Paranasal sinus mucocoeles: a comprehensive retrospective study in indian perspective

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Abstract Paranasal sinus mucocoeles are the most common expansile lesion of the paranasal sinuses. Hereby we present a comprehensive retrospective study on the paranasal sinus mucocoeles in our geographic area which is very significantly lacking till now which we hope would immensely help comparative analysis and management in near future.

Keywords Paranasal sinus · Mucocoeles · Retro prospective analysis.

Introduction

A paranasal sinus mucocoele is defined as a mucous collection lined by the mucous-secreting epithelium of a paranasal sinus [1]. It is the most common benign expansile lesion of the paranasal sinuses. The clinical symptoms of mucocoeles are usually caused by expansion of surrounding structures or infection [1, 2, 3, 4, 5, 6]. The diagnosis is based on the history, physical examination and radiological findings. CT is the preferred imaging modality for mucocoeles [7, 8]. Treatment for paranasal sinus mucocoeles ranges from

simple incision and drainage to total excision of the cyst through different approaches [9, 10, 11, 12, 13].

Materials and methods

The study was carried out in our department of Otorhinolaryngology and it comprising of 16 cases of paranasal sinus mucocoeles successfully managed surgically over a period of 5 years from March 2001 to March 2006. The patients were selected from the out-patient department based on presenting signs and symptoms. All patients were subjected to common battery of tests including radiological evaluation using CT scan and MRI as and when required. Diagnostic nasal endoscopy was done to confirm the diagnosis and to assess the extent. The exact surgical approach was determined on the basis of site, size, extent and preoperative diagnosis. Operative intervention was then carried out and the patients were followed up over a period of 1 month, 3 months, 6 months, 1 year and then yearly and post-operative outcome was analyzed.

Observation and results

The study comprises of 16 cases of paranasal sinus mucocoeles the most common among them was frontal sinus mucocoele (9 cases, 56.25%). Second common type encountered was frontoethmoid mucocoele (5 cases, 31.25%) followed by maxillary sinus mucocoele (2 cases, 12.5%) (Fig. 1). The average age of the patient was 43.68 years with a range of 21–75 years. Female patients (9 cases) exceeded male patients (7 cases) by a ratio of 1.28:1.

The most common presenting symptom was facial swelling (81.25%) followed by headache (75%) and facial pain (62.5%). Fever (25%) and dimness of vision (12.5%) were unusual symptoms presenting in cases with acute exacerbation. One patient with frontal sinus mucocoele presented with discharging fistula on the forehead (Fig. 2).

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The most common presenting sign was facial deformity seen in 81.25% cases followed by endoscopic finding of crowded frontal recess region in 62.5% cases. Telecanthus (37.5%) and proptosis (31.5%) were relatively uncommon finding seen in frontoethmoidal and frontal mucocoele. Erythema and chemosis of the eye was seen in 18.75% cases with acute exacerbation and infection at the time of presentation. A discharging sinus in frontal region was seen in 1 case (6.25%) (Fig. 3).

The operative intervention used for management of the frontal mucocoele varies from combination of Lynch procedure and trephination in 4 cases to osteoplastic flap procedure in 2 cases. Endoscopic sinus surgery was the

Fig. 1 Pie chart showing the types of mucocoeles

Fig. 2 Bar diagram showing the presenting symptoms

Fig. 3 Bar diagram showing the signs at presentation

least commonly used modality for the treatment of frontal mucocoele (1 case). Operative procedure most commonly used for frontoethmoid mucocoele was Lynch procedure alone (4 cases) or in combination with trephination (1 case). Maxillary sinus mucocoele was exclusively managed by endoscopic sinus technique (Table 1).

Discussion

Langenbeck first described mucocoeles in the early 19th 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 mucocoele. Until Rollet coined the term “mucocoele” in 1886, these lesions were known as “hydatid cysts.” from the Greek word for “a drop of water” [1].

A sinus mucocoele 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 [1, 2].

Paranasal sinus mucocoeles are slowly expanding cystic lesions. The obstruction can be caused by congenital anomalies, allergy, infection, trauma, surgical intervention in the nose and neoplasms. The pressure exerted by the mucocoele can cause expansion of the sinus, thinning of the bony wall,

Table 1 Showing the management and complications

Type of Mucocoele	Management	Complication
Maxillary	FESS	Pain, mild synechia
Frontoethmoid	Lynch	Pain
Frontoethmoid	Lynch	Nil
Frontal	Patterson	Pain, persistent anesthesia
Frontal	Patterson	Pain, persistent anesthesia
Frontoethmoid	Trephination, lynch	Pain
Frontal	Trephination, Lynch	Osteomyelitis, cellulites
Frontal	FESS	Pain
Maxillary	FESS	Synechia
Frontal	Osteoplastic flap	Nil
Frontal	Trephination, Lynch	Wound dehiscence
Frontoethmoid	Trephination, Lynch	Pain
Frontal	Lynch	Nil
Frontal	Lynch	Pain
Frontoethmoid	Lynch	Nil
Frontal	Trephination, Osteoplastic flap	Nil

and finally extension through the weakest point to the adjacent important structures namely orbit and cranial cavity and finally deossification may occur [2].

According to various texts and literatures, mucocoeles can affect any age group and there is generally no gender bias. As per various textbooks they are generally seen between the 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 years to 75 years and the mean age was calculated to be 43.68 years. This is not very much different compared to previous publications [1–3].

Regarding sex ratio, literatures states an almost equal sex ratio [2, 3]. However in our study, we encountered a sex ratio of male : female of 1:1.28. This indicated a slight female preponderance in our region. This difference might be explained by the fact that females in our socioeconomic status suffer from poor awareness and delayed treatments. On the other hand, Males receives treatment much earlier thereby effectively treating the factors implicated in mucocoele formation whereas in females due to delayed treatment, pathology progress relentlessly and results in frank mucocoeles.

According to various published literatures, about 66 percent of mucocoele occur in the frontal sinuses, about 25 percent occur in the ethmoid sinuses, 10 percent in the maxillary sinuses, and only a small percentage in the sphenoid sinuses [2–6]. In our study the most common type of mucocoele was frontal sinus mucocoele seen in 9 out of 16 cases (56.25%). Next common type was the frontoethmoidal mucocoele seen in 5 cases (31.25%) and least common was the maxillary sinus mucocoele seen in 2 cases (12.5%) (Fig. 1). we did not encounter any sphenoid sinus mucocoele in our study. The slight difference in the occurrence of frontal sinus mucocoele in our study can be explained by the fact that some of them are included in the frontoethmoid category as we did not encounter any pure ethmoid sinus mucocoele. The prevalence of other types of mucocoele is in accordance with earlier literature.

As per previous publications, mean duration of symptoms was observed to be an average of 1 year in most of the studies [2–6]. In our study the average duration was 1.25 years. This is more or less same as the previous published western literatures. This is most probably because of the lesser socioeconomic status and poor awareness compared to western society.

The clinical symptoms of mucocoeles 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 mucocoele 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 [2–4].

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 mucocoeles cause outward and downward displacement of the globe and are often associated with a palpable mass in the superonasal and medial canthal region along with frontal headaches. A mucocoele in the frontal sinuses typically and inferolateral proptosis with diplopia. Sphenoidal or sphenothmoidal mucocoeles may give rise to visual impairment, suboccipital headaches, superior orbital fissure syndrome or retrobulbar neuritis. A mucocoele in the maxillary sinuses causes upward displacement of the eye, a cheek mass, and nasal congestion [1–4, 6].

In our study, the most common presenting symptom was the facial swelling seen in 81.25% cases followed by headache in 75% cases. Nasal obstruction though expected to be very common was not the case and it was seen only in 43.75% cases. This may be due to the fact that most of the mucocoeles in our study was frontal mucocoeles which generally do not obstruct the air passage till it attains a large size. Symptoms indicating acute infection like fever were seen in 4 cases (25%). A rather unusual symptom of purulence from a fistula on the forehead was seen in a case of frontal sinus mucocoele (Fig. 2).

The diagnosis of mucocoeles is based on the history, physical examination, and radiologic findings. Both clinically and radiographically, mucocoeles can resemble other expansile processes of the paranasal sinuses, such as neoplasia or nasal polyposis. The most common sign seen was that of facial deformity seen in 13 cases (81.25%). Small frontal mucocoele rarely cause facial deformity which can explain the absence of this sign in 3 cases. Next common signs at presentation were telecanthus (37.5%) and proptosis (31.5%) encountered mostly in cases of frontoethmoid mucocoele. On nasal endoscopy the most consistent finding especially in cases of frontal mucocoele was that of crowded frontal recess region (62.5%) with rest of features within normal limits. Medial bulging of the lateral nasal wall on nasal endoscopy was seen in 25% cases mostly associated with maxillary sinus mucocoele (Fig. 3).

Mucocoeles have a number of consistent radiographic features; however, none of these features is unique to the mucocoele. On plain films, the mucocoele nonspecific findings as clouding, expansion or loss of normal scalloping of the larger sinus may be effaced. 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 mucocoele presents as a nonenhancing, homogeneous, and hypodense mass that fills and expands the entire sinus cavity as seen in our cases also (Figs. 4–8). Magnetic resonance imaging is best reserved for mucocoele

Fig. 4 CT scan picture showing the mucocele of right frontal sinus

Fig. 5 CT scan picture showing the mucocele of right frontal sinus

Fig. 6 CT scan picture showing the mucocele involving left frontoethmoid region

Fig. 7 CT scan picture showing the mucocele involving right ethmoidal region

Fig. 8 CT scan picture showing the mucocoele of left maxillary sinus

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 [7, 8]. 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 mucocoeles. The definitive treatment of mucocoeles is primarily surgical. The treatment may be roughly divided into two categories: radical surgery and conservative sur-

gery. 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 mucocoele and in the long term the sinus 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.

In our study the most common mucocoele was frontal sinus mucocoele comprising 9 cases (62.5%). Out of these 4 cases (44.4%) were managed by Lynch operation, 2 cases (22.2%) were done by Pattersons approach, trephination was done in 3 cases (33.3%) and 1 case done by endoscopic sinus surgery (11.1%) (Table 1). The traditional treatment of frontal sinus mucocoeles 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 this concern [4, 9–11].

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.

In our study Lynch approach was done most commonly in about 44.4% cases. The percentage is little lower than various studies which state it to be almost a universal procedure due to good exposure, safety and good outcome which was also same for us. However very interestingly we had to carry out trephination in 33.3% cases prior to definitive surgery which is quite striking compared to all published literatures. This is most probably because of the late advanced presentations in our study which necessitated initial drainage for immediate relief prior to definitive procedure. Pattersons approach was done in 2 cases (22.2%) had a distressing problem of postoperative anesthesia persisting for more than 3 months which according to established texts is quite common.

Radical approaches to the frontal sinus include various Riedel, Lothrop, Caput Meyer and Osteoplastic procedures [9]. Osteoplastic flap procedure with frontal sinus obliteration was done in two cases of frontal mucocoele. One case was that of frontal sinus mucocoele with a discharging fistula and other was a case of frontal mucocoele secondary to frontal fibrous dysplasia.

In 1989 Kennedy came out in favor of endoscopic management of mucocoeles. 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 [10–12]. The successful treatment of frontal sinus mucocoele via the transnasal endoscopic approach has been well documented

and has increased the safety and efficacy of mucocoeles with a favorable outcome. Interestingly we had done this in only 1 case (11.1 %) of frontal mucocoeles which is quite meager compared to other studies. This is quite expected as most of our cases presented late with limited endonasal access through endoscope due to crowded frontal recess region and associated deviation of septum.

Among the frontoethmoid mucocoeles, Lynch approach was undertaken in all cases and preoperative trephination was done in 2 cases (40%). No other approaches were required and endoscopic approach was not possible due to advanced disease and poor access. This outcome is quite different than most published western articles who have resorted to lynch in only few of their cases and done endoscopic excision in majority. This significant difference is probably again due to the late presentation which makes endoscopic removal cumbersome and inadequate due to poor access and visualization thereby increasing chances of undue recurrence [4, 6, 9].

Maxillary sinus mucocoeles were exclusively treated with endoscopic sinus surgery as the lateral nasal wall was bulging in most of the cases and can easily be approached by the endoscopes. Endoscopic sinus surgery is the mainstay of treatment of maxillary mucocoele in western countries [13].

Conclusion

Paranasal sinus mucocoeles 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 retrospective study. We found out that females outnumbered males with facial swelling being the commonest presenting symptom. Average duration of disease was longer than previously reported series probably due to poor socioeconomic condition. Osteoplastic flap was seen to be excellent for frontal sinus pathology and lynch for both frontal and frontoethmoid mucocoeles although endoscopic procedures were limited due to late presentations and poor reach. Significantly, trephination had to be done in many cases compared to other studies due to advanced local complications. Maxillary sinus mucocoele were treated exclusively by the endoscopic approach and was found to be very effective. We are therefore hopeful that this study will present a comprehensive picture of paranasal sinus mucocoeles in our area and therefore help comparative assessment and management in future.

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