In the Name of God

The Compassionate

The Merciful

دانشکده دندانپزشکی

Shiraz University of Medical Science
School of Dentistry

The Evaluation of Incidence of Mucous Retention Pseudocyst (MRC) of Maxillary Sinus in Panoramic View

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Dedicated to

Our Parents & Sisters

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Introduction

Mucous Retention Cyst (MRC) of the antrum is an inflammatory lesion caused by mucous extravasation into the submucosa of the antrum, more commonly found in maxillary sinus.

The drainage of a solitary mucous gland can be stopped accidentally often with no signs and symptoms.

On the plain radiography they can be seen as a smoothly outlined dome-shaped elevation without any surrounding cortical thickening.

Different types of conventional radiographies may be employed in MRC detection. Panoramic views provides the dental staff with an overall image of the maxilla and mandible and sometimes is supplemented with bite-wing and selected periapical views.

The principal advantages of panoramic images include the following:

- Broad coverage of the facial bones and teeth (field size)
- Low patient radiation dose (Minimal exposure)
- Convenience of the examination for the patient.
- Ability to be used in patients unable to open their mouths.
- Simplicity, short time required to make panoramic images, usually in the range of 3 to 4 minutes. (include) the time necessary for positioning the patient and the actual exposure (cycle)
- Patients ready understandability of panoramic films, making them a useful visual aid in patient education and case presentation.

Since panoramic view is routinely and extensively used in dental practice and maxillary antrum is depicted well in this view, it creates a valuable opportunity to detect MRC if present.

In this cross- sectional study the incidence of MRC was evaluated in panoramic view which were taken for different purposes.

PART I

Review of the Literature

A - Brief review of the anatomy of maxillary sinus

The maxillary sinus is the largest of the paranasal sinuses. Its Proximity to dento-oral complex, eyes, ptrygopalatine fossa, ear, brain, etc., makes it an important structure when differential diagnosis of the diseases, pain or lesions in the area is concerned. In other words, abnormal condition of the maxillary sinus may become related to each of these structures and vice versa. For example the pain produced by maxillary sinusitis may mimic dental or eye pain, or may refer to the maxillary and frontal area. Infection of the maxillary sinus may cause purulent nasal and postnasal discharge or may spread to the adjacent facial structures causing facial swelling [(1)], oro-antral fistulas, possibly optic neuritis [(2)], cavernus sinus thrombosis, etc. similarly, cysts and tumors of the maxillary sinus may invade and of its neighboring structures and produce nasal obstruction, facial pain, exophthalmos, diplopia, decreased vision, loosening of the teeth [(3)], etc.

Consequently dentists, maxillofacial and ENT surgeons as well as ophthalmologists, neurologists and neurosurgeons may be involved when the correct diagnosis of maxillary sinus diseases is not easily made.

Imaging is one of the most important diagnostic tools for detecting diseases of the maxillary sinus. Conventional radiography, tomography, ultrasonography, CT scanning and MRI are among the techniques that have been used for imaging of the maxillary sinus. [4,5]

Conventional radiography has still kept its role for screening or as the primary imaging modality for the diagnosis of diseases in the maxillofacial region. [5,6] It can also be used for initial detection of the of cysts, tumors, sinusitis, fractures, displaced roots and detection of malignant lesions of the sinus. Advanced imaging techniques such as CT and MRI, on the other hand are more useful if detailed investigation of the sinus or tumors are required. [7]

Overview of Craniofacial Growth and Development

"Growth" is a general term implying simply that something changes in magnitude. It dose not, however, presume to account for how it happens. For the professional clinician, such a loose meaning is often used quite properly. However, to try to understand "how" it works, and what actually happens, the more descriptive and explanatory term "development" is added. This connotes a maturational process involving progressive differentiation at the cellular and tissue levels, thereby focusing on the actual biologic mechanism that accounts for growth.

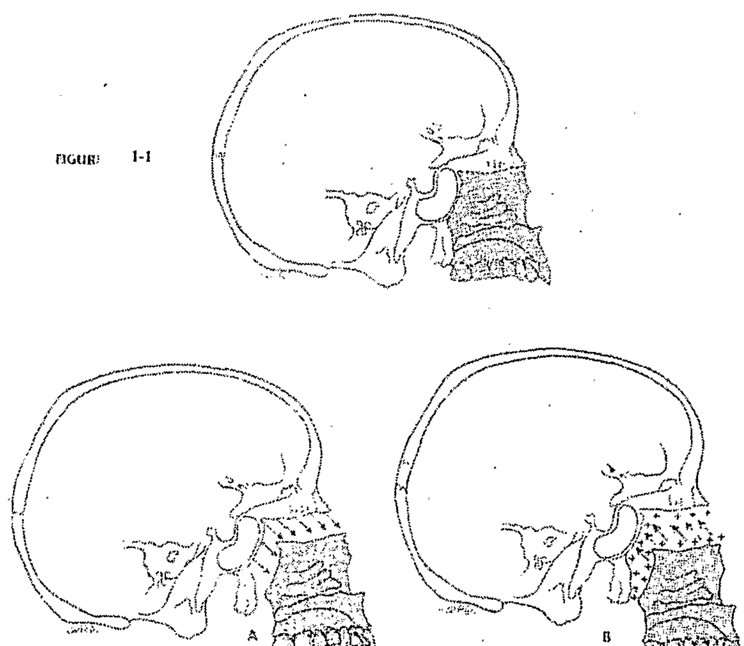
No craniofacial component is developmentally self-contained and self-regulated. Growth of a component is not an isolated event unrelated to other parts. Growth is the composite change of all components.

As a bone enlarges, it is simultaneously carried away from other bones in direct articulation with it. This creates the "space" within which bony enlargement takes place at the interface between bone-to-bone joint contacts. The process is termed displacement (also called "translation"). It is a physical movement of a whole bone and occurs while the bone simultaneously remodels by resorption and deposition (to an equivalent extent).

As the bone enlarges in a given direction within the joint, it is simultaneously displaced in the opposite direction. The relationships underscore why facial articulations (sutures and condyles) are important factors; they are direct clinical targets.

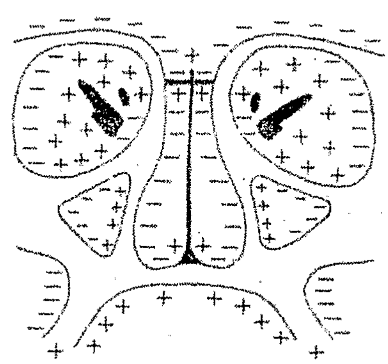
The process of new bone deposition dose not cause displacement by pushing against the articular contact surface of another bone. Rather, the bone is carrid away by the expansive force of all the growing soft tissues surrounding and attached to it by anchoring fibers. As this takes place, new bone is added immediately (remodeling), the whole bone enlarges, and the two separate bones thereby 6 in constant articular junction. The nasomaxillary complex, for example, is in sutural contact with the floor of the cranium. The whole maxillary region, in toto, is displaced downward and forward away from the cranium by the expansive growth of the soft tissues in the midfacial region (Fig. 1-1A). This then triggers new bone growth at the various sutural contact surfaces between the nasomaxillay composite and the cranial floor (Fig. 1-1B). Displacement thus proceeds downward and forward an equivalent amount as maxillary remodeling simultaneously takes place in an opposite upward and backward direction (i.e., toward its contact with the cranial floor).

FIGURE 1-1



In Figure 1-2 a few of the many "arches" in a face can be recognized, and bony remodeling (+ and -) producing them. Horizontally and vertically, the arch from of the orbits, the nasal and oral sides of the palate, the maxillary arch, the sinuses, the zygomatic arches, and so forth are all subject to airway configuration, size, and integrity. Note that the airway is strategically pivotal to all of them. [8]

FIGURE 1-2



The growth of the cartilaginous nasal septum, particularly the vomer and the perpendicular plate of the ethmoid, carries the nasomaxillary complex downward and forward.

The maxillary complex is surrounded by a system of sutures that allows for the growth and the displacement of the various bones both anteroposteriorly and laterally. The circummaxillary suture system includes the zygomaticomaxillary, frontozygomatic, sphenopalatine, and palatomaxillary sutures. [9]

Paranasal Sinuses

Four paris of paranasal sinuses (air- filled spaces lined by mucos membrane) surround the nasal cavities and are named from the bones in which they are located: maxillary (or antrum of Highmore), frontal, sphenoid, and ethmoid sinuses.

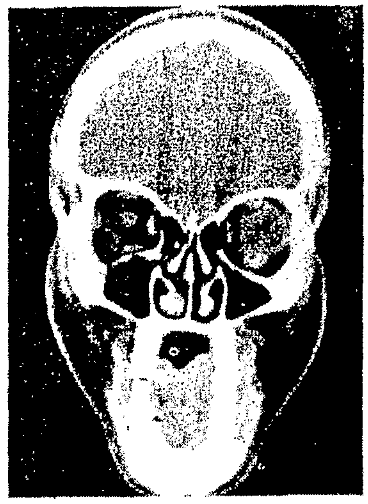
The ethmoid is often called the ethmoid labyrinth because of its many cellular divisions. The sinuses develop as outpocketings of nasal mucous membrane. At birth only the maxillary and ethmoid sinuses are present. The frontal sinus develops from one of the anterior ethmoid cells but does not start to pneumatize the frontal bone until the first or second year of life. Similarly the sphenoid sinus begins to invade bone about the third year of life. [10]

Anatomy: regional, systematic and applied

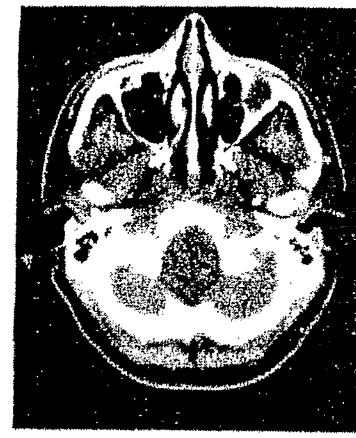
The maxillary sinuses are the largest of the air-filled spaces surrounding the nose. They are paired structures located largely in the body of each maxilla, are mirror images of one another (though not always symmetrical) and are approximately pyramidal in shape (Figure 1.3 and 1.4).

Figure 1-3

(a) Coronal and (b) axial CT scans showing the shape and relations of the maxillary sinus



(a)



(b)

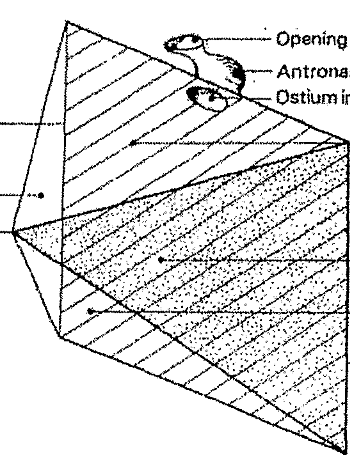


Figure 1-4

Diagram of the right maxillary sinus including the antronasal duct viewed from the anterolateral aspect

The base of each pyramid is medial, its upper two-thirds being the lower half of the lateral wall of the nasal cavity, and its lower third being the palatal alveolar process; the apex is directed laterally towards the zygomatic bone and in large sinuses may extend into it. [11,12,13] The four sloping surfaces connecting the base to the apex are: the roof of the sinus, which forms part of the orbital floor and slopes down laterally; the buccoalvelar surface or floor, which slopes up laterally; the facial surface, which faces anterolaterally; and the infratemporal surface facing posterolaterally. [11,12] The sloping walls, except for the roof which receives a contribution from the lacrimal bone near its anteromedial angle, are formed entirely from the maxilla. Other bones always contribute to the base and occasionally to the apex. [11]

The sinuses are usually, but not always, equal in size, and rarely one sinus may be completely absent. Their osita open high up through the medial wall into the middle meatus of the nose. [4,11] (Figure 1.4)

Although the ostium is located at a higher level than the floor of the maxillary sinus, the normal sinus drains satisfactorily because of the action of the cilia of the pseudo stratified columnar epithelium. The functions of the maxillary sinuses are 1) to lighten the weight of the skull, 2) to give resonance to the voice, and 3) to warm and moisten the inspired air. [11]

Development and Age changes

During the fourth week of embryonic life the dorsal portion of the first pharyngeal arch forms the maxillary process.

At birth the maxilla is filled with deciduous tooth germs which are very close to the orbital floor so the superior dental nerves and vessels have only a short distance to travel to reach the teeth. The maxillary sinus averages 7 mm in anteroposterior length and 4 mm in height and width at this stage. It expands approximately 3 mm anteroposteriorly and 2mm vertically each year [11] (Sperber, 1989). Because the maxillary sinus is a mere anteroposterior groove between the inferior and middle turbinates, the sinus floor is high above the level of the floor of the nose (figure 1.5). The alveolar and orbital aspects of the maxilla gradually become separated by cancellous bone which is then resorbed as the sinus enlarges. Pneumatization of the maxilla commences just below the orbital floor. Downward growth of the maxillary sinus leaves the ostium in a position unfavorable for gravitational drainage [11,4] (Figure 1.5). The maxillary sinus expands not only downwards but also forwards and backwards from its initial evagination, the site of which persists as the antronasal duct [11] (Figure 1.4). It undergoes concurrent lateral expansion and by the end of the first year extends beneath the as far as the infraorbital canal (Adams and Schofield, 1963). By the 20^{th} month it has