10.5005/jp-journals-10013-1263

REVIEW ARTICLE

# Maxillary Sinus Hypoplasia—A Not-so-uncommon Clinical Entity: A Review

[1]Anuja Bhargava, [2]Sachin Khanduri, [3]Mohd Shakeel, [4]Saurabh Srivastava, [5]Prasoon Varshney


## ABSTRACT

Bilateral sinus maxillary sinus hypoplasia is a rare anomaly. Radiological diagnosis of maxillary sinus hypoplasia is important for diagnosis to prevent recurrent rhinosinusitis and complications during endoscopic sinus surgery. A high index of suspicion is required by outpatient department examination for proper clinical evaluation and further management of these patients.


**Keywords**: Anamoly, Maxillary sinus, Hypoplasia.

**How to cite this article:** Bhargava A, Khanduri S, Shakeel M, Srivastava S, Varshney P. Maxillary Sinus Hypoplasia—A Not-so-uncommon Clinical Entity: A Review. Clin Rhinol An Int J 2016;9(1):43-45.

**Source of support:** Nil

**Conflict of interest:** None

## INTRODUCTION

Bilateral maxillary sinus hypoplasia is a rare anomaly. The incidence of maxillary sinus hypoplasia (MSH) ranges between 1.5 and 10%,[1] but some studies have reported less than this range.[2,3] Majority of these patients reported were asymptomatic, and hypoplasia involving maxillary sinuses was identified only on routine radiology.

We report this case due to high index of suspicion of maxillary hypoplasia due to short stature of the patient. This finding also helped to keep this patient on regular follow-up, which can prevent development of chronic sinusitis.

## CASE REPORT

A 20-year-old female presented to the otorhinolaryngology outpatient department with chief complaints of watery nasal discharge on and off since childhood. Routine ear, nose, and throat (ENT) examination was done. On clinical examination, the nasal septum was in the midline.

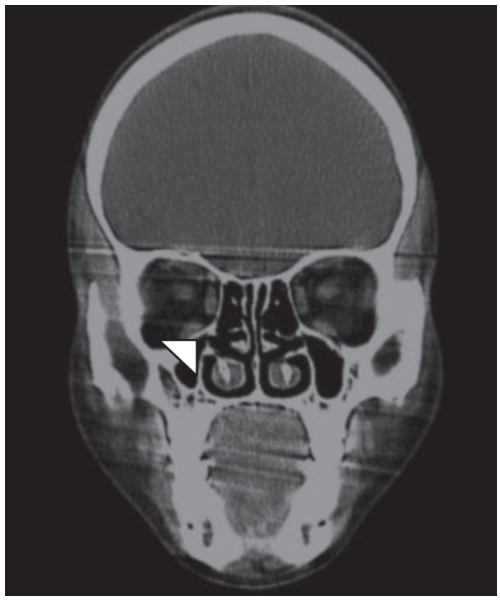

**Fig. 1:** Plain computed tomography scan coronal cut of a 20-year-old female; the arrow head shows normal uncinate process and a well-developed infundibular passage with bilateral maxillary sinus hypoplasia (right > left)

Bilateral inferior turbinates were normal. The patient was of short stature according to her age, which led to suspicion of some congenital anomaly. On detailed history, she told that her parents are of normal height comparatively. Therefore, a computed tomography (CT) scan of the nose and paranasal sinus was done. The scan revealed bilateral MSH (right > left). According to MSH grading, it is classified as Type I as it is characterized by mild hypoplasia of the maxillary sinus, normal uncinate process, and a well-developed infundibular passage (Fig. 1). She underwent complete ENT examination and diagnostic nasal endoscopy and was diagnosed with allergic rhinitis based on her symptoms. The patient was managed with antihistaminics and steroid nasal spray. She is now on regular follow-up.

## DISCUSSION AND REVIEW OF THE LITERATURE

Maxillary sinus hypoplasia is classified into 3 types depending on the embryological development of the sinus and uncinate process. Type I MSH is characterized by mild hypoplasia of the maxillary sinus, normal uncinate process, and a well-developed infundibular passage. Type II MSH has significant hypoplasia of the maxillary sinus, hypoplastic or absent uncinate process, and absent

[1,3]Assistant Professor, [2]Professor, [4]Senior Resident, [5]Junior Resident

[1-5]Department of ENT, Era's Lucknow Medical College, Lucknow Uttar Pradesh, India

**Corresponding Author:** Anuja Bhargava, Assistant Professor Department of ENT, Era's Lucknow Medical College, Lucknow Uttar Pradesh, India, Phone: +917897662220, e-mail: prasoonvarshney@gmail.com

or pathologic infundibular passage. Type III MSH is characterized by near absence of the uncinate process and cleft-like maxillary sinus.[2]

Hypoplasia of maxillary sinus is less likely than of sphenoid and frontal sinuses,[4] which can be acquired or congenital. Some reasons have been mentioned as a cause of congenital hypoplasia or aplasia, such as

- Arresting of the development because of infection, injuries, and irradiation
- Congenital first-arch syndrome
- Developmental anomalies, such as craniosynostosis, osteodysplasia, and Down's syndrome.[3]

Also, the following are some reasons for an acquired category of maxillary sinus hypoplasia, such as

- Trauma with deformity due to fracture or surgery in the sinus region
- Thalassemia and cretinism
- Wegener's granuloma (inflammatory osteitis)
- Neoplasm that causes osteitis.[5]

Various hypothesis to explain the etiopathogenesis of MSH are:

*Hall's hypothesis*[6]: Hall proposed that intrauterine developmental anomalies are the cause for hypoplastic maxillary sinus.

*Wasson's hypothesis*: According to Wasson,[7] sinus infections during the first year of life could cause MSH.

Some of the putative roles that have been described to the sinuses are as follows:

- Air conditioning (heating and humidification)
- Acting as an air reservoir, ventilating, and aiding in olfaction
- Reduction in weight of the cranium
- Addition of resonance to the voice
- Insulation of the cerebrum and orbits
- Participation in the formation of the cranium
- The paranasal sinuses may also have no function.[4,8]

Hypoplasia or aplasia of the maxillary sinus may cause symptoms, such as headaches, facial pain, nasal discharge, and speaking voice problems. But the majority of patients are asymptomatic and unaware of their conditions.[4] In this case report, she presented with nasal discharge due to underlying allergic rhinitis.

Maxillary sinus opacification on plain radiographs can be diagnosed as a mucosal thickening of infectious disease, tumor, or aplasia of the sinus. A CT examination is the ideal method for detecting this pathology.[9] Cone beam computed tomography scan has the advantages of CT, in addition to requiring lower radiation dose,[10-13] and is a good modality of diagnostic imaging in the evaluation of sinus conditions like aplasia or hypoplasia. Radiological diagnosis of MSH and aplasia helps the otolaryngologists to differentiate that from chronic sinusitis and neoplasm.[14] It is important to diagnose these abnormalities to prevent possible complications during endoscopic sinus surgery, such as causing potential harm to the orbit.[15,16]

## CONCLUSION

Hypoplasia of maxillary sinus is very rare. It is asymptomatic and picked up as incidental finding in routine CT imaging. Hypoplasia involving more than one sinus is still rare. Awareness of this condition will help in avoiding complications like missed ostia or breach of lamina papyracea during functional endoscopic sinus surgery surgery. We emphasize multidisciplinary approach to a patient with maxillary hypoplasia to rule out other congenital anomalies and if possible to keep such patients on regular follow-up, which will prevent them from further sequelae.

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