nose, which is formed by a double layer of skin. In the midline they are loosely connected to each other by the interdomal ligament. In this area, the structure is supported only by the septal cartilage,

subcutaneous tissue, and the thickness of the overlying skin. The external valve is a variable area dependent on the size, shape, and strength of the lower lateral cartilages.

The medial crus is the downward continuation of the lateral crus from the apex. It extends inferiorly to the region of the area of the anterior nasal spine of the maxilla, passing anterior to the free end of the nasal septum. It is more slender than the lateral crus, and these are loosely joined to each other and to the inferior border of the septal cartilage with connective tissue. The medial crus and lateral crus form the nostril, which is the opening into the nasal cavity itself.

The Nasal Cavity

The nasal cavity is divided by a vertical septum into two similarly paired cavities. Each half has a medial wall (the nasal septum) and a lateral wall that contains ridges called conchae or turbinates that participate in the drainage and ventilation of the paranasal sinuses. The roof of the nasal cavity consists of the crista galli, the cribriform plate, and the body of the sphenoid containing the sphenoid sinus. The cribriform plates contain nerves associated with the sense of smell passing through tiny openings in them. The bony floor is made up anteriorly of the palatine process of the maxilla and posteriorly by the horizontal process of the palatine bone.

Nasal septum

The nasal septum is a midline bony and cartilaginous structure that is composed of five parts (Fig. 3):

- Perpendicular plate of ethmoid bone
- Vomer bone
- Crest of the maxillary bone
- Crest of the palatine bone
- Cartilage of the septum.

The vertical or perpendicular ethmoid plate forms the upper half of the bony nasal septum and is continuous superiorly with the cribriform

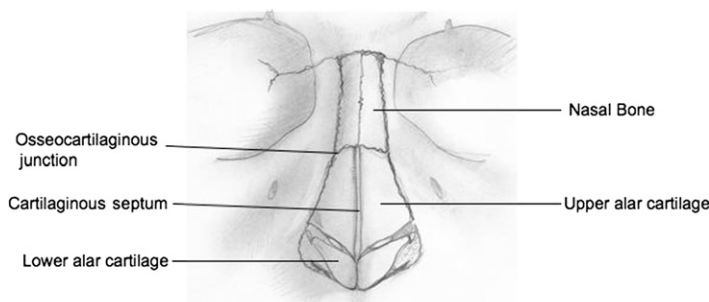


Fig. 2. Frontal view of nasal cartilages.

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