

Case Series

Management of paranasal sinus mucoceles (fronto-ethmoid mucocele)

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ABSTRACT

Paranasal sinus mucoceles are quite rare and benign but expansile masses. Most commonly frontal and ethmoid sinuses are involved, maxillary and sphenoid sinuses are involved in descending order of frequency. Early recognition and timely management of Paranasal sinus mucocele is very important as it can cause local, orbital and cranial complications which led to our prospective study. This was prospective study of five patients at tertiary care at BMC Sagar from May 2021 to April 2022, after our ethics committee approval. Proper history was taken. Otorhinolaryngological and ophthalmological examination was done. Computed tomography was preferred mode of imaging. All cases were managed surgically through endoscopically. Our study was compromised of five patients. Out of them two were females and three were mens. Mean age of patient was 54.2. In our study most common symptom was periorbital swelling and displacement of eyeball. Most common sign was proptosis. Most common sinus involved were frontoethmoid. Paranasal sinus mucoceles usually occur at 3rd to 7th decade of age group with almost equal sex ratio. Computed tomography is preferred mode of imaging. Endoscopic endonasal surgery is currently most commonly used surgical method for this. Paranasal sinus mucocele has good outcome if treated timely. Early recognition and management is very important as it can cause local, orbital and cranial complications.

Keywords: Paranasal sinus mucocele, Frontoethmoid, Endoscopy

INTRODUCTION

A mucocele is an epithelial lined mucus filled sac within one or more paranasal sinuses with expansion of sinus cavity and remodelling of sinus walls. It usually occurs due to sinus outflow obstruction followed by inflammation within sinus.¹ Most common are frontal sinus mucoceles as it has narrow and complex drainage pathway. After frontal, ethmoid, maxillary and sphenoid sinuses are involved in descending order of frequency.^{2,3}

Most common cause for mucocele is sinus surgery for chronic rhinosinusitis, nasal polyposis. Other causes includes spontaneous, trauma, chronic rhinosinusitis without surgery, tumour.

Mucocele has epithelial lining containing osteolytic cytokine IL-1 and tumour necrosis factor causing bone erosion and expansion of sac beyond sinus cavity into orbit and intracranially.⁴ Symptoms of mucocele depends on sinus involved. It includes visible mass on the forehead, medial canthus, gingivobuccal sulcus, cheek, headache, nasal obstruction, periorbital swelling, diplopia, limited ocular mobility, displacement of eyeball, visual disturbance, facial pain, facial oedema.^{4,5} Mucoceles are diagnosed with proper history, clinical examination and radiologically with the help of computed tomography and magnetic resonance imaging. Computed tomography is preferred mode of imaging for mucoceles. Now a days, surgical approach used for mucocele is endoscopic endonasal surgery. If endoscopy is not possible then external approach is used.

CASE SERIES

This was prospective study carried out at Bundelkhand medical college, Sagar, tertiary care centre from May 2021 to April 2022. Five patients were included in this study. Patients were selected from out-patient department. Ethics committee approval was taken at institutional level. Proper history was taken and otorhinolaryngological examination was done in detail. Diagnostic nasal endoscopy was done to assess extent of disease. Computed tomography was done to assess location and extent of disease. MRI was done whenever required to see intracranial and intra-orbital soft tissue involvement. Ophthalmological examination was done for those with Ocular and visual symptoms and signs. Surgery was done and follow up taken. Collected data was tabulated and descriptive statistical analysis was done.

Patients aged between 30 to 65 years and medically fit to undergo surgery were included in the study. Patients with any comorbidity/debilitating conditions, presence of intracranial extension, patients not willing to participate in the study were excluded from study.

In this study five patients of paranasal sinus mucocele were involved. Mean age of patient was 54.2. Two female and three male patients were present in this study. One patient had history of surgery external dacryocystorhinostomy 12 years back. One patient had history of head injury 15 years back. In three patients it was spontaneous. Out of five patients three had presented with periorbital swelling, displacement of eyeball. Symptoms of diplopia and headache was present in two patients. One patient had nasal obstruction and facial pain. Reduced vision was present in one patient (Table 1).

Table 1: Tabulated form of symptoms and no. of patients involved in our study.

S. no.	Symptoms	N
1	Periorbital swelling	3
2	Displacement of eyeball	3
3	Diplopia	2
4	Headache	2
5	Nasal obstruction	1
6	Facial pain	1
7	Reduced vision	1

Most common sign was proptosis, seen in three patients (Figure 1). In two patients restricted ocular mobility was present (Table 2). Endoscopically two patients had crowded frontal recess. Computed tomography was preferred mode of imaging to assess location and extent of disease (Figure 2). Endoscopic surgery was done in four patients (in one patient DRAF type 2A was done). In one patient combined approach, endoscopic plus external approach was used. Out of five one patient had mucopyocele, around 30-40 ml mucopurulent material drained

from frontal sinus and its lining marsupialised (Figure 3 and 4).

Table 2: Tabulated form of signs and no. of patients involved in our study.

S. no.	Signs	N
1	Proptosis	3
2	Restricted ocular mobility	2

Table 3: Tabulated form of sinus involvement and no. of patients in our study.

S. no.	Sinus involvement	N
1	Only frontal	1
2	Frontoethmoid	3
3	Maxillary+ethmoid	1
4	Sphenoid	None



Figure 1: Pre-operative clinical picture.

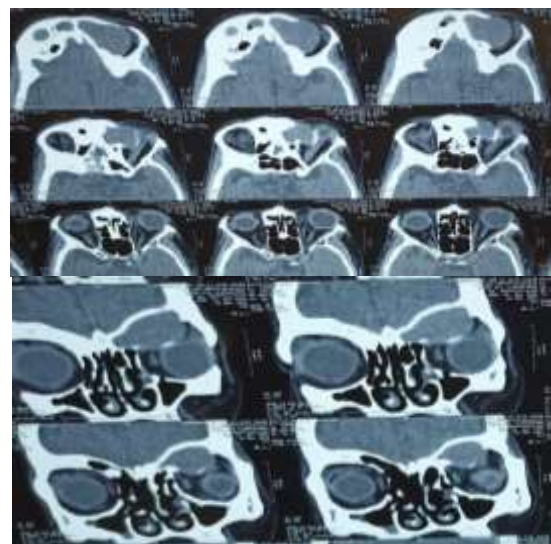


Figure 2: Pre-operative CT scan.

In three patient's frontoethmoid sinus was involved. One patient had only frontal sinus involvement. In one patient maxillary and ethmoid sinus was involved (Table 3). In post-operative follow up all patients were improved

clinically and symptomatically. Improvement of vision and eye movement was there in whom it was reduced and restricted respectively (Figure 5). Post-operative nasal endoscopy was normal. Till date there is no recurrence.

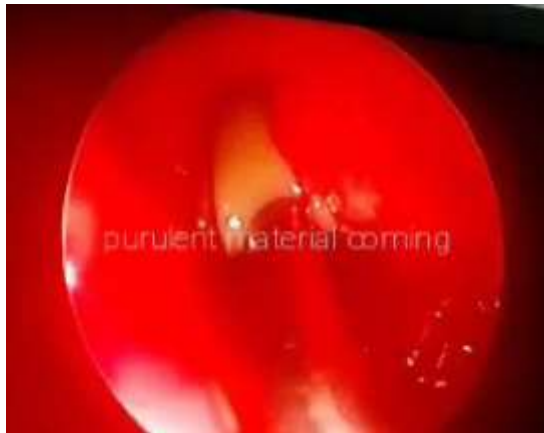


Figure 3: Intra-operative mucopurulent material coming from frontal sinus.

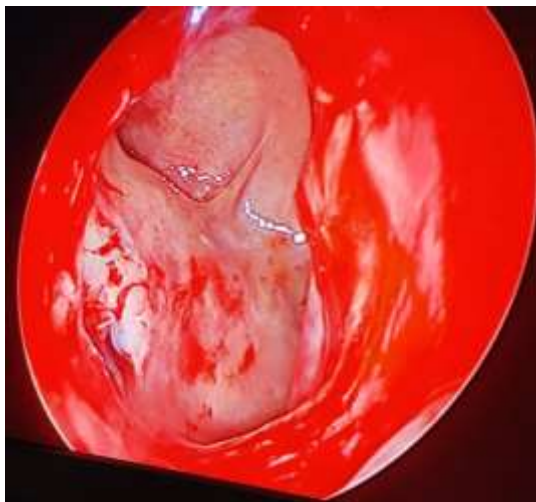


Figure 4: Intra-operative picture after clearance of frontal mucopyocoele.



Figure 5: Post-operative clinical picture.

DISCUSSION

Mucocele term was coined by Rollet in 1896. In 1901 Onodi described histopathology of mucocele for the first time. A mucocele is an epithelium-lined mucus-filled sac within one of the paranasal sinuses with expansion of the sinus cavity and remodelling of the sinus walls. It forms secondary to obstruction of the outflow tract of the involved sinus together with an inflammatory process within the sinus. It is lined by pseudostratified or low-columnar epithelium in contradistinction to a cyst that has a distinct separate membrane.⁴ Usually mucocele occurs between age of 40 to 60 years with almost similar male:female preponderance.⁶ In our study mean age was 54.2 years. Three males and two females were included in our study. Etiology for mucocele includes sinus surgery for chronic rhinosinusitis, nasal polypsis. Other causes includes spontaneous, trauma, chronic rhinosinusitis without surgery, tumour.^{4,7}

Interval between surgery and mucocele formation can range from 1 year to 19 years. In a large series by Bockmuhl et al 78% of mucoceles following sinus surgery was associated with the Lynch-Howarth and/or Caldwell-Luc operations versus 1.5% after endonasal surgery.² 10-14% of mucoceles are secondary to trauma and 15-17% develop spontaneously. The mean interval between head injury and mucocele formation is 9 years.⁷ In our study one patient had history of external dacryocystorhinostomy surgery 12 years back. One patient had history of head injury 15 years back. In three patients it was spontaneous. Pathogenesis of mucocele has two factors. One is obstructed sinus outflow tract and other is inflammatory process within sinus cavity. Osteolytic cytokine IL-1 and tumour necrosis factor are present within epithelial lining of mucocele. Cytokines are responsible for bone erosion and sac expansion.^{1,4} As per various published literatures, frontal sinus mucoceles are 66 percent, 25 percent in ethmoid sinuses, 10 percent in maxillary and small percentage in sphenoid sinuses.⁸⁻¹⁰ we never had sphenoid sinus involvement. In three patient's frontoethmoid sinus was involved. One patient had only frontal sinus involvement. In one patient maxillary and ethmoid sinus was involved.

Most of the patients initially present with orbital symptoms such as proptosis and diplopia.¹¹ Other symptoms and signs include visible mass on the forehead, medial canthus, gingivobuccal sulcus, cheek, headache, nasal obstruction, periorbital swelling, limited ocular mobility, displacement of eyeball, visual disturbance, facial pain, facial oedema. 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.¹² In our study three patients presented with periorbital swelling, displacement of eyeball. Symptoms of diplopia and headache was present in two patients. One patient had nasal obstruction and facial pain. Reduced vision was present in one patient which improved postoperatively. Most common sign was

proptosis, seen in three patients. In two patients restricted ocular mobility was present.

Computed tomography is primary imaging method of choice. On computed tomography mucocoele presents as homogenous, non-enhancing, hypodense mass which fills and expands the entire sinus cavity.¹³ Magnetic resonance imaging is considered for intracranial and intraorbital soft tissue involvement, mainly when there is erosion of posterior table of frontal sinus and orbital lamina papyracea. Mucocoeles generally have high water content and hyperintense on T1 whereas pyocoeles have higher protein content and variation of signal intensity on both T1 and T2 weighted images.¹⁴ We did CT in all cases. MRI was not required in our cases. For treatment of mucocoele team approach of otorhinolaryngologist, ophthalmologist and radiologist is needed. Definitive treatment of mucocoele is surgery. Mucocoele surgery can be performed by using external approach, endoscopic approach or combined approach. Now a day's endoscopic approach is preferred. In past external approaches (Lynch-Howarth frontoethmoidectomy) or osteoplastic flaps with sinus cavity obliteration were used. These procedures were associated with high recurrence rate, cosmetic deformity and severe morbidity.¹⁵

Endoscopic surgery is minimally invasive and has increased safety and efficacy of intranasal marsupialization including those with intracranial or intraorbital extension. Other benefits of endoscopic technique are reduced surgical time, cosmetically better, reduced hospitalisation cost, and preservation of bone framework of the involved sinus. Combined approach can be used if endoscopic disease clearance is not possible.^{16,17} In our study Endoscopic surgery was done in four patients (in one patient DRAF type 2A was done). In one patient combined approach (endoscopic plus external approach) was used. Out of five one patient had muco-pyocoele, around 30-40 ml mucopurulent material drained from frontal sinus and its lining marsupialised. There is no recurrence till date.

CONCLUSION

Paranasal sinus mucocoeles are quite rare benign lesions. They usually occur at 3rd to 7th decade of age group with almost equal sex ratio. Computed tomography is preferred mode of imaging. It has good outcome if treated timely. Early recognition and management is very important as it can cause local, orbital and cranial complications. Aim of surgery is complete removal of cyst and restoration of sinus drainage pathway. Surgery can be performed endoscopically or using combined approach.

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