



AN ANATOMICAL STUDY ON LOCATION OF MAXILLARY SINUS OSTIUM AND IT'S SURGICAL IMPORTANCE

Jyothi N. Nayak, Varalakshmi K. L., Sangeetha M., Shilpa Naik

Department of Anatomy, MVJMC&RH, Hoskate, Bangalore, KA, India.

ABSTRACT

Background: A clear knowledge of exact location of maxillary sinus openings is essential for the endoscopic sinus surgeons as it is related to important structures like orbital floor, ethmoidal infundibulum and the nasolacrimal duct.

Aim: The principle maxillary ostium is opened in the hiatus semilunaris which is located on the upper part of medial wall of maxillary sinus.

Materials and Methods: This study was carried in 52 sagittally cut head and neck specimens from the Department of anatomy, MVJ Medical College and Research Hospital. **RESULT:** In the present study, maxillary sinus ostium was more commonly opened in to the posterior third of the hiatus semilunaris in 33(63.46%) specimens, middle third of hiatus semilunaris in 13(25%) specimens, anterior third in 5(9.61%) and absent in 1 (1.9%)specimens. Accessory maxillary ostium was found in 6(18.75%) specimens, which opened into the membranous meatus inferior to the uncinate process.

Conclusion: This study will be helpful for surgeons to prevent the complications while performing endoscopic sinus surgery.

Key Words: Accessory maxillary ostium, Ethmoidal infundibulum, Hiatus semilunaris, Nasolacrimal duct, Principal maxillary ostium

INTRODUCTION

Evolution is a gradual process due to which man attained erect posture whereby the principal or main maxillary ostium came to be located at a higher level because of that the drainage was no longer due to gravity. This factor along with the improper mucociliary action of the lining mucosa is the main cause of the obstruction of ostium which opens at the hiatus semilunaris^[1]. The osteomeatal complex refers to the common drainage pathway of the frontal, maxillary, anterior and middle ethmoidal sinuses^[2]. The maxillary sinus ostium drains into the infundibulum which joins the hiatus semilunaris and drains into the middle meatus. A possible mechanism of formation of accessory ostia is obstruction of the primary ostium by maxillary sinusitis or due to anatomic and pathologic factors in the middle meatus which results in the rupture of membranous areas known as fontanelle^[1].

The ostium of maxillary sinus is located on the highest part of the medial wall of the sinus which is responsible for poor free drainage and it opens in to the narrow

ethmoidal infundibulum instead of direct opening into the nasal mucosa, so the inflammation of its surrounding area can further interfere with drainage^[3]. So the Osteomeatal unit is a critical area for the Functional endoscopic sinus surgery. The surgical interventions of the functional endoscopic sinus surgery is designed to remove the blockage of maxillary sinus ostium and to retain the normal sinus ventilation and mucociliary function^[4]. Considering the surgical importance of location of maxillary sinus ostium, the present study is an attempt to learn the exact location, presence of accessory / absence of maxillary ostium.

MATERIAL AND METHODS

Fifty two sagittally cut head and neck specimens were taken from the department of anatomy of MVJ Medical College and Research Hospital. In each specimen middle concha was cut or reflected along its margins and middle meatus was opened. The specimens were washed properly and then a probe is introduced to observe the location of sinus ostium and direction of opening. The

Corresponding Author:

Dr. Varalakshmi K. L., Department of Anatomy, MVJMC&RH, Hoskate, Bangalore, India.

E-mail: drvara.hitesh@gmail.com

Received: 26.07.2014 **Revised:** 20.08.2014 **Accepted:** 12.09.2014

presence of accessory maxillary ostium is also noted. The percentages of different locations of sinus ostium were calculated.

RESULTS

The principal maxillary ostium was found at the junction of medial maxillary wall and the floor of the orbit, half-way between the anterior and posterior maxillary walls. The maxillary ostium was oval shaped or slit like and oriented horizontally or obliquely.

The position of the maxillary sinus ostium in 52 half heads was as follows.

- In 33 specimens, maxillary sinus ostium was located in the posterior 1|3 of hiatus semilunaris.
- In 13 specimens, maxillary sinus ostium was located in the middle 1|3 of hiatus semilunaris.
- In 5 specimens, the maxillary sinus ostium was located in anterior 1|3 of hiatus semilunaris.
- In 1 specimen the maxillary sinus ostium was absent.
- Accessory maxillary ostia were found in 6 specimens

Table 1: Incidence and location of maxillary sinus ostium

Location of maxillary sinus ostium	Number of specimens	%
Posterior 1 3 of hiatus semilunaris	33	63.46%
Middle 1 3 of hiatus semilunaris	13	25%
Anterior 1 3 of hiatus semilunaris	5	9.61%
Absent	1	1.9%

DISCUSSION

The maxillary sinus formed from outgrowths or diverticula of the walls of the nasal cavities and become pneumatic extensions of the nasal cavities of maxillae. The original openings of the diverticula persist as the primary maxillary sinus ostium^[5].

The primary maxillary ostium may be found at any point along the course of infundibulum. In the present study, maxillary sinus ostium was more commonly found to open into the posterior third of the infundibulum in 33(63.46%) specimens, while it was opened in the middle third in 13(25%) and anterior third in 5(9.61%) specimens.(Table1). Prasanna reported similar observations and found the opening of maxillary ostium into the

anterior 1/3 of hiatus semilunaris in 4(10%), the middle third in 11(27.5%) and the posterior third in 21(52.5%) cases^[4]. Van Alyea also reported the openings of maxillary ostium into the posterior third of uncinat groove in 71.8% cases^[6]. Rosenberger has stated that maxillary ostium opens into the posterior third in 70% cases. Thus maxillary ostium commonly opens into the posterior third of the uncinat groove^[3].

Myerson recognised that the ostium of the maxillary sinus is located immediately below the orbital floor, and thus below the lamina papyracea in the posterior part of the infundibulum, and that perforating the lateral wall of the infundibulum superior to the ostium violates the orbit. Hence the sinus surgeon must have a thorough knowledge of the relevant relationship to avoid injury to the orbit. Blind probing or nibbling with the forceps may lead to higher incidence of orbital complications^[7]

Maxillary accessory ostium is one of the anatomical variations that may play a role in the development of chronic maxillary sinusitis. The incidence of accessory maxillary ostium has been recorded from to range from 0 to43%.In the present study accessory maxillary ostia were found in 6(18.75%) specimens. Similar observations were earlier noted by Van Alyea in 23%, Myerson in 30.7%, Prasanna in 22.5%, and Manju Singhal in 18.5%. Manju and Kennedy reported their presence either in the Anterior nasal fontanelle or Posterior nasal fontanelle^[8]. May et al found their presence restricted to the Posterior nasal fontanelle posteroinferior to the natural ostia^[9].

Van Alyea reported in his study that the natural ostia were easily accessible in 40% of specimens, but that in 20% the ostia could not be cannulated because of the anatomic configuration of the uncinat process or the bulla or the size of the ostia. In the remainder of the specimens, cannulation was only possible because of the skill, experience of the surgeon or because an accessory ostium was present^[6].

Clinically the Accessory maxillary ostium may be utilized in such cases by the endoscopic sinus surgeons to irrigate the maxillary sinus. Apart from the ostia the fontanelles may be used to create alternative passage which re-establishes ventilation and drainage during therapy of maxillary sinusitis^[10].

CONCLUSION

The detailed anatomical knowledge of variations in the location of maxillary sinus ostium and accessory ostium is important for endoscopic sinus surgeon in order to perform the middle meatal antrostomy as well as for radiologists for proper interpretation of x rays. The exact localisation of sinus ostium is also important in case of

stenosis for proper dilatation of ostium without any complications.

ACKNOWLEDGEMENT

Authors acknowledge the immense help received from the scholars whose articles are cited and included in references of this manuscript. The authors are also grateful to authors / editors / publishers of all those articles, journals and books from where the literature for this article has been reviewed and discussed.

REFERENCES

1. Kumar H, Choudhry R, Kakar S. Accessory maxillary ostia: Topography and clinical application. *Journal of Anatomical Society India* .2001; 50(1):3-5.
2. Manju D. Singhal and Deepak Singhal. Maxillary Sinus Ostium – Morphology and it's Clinical Relevance.2013; 2 (3): pp. 26-29.
3. Hollinshed WH, Rosse C. *Text book of Anatomy*, 4th edition. Herper and Row, Philadelphia.1985; pp 976-985.
4. L C Prasanna and H Mamatha .The Location of Maxillary Sinus Ostium and Its clinical Application. *Indian Journal of Otolaryngology and Head & Neck Surgery*.2010; 62(4):335-337.
5. Moore K L and Persaud TVN. *The Developing Human*. Saunders Elsevier; Philadelphia, Pennsylvania.2003; 227-228.
6. Van Alyea OE. The ostium maxillare. *Anatomic study of its surgical accessibility*. *Arch Otolaryngology*.1936; 24:553-569.
7. Myerson The natural orifice of maxillary sinus, anatomical studies, *Archives of Otolaryngology*.1932; 5 80-91.
8. Manju D Singhal and Deepak Singhal. Anatomy of Accessory Maxillary Sinus Ostium with Clinical Application *International Journal of Medical Science and Public Health*.2013; Vol 3, 327-329.
9. MayM, Scbol SM, Korzee J .Location of maxillary ostium and its importance to the endoscopic sinus surgeons.*Laryngoscope*.1990; 100, 1037-42.
10. Levine HL, Mark M, Rontal M, Rontal E. Complex anatomy of lateral nasal wall simplified for endoscopic surgeon *Endoscopic sinus surgery*. Thieme medical Publishers, New York.1993; pp 1-28.

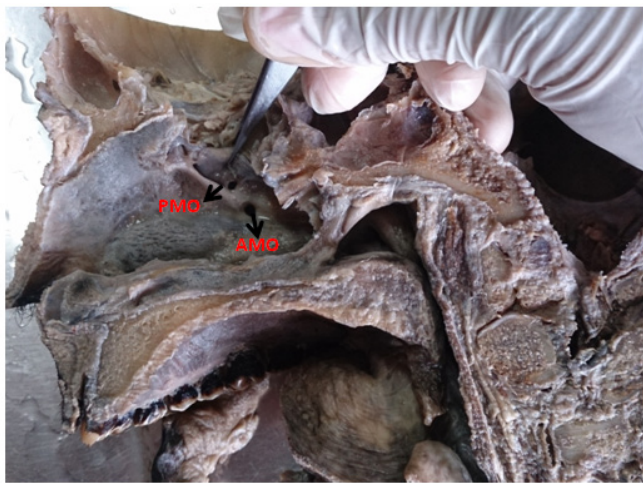


Figure 1: Sagittal section showing primary maxillary ostium and accessory maxillary ostium

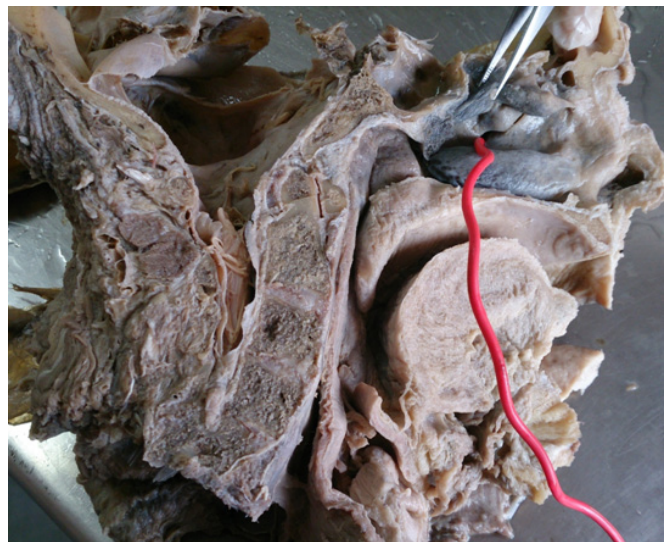


Figure 2: Sagittal section showing lateral wall of nose, probe in Primary maxillary ostium.