# **Original Research Article**

DOI: http://dx.doi.org/10.18203/issn.2454-5929.ijohns20164812

# Fronto-ethmoidal mucoceles: a study of 25 cases

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Received: 19 October 2016 Revised: 14 December 2016 Accepted: 17 December 2016

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## **ABSTRACT**

**Background:** Paranasal sinus mucoceles are quite rare and a comprehensive study regarding their incidence, presentations, management and complications is significantly lacking in our geographical area which led to our prospective study. Fronto-ethmoidal mucoceles are the most common expansile lesions of the paranasal sinuses.

**Methods:** This is a prospective study of 25 cases of patients presenting with fronto-ethmoidal mucoceles in a tertiary care hospital in Ahmedabad. All patients were managed surgically through endoscopic approach.

**Results:** The study comprised of 25 cases of fronto-ethmoidal mucoceles. The average age of the patients was 47.72 years with a range of 21–75 years. 16 patients (64%) were females. The most common involvement was of frontal sinus (16 cases, 64%). The most common presenting symptom was displacement of eyeball (68% cases). The most common presenting sign was proptosis, present in 68% cases. Endoscopic sinus surgery was the most commonly used modality of treatment of frontal mucocele and fronto-ethmoidal mucoceles (23 cases). In 2 cases combined approach surgery (endoscopic and external) was done.

**Conclusions:** Mucoceles most commonly occur between 4<sup>th</sup> to 7<sup>th</sup> decades of life. In most cases no predisposing factor is identified. The diagnosis is based on the history, physical examination and radiological findings. CT is the preferred imaging modality for mucoceles. Endoscopic endonasal surgery is currently the most commonly used surgical approach.

**Keywords:** Endoscopic approach, Fronto-ethmoidal mucoceles, Paranasal sinus

# **INTRODUCTION**

Mucoceles are benign masses located in the paranasal sinuses. Their origin is probably secondary to obstruction of the ostium of the paranasal sinuses and they are described as epithelial sacks containing mucus secretion and occupying the paranasal sinuses. These lesions are thought to be secondary to an obstruction of sinus ostium caused by an inflammation, fibrosis, trauma, previous surgery or mass effects. The most common locations of

mucoceles are the frontal and fronto-ethmoidal sinuses, although they can also be found in the maxillary and sphenoid sinuses. They cause slow, progressive expansion and dilatation of the sinuses, producing symptoms, such as headache, nasal obstruction, facial pain, decreased visual acuity, diplopia, displacement of the eyeball and facial edema. The diagnosis is based on the history, physical examination and radiological findings. Computed Tomography (CT) is the preferred imaging modality for mucoceles. Endoscopic endonasal

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surgery is currently the most commonly used surgical approach.

#### **METHODS**

This is a prospective study carried out in the Department of Otorhinolaryngology of Civil Hospital in Ahmedabad from May 2011 to December 2013. Institutional Ethics Committee approval was taken and 25 patients of frontoethmoidal mucoceles were selected for the study from the out-patient department based on presenting signs and symptoms. All patients were subjected to history taking and otorhinolaryngologic examination. Diagnostic nasal endoscopy was done to assess the extent of the disease. The location and extent of the fronto-ethmoidal mucoceles were defined through CT scan. MRI was done whenever indicated to evaluate any intra-cranial and or intra-orbital extension. An ophthalmological examination was carried out in patients with ocular or visual disturbances. Surgery was done and the patients were followed up over a period of one month, three months, six months, one year and then yearly for two years. The data collected was tabulated and descriptive statistical analysis was done.

Patient aged between 20 and 75 years and medically fit to undergo surgery were included in the study. Exclusio criteria were patients with presence of any co morbid/debilitating conditions, co-presence of any sinus

pathology other than mucocele, presence of intracranial extension of disease and patient not willing to participate in the study.

## **RESULTS**

The study comprised of 25 cases of fronto-ethmoidal mucoceles. The most common involvement was of frontal sinus (16 cases, 64%) followed by fronto-ethmoid sinuses (9 cases, 36%). In our study there were no cases of maxillary and sphenoid sinus mucoceles. The average age of the patients was 47.72 years with a range of 21–75 years. 16 patients (64%) were females as given in Table 1.

The most common presenting symptom was displacement of eyeball (68%) followed by diplopia (48%) and headache (40%). Fever (20%) and diminished vision (12%) were unusual symptoms presenting in cases with acute exacerbation.

The most common presenting sign was proptosis, present in 68% cases, followed by limited ocular mobility (60%) and endoscopic finding of crowded frontal recess region in 52% cases. Telecanthus (40%) and facial deformity (36%) were relatively uncommon findings. Erythema and chemosis of the eye was seen in 16% cases with acute exacerbation and infection at the time of presentation.

Table 1: Distribution of patients according to the type of mucocele and surgery.

S no	Type of Mucocele	Sex (n=25)		Total (0/)	Tune of Courses
		Male	Female	Total (%)	Type of Surgery
1	Frontal mucocele	6 (24%)	10 (40%)	16 (64)	<ul> <li>Endoscopic approach in 14 cases</li> <li>Endoscopic + External (Lynch) approach in 2 cases (one male, one female).</li> <li>Recurrence occurred in both.</li> </ul>
2	Fronto-ethmoid mucocele	3 (12%)	6 (24%)	9 (36)	Endoscopic approach in all cases

Endoscopic sinus surgery was the most commonly used modality of treatment of frontal mucocele and frontoethmoidal mucoceles (23 cases). In 2 cases combined approach surgery (endoscopic and external) was done. External approach used for frontal mucocele was Lynch procedure alone (2 cases). At the last follow up visit presenting symptoms completely resolved in 23 patients (success rate 92%). Postoperative nasal endoscopy findings and radiological findings were normal in these patients. Two patients had recurrence of the disease.

# **DISCUSSION**

Langenbeck first described mucoceles in the early 19<sup>th</sup> century, but their history certainly goes further back. Canalis described a 3rd century AD skull with changes in the frontal sinus that indicated that the specimen probably had a mucocele. Until Rollet coined the term "mucocele"

in 1886, these lesions were known as "hydatid cysts", from the Greek word for "a drop of water".

A sinus mucocele is defined as a mucous collection lined by the mucous-secreting epithelium of a paranasal sinus. It occurs when a sinus ostium or a compartment of a septated sinus becomes obstructed. It is the most common expansile lesion of the paranasal sinuses. The obstruction can be caused by congenital anomalies, allergy, infection, trauma, surgical intervention or tumor. The pressure exerted by the mucocele can cause expansion of the sinus, thinning of the bony wall, and finally extension through the weakest point to the adjacent important structures like orbit and cranial cavity and finally deossification occurs.

According to various texts and literatures, mucoceles can affect any age group and there is generally no gender

bias, though in our study there was a slight (1.77:1) female preponderance.<sup>3,4</sup> They are generally seen between fourth and seventh decades and most frequently during the third and fourth decades of life. In our study, the range of age group varied from 21 to 75 years and the mean age was 43.68 years.

According to various published literatures, about 66 percent of mucoceles occur in the frontal sinuses, 25 percent in the ethmoid sinuses, 10 percent in the maxillary sinuses, and only a small percentage in the sphenoid sinuses. We did not encounter any maxillary and sphenoid sinus mucoceles in our study.

In some previous studies, the mean duration of symptoms was one year. 6,7 In our study the average duration of symptoms was 1.25 years. This is more or less same as the previous published literatures. The delay in seeking medical help may be due to lack of awareness as patients may initially seek an ophthalmologist's advice. The clinical symptoms of mucoceles are usually caused by pressure expansion of surrounding structures along with associated factors like focal osteomyelitis and hyperemic decalcification. The exact presentation depends on the original site of the mucocele and structures affected by herniation. They may herniate internally, staying within the confines of their sinus of origin or they may herniate externally, extending outside of the sinus into surrounding structures such as the orbit or cranial cavity. Patients can present with signs and symptoms as dramatic as facial deformity, proptosis or enophthalmos, loss of vision or diplopia. They may also be non-specific and subtle, such as facial pain, headache or nasal obstruction. Frontoethmoid mucoceles cause outward and downward displacement of the globe and are often associated with a palpable mass in the supero-nasal and medial canthal region along with frontal headaches. A mucocele in the frontal sinus typically causes inferolateral proptosis with diplopia. Sphenoidal or sphenoethmoidal mucoceles may give rise to visual impairment, suboccipital headaches, superior orbital fissure syndrome or retrobulbar neuritis. A mucocele in the maxillary sinuses causes upward displacement of the eye, a cheek mass, and nasal congestion.8

The diagnosis of mucoceles is based on history, physical examination and radiological findings. Both clinically and radiographically, mucoceles can resemble other expansile masses of the paranasal sinuses, such as neoplasia or nasal polyposis. In our study, the most common sign seen was proptosis (68% cases) followed by limited ocular mobility (60%) and telecanthus (40%), encountered mostly in cases of frontoethmoid mucocele. On nasal endoscopy, the most consistent finding especially in cases of frontal mucocele was that of crowded frontal recess region (52%) with rest of features within normal limits. Mucoceles have a number of consistent radiographic features; however, none of these features is unique to the mucocele. Sometimes herniation into adjacent structures like orbit or the cranial cavity

occur which may be difficult to distinguish from a malignant lesion. CT and MRI are effective in detecting the lesion, extent of bone destruction and in demonstrating any intracranial extension. CT is the primary imaging method of choice. On CT, a mucocele presents as a non-enhancing, homogeneous, and hypodense mass that fills and expands the entire sinus cavity as seen in our cases also.

Magnetic resonance imaging is best reserved for mucocele formation secondary to sinonasal tumors or having relation to the orbit. Orbital ultrasonography is another useful imaging tool as it helps to determine whether the lesion is a cystic or a solid mass. On MRI, a mucocele will have varying signal intensities on T1 and T2-weighted images depending on the protein concentration of its contents. In our study, most commonly employed radiological investigation was CT scan and it serves the purpose in most of the cases. Orbital USG was done in one case before CT to exclude orbital abscess.

A team approach involving the ophthalmologist, otolaryngologist and radiologist is advisable in diagnosing and treating mucoceles. The definitive treatment of mucoceles is primarily surgical. The treatment may be roughly divided into two categories: radical surgery and conservative surgery. Radical surgery entails the complete extirpation of the mucus membrane with obliteration of the sinus cavity. Conservative surgery involves marsupialization with adequate drainage in order to minimize risk of recurrence. This will acutely relieve the symptoms of the mucocele and in the long term the sinus can be obliterated with soft tissue like abdominal fat. This can be accomplished by an external open obliterative procedure or the more cosmetically appealing osteoplastic flap technique.

The traditional treatment of frontal sinus mucoceles has been the radical approach, particularly in cases complicated by drainage fistulae, osteomyelitis or intracranial infection. Total extirpation of the mucosa along with fat obliteration theoretically virtually eliminates the recurrence. In 1920, Lynch introduced an orbital approach to the frontal sinus through an external ethmoidectomy. The floor of the frontal sinus is removed along with the ethmoids and the middle turbinate. The Lynch operation is relatively simple and may be performed rapidly but leave a cosmetic deformity, particularly with resection of the supra-orbital rim. Radical approaches to the frontal sinus include various Riedel, Lothrop, Caput Meyer and Osteoplastic procedures. 11,12

In 1989 Kennedy came out in favor of endoscopic management of mucoceles. This approach is minimally invasive and preserves sinus architecture and has increased the safety and efficacy of intranasal marsupialization including those with intracranial or intraorbital extension. The successful treatment of frontal

sinus mucocele via the transnasal endoscopic approach has been well documented and has increased the safety and efficacy of mucoceles with a favorable outcome. The benefits of this technique are the preservation of the bone framework of the involved sinus, decreased surgical time, avoidance of external incisions and reduced hospitalisation costs. In Interestingly we had done this in 23 cases (92%) of frontal mucoceles which is more compared to other studies. Endoscopic mucocele management has the advantage of allowing a less traumatic approach, as well as reducing morbidity rates and operative time to a minimum. Therefore, endoscopic surgery is becoming the surgical technique of choice.

#### **CONCLUSION**

Paranasal sinus mucoceles are quite rare and a comprehensive study regarding their incidence, presentations, management and complications is significantly lacking in our geographical area which led to our prospective study. Mucoceles are benign masses located in the paranasal cavities. Their origin is probably secondary to obstruction of the ostium of the paranasal sinuses and they are described as epithelial sacks containing mucus secretion and occupying the paranasal sinuses. Mucoceles most commonly occur between 4th to 7<sup>th</sup> decades of life. In our study the females outnumbered males by ratio of 1.77:1. Inflammation and trauma have a role in its pathogenesis. In most cases no predisposing factor is identified. The most common locations of mucoceles are the frontal and fronto-ethmoidal sinuses. Displacement of eyeball, diplopia and headache are the most common presenting complaints. Proptosis, limited ocular mobility and crowed frontal recess area on endoscopy are the most common signs on presentation. The diagnosis is based on the history, physical examination and radiological findings. CT is the preferred imaging modality for mucoceles. Endoscopic endonasal surgery is currently the most commonly used surgical approach.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

Institutional Ethics Committee

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**Cite this article as:** Prajapati V, Khilnani AK, Gami G, Bhalodiya N, Gupta D. Fronto-ethmoidal mucoceles: a study of 25 cases. Int J Otorhinolaryngol Head Neck Surg 2017;3:112-5.