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ANATOMIC VARIATIONS

First report of lateral nasal wall pneumatization

Emre Köse[1] · **Özge Dönmez Tarakçı**[1]

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Abstract
Pneumatization is defined as air-filled cavities inside bone tissue. It is an anatomic variation such asymptomatic radiolucent defects that can be unilateral and multilocular in healthy individuals. The skull contains numerous pneumatized regions including paranasal sinuses, nasal cavity, zygomatic arch and temporal bone. 38-year-old female patient was referred to our clinic with a complaint of upper third molar pain. A radiolucent area was observed in left nasal region during panoramic radiograph examination. In cone beam computed tomography images, a pneumatization within mucosal thickening was diagnosed in left nasal wall. This case report describes anatomic and morphologic features of lateral nasal wall pneumatization with cone beam computed tomographic images.

Keywords Nasal wall pneumatization · Cone beam computed tomography · Nasal cavity

Introduction

Development of air-filled cavities in bone are called pneumatization [2]. The skull contains numerous pneumatized regions including paranasal sinuses, nasal cavity, sphenoid bone, zygomatic arch and temporal bone [5]. In nasal cavity, pneumatization can be seen in nasal septum and conchas which is called concha bullosa. Concha bullosa is the most frequent variations of nasal cavity also known as a middle turbinate pneumatization [12]. These variations may represent potential risk for surgical procedures [3]. Mucosal thickening and excessive enlargement of pneumatizations in nasal cavity can obstruct maxillary sinus ostium and may impede ventilation and mucociliary clearance from the sinuses which resulting maxillary sinusitis [11, 13]. In the literature review, we did not find any report about the pneumatization of lateral nasal wall.

Accurate radiologic examination is so important to differentiate pathological conditions from normal variants. Plain radiographs are often insufficient to visualize facial bone structures because of complex anatomy and superimpositions [3, 5, 6]. With the use of cone beam computed tomography (CBCT), maxillofacial radiologists and otolaryngologists are able to define pathological conditions and anatomical aberrancies of paranasal region [10]. Although CBCT has major limitations in the differentiation of soft tissue masses, it is superior to demonstrate the bony anatomy and variations, extent of inflammatory lesions and inflammatory changes of bone tissue such as sclerotic thickening and cortical destruction [4, 8].

In this case report, unilateral pneumatization of lateral nasal wall was reported for the first time in the literature with CBCT images.

Case report

38-year-old female patient was admitted to our clinic with a complaint of bilateral upper third molar pain. A radiolucent area was observed in left nasal region during panoramic radiograph examination (Fig. 1). There was no history of surgical procedure in nasal cavity. Her medical history was unremarkable. In CBCT images, pneumatization within mucosal thickening was diagnosed in left nasal wall. In multiplanar CBCT sections, air cavity was measured 10 mm in diameter with well-defined borders, nonexpansile and nondestructive characteristics. Additionally, coronal scans showed a septum slightly deviated to the left and left inferior and middle hypertrophic turbinates. Floor of bilateral maxillary sinuses were normal without any mucosal thickening

✉ Emre Köse
mail_emrekose@hotmail.com

[1] Department of Oral and Maxillofacial Radiology, Faculty of Dentistry, Aydın Adnan Menderes University, Aydın, Turkey

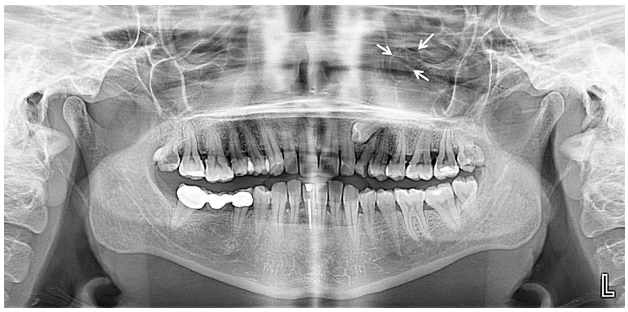

Fig. 1 Panoramic radiograph (white arrows show the pneumatization)

(Fig. 2). Maxillary sinus ostium was not examined due to limited field of view. Patient was informed about the variation and no treatment was initiated.

Discussion

Between 15 and 16th weeks of gestation superior, middle and inferior turbinates are formed. The development of lateral nasal wall is completed around 24th week of gestation. During gestation, development and ossification of superior and middle turbinates which are originated from ethmoid bone are completed while inferior turbinate is developed by maxilla and the lateral cartilaginous capsule [1]. Osseous development of turbinates can form in many ways. Especially in inferior turbinate lamellar bone formation usually can be seen. Spongious bone formation also can be found anteriorly and similar to formation of perpendicular plate. This bone structure is observed both in inferior and middle turbinate [10]. Enlargement of bone tissue can obstruct nasal airway remarkably. Concha bullosa is the most common variation of nasal cavity that can lead obstruction and observed about one-third of the population [13]. Septal deviation and septum pneumatization are considered anatomic variations of nasal septum which could be possible causes of osteomeatal obstruction [1]. Obstruction of osteomeatal complex and impaired mucociliary clearance can prevent ventilation and drainage of maxillary sinuses [4, 11]. In our case, nasal wall pneumatization was not related to ostium. Turbinates were normal in the sections obtained field of view.

The strongly vascularised nasal mucosa has an important role to humidify and purify inspired air [4]. The mucosa covers about 100–200 cm^2 in nasal cavity. Stratified squamous and respiratory-type ciliated columnar epithelium and in some places transitional epithelium coat the nasal cavity. These cells which are connected to basal membrane are responsible for mucociliary clearance that provides flow of mucus from sinuses to the choanae [4, 7]. Inflammation, mucosal swelling or hyperplasia may be represent a sign of mucosal thickening of nasal cavity [9]. Mucosal thickening may obstruct ostium. In our case, there was no mucosal thickening in obtained field of view of around pneumatized area and sinuses.

Conclusions

Pneumatized areas are minimal resistant sites that can lead to irregularity of drainage and chronic sinusitis, thereby awareness of these kinds of variations is important to prevent complications of surgical treatments and misdiagnosis. At this point CBCT examination has a key role to

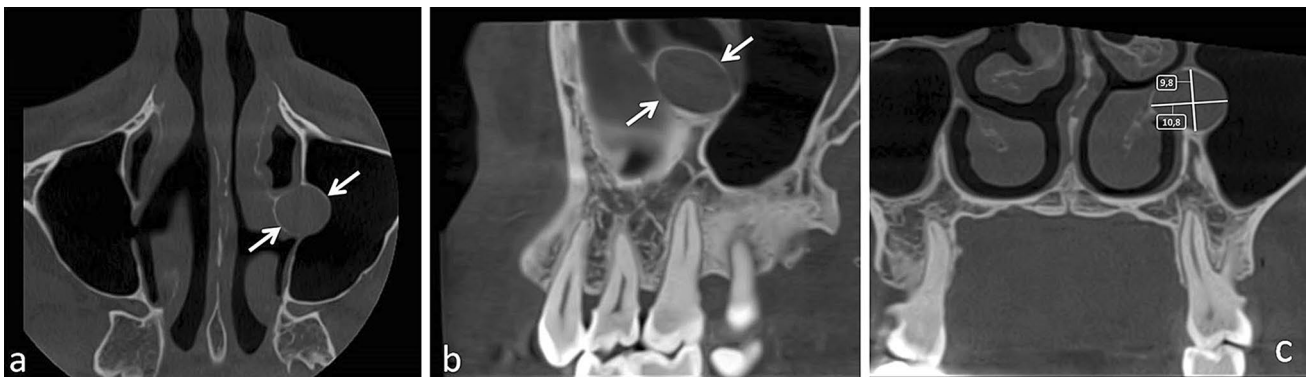

Fig. 2 CBCT images. **a** Axial view. **b** Sagittal view (white arrows show the pneumatization). **c** Coronal view (white lines show dimension of pneumatization)

minimize risk before surgery and identify relations with adjacent anatomical structures.

Author contributions KE Project development, Manuscript writing. DTÖ Manuscript writing.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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