

Cone Beam Computed Tomography for the Nasal Cavity and Paranasal Sinuses



Edwin T. Parks, DMD, MS

KEYWORDS

• Paranasal sinuses • CBCT • Anatomic variant • Sinus pathology

KEY POINTS

- The paranasal sinuses are 4 paired airspaces that border the nasal cavity. The functions of the nasal cavity and paranasal sinuses include decreasing the weight of the skull, heating and humidifying inspired air, resonance in speech, regulation of intranasal pressure, and increasing surface area for olfaction.
- The paranasal sinuses have also been described as crumple zones or areas that absorb the energy from trauma and protect vital structures in the skull.
- Dental professionals are most familiar with the maxillary sinuses as viewed 2-D imaging (eg, periapical, panoramic projections). With the increasing implementation of 3-D imaging, however, specifically cone beam computed tomography (CBCT), there is a high probability that much or all of the paranasal sinuses and nasal cavity are captured in a scan.

NASAL CAVITY

The nasal cavity is bounded inferiorly by the hard palate, laterally by the medial walls of the right and left maxillary sinus, and superiorly by the nasal, ethmoid, and sphenoid bones.¹ The primary components of the lateral walls of the nasal cavity are the inferior middle and superior conchae (also termed, *turbinates*). These structures protrude into the nasal cavity and act as baffles to help warm/cool, filter, and humidify inspired air. Another function of the nasal cavity is the sense of smell. The spaces between the conchae are referred to as *meatuses*. The inferior meatus is located beneath the inferior concha and is the site for drainage of the nasolacrimal duct. The middle meatus is the site of drainage for the frontal, anterior ethmoid, and maxillary sinuses. There is also a communication from the middle meatus to the maxillary sinus through an opening, called the *ostium*. The superior meatus communicates with the posterior ethmoid and sphenoid sinuses through the sphenothmoidal recess (**Fig. 1**). The nasal cavity is

The author has nothing to disclose.

Department of Oral Pathology Medicine and Radiology, Indiana University School of Dentistry, 1121 West Michigan Street, Room S110b, Indianapolis, IN 46202, USA

E-mail address: edparks@iupui.edu

Dent Clin N Am 58 (2014) 627–651

<http://dx.doi.org/10.1016/j.cden.2014.04.003>

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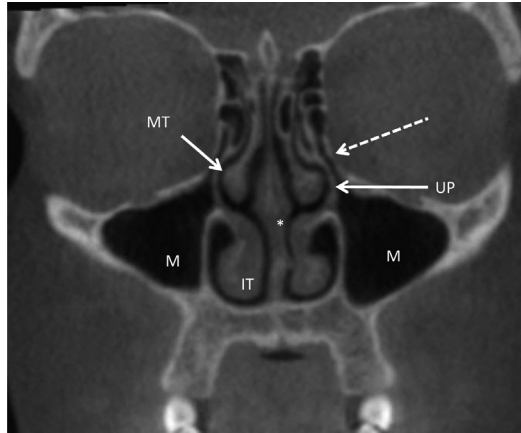


Fig. 1. Nasal cavity coronal views of nasal cavity and maxillary sinuses. IT, inferior turbinate; M, maxillary sinus; MT, middle turbinate; UP, uncinate process; asterisk, nasal septum; dashed white arrow, patent ostiomeatal complex.

divided by the nasal septum. The anterior portion of the nasal septum is composed of cartilage. The posterior nasal septum is bony. The arterial blood supply for the nasal cavity comes from internal maxillary artery (branch of external carotid artery) and the anterior and posterior ethmoidal arteries (branches of the internal carotid artery). The vascularity of the nasal cavity accounts for the volume and intensity of bleeding when the region is injured. The nasal cavity is innervated by the olfactory (CN I), ophthalmic, and maxillary branches of the trigeminal (CN V) and facial (CN VII) nerves.²

ANATOMIC VARIANTS—NASAL CAVITY

Deviated Nasal Septum

The deviated nasal septum is a common finding within the nasal cavity and occurs when the nasal septum is displaced toward one side of the nasal cavity. Deviated nasal septum may be congenital or due to trauma. The deviation may be mild with no symptoms or sequelae. When a deviation is severe, however, the flow of air through the nasal cavity is redirected and may manifest as nasal obstruction, noisy breathing during sleep, and/or epistaxis. Severe deviations can result in hypoplasia of the ipsilateral turbinates and/or hyperplasia of the contralateral turbinates (**Fig. 2**).³ The nasal septum may also exhibit pneumatization. This is of little clinical significance unless it obstructs nasal airflow or surgical access to the paranasal sinuses.

Concha Bullosa

Concha bullosa or pneumatization of the concha is seen in from 14% to 53.6% of the population (**Fig. 3**).⁴ Concha bullosa are grouped according to the location of the pneumatization and are classified as lamellar, bulbous, or extensive.⁴ Concha bullosa are most commonly seen in the middle turbinate and may be unilateral or bilateral. Unilateral concha bullosa are frequently associated with a deviated nasal septum. A vast majority of concha bullosa are asymptomatic. There is ongoing debate regarding the association of concha bullosa with sinus disease, with the current view that concha bullosa are associated with sinus disease when they block or impinge on the ostiomeatal complex.⁴

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