Frontal Sinus Mucoceles Causing Proptosis—Two Case Reports

S K Yap, *MBBS, M Med (Ophth), FRCS (Edin)*, T Aung, **MBBS, M Med (Ophth), FRCS (Edin)*,
E Y Yap, ***MBBS, FRCS (Edin), FRCOphth (UK)*

Abstract

Paranasal sinus mucoceles can present with a multitude of different symptoms including ophthalmic disturbances. We describe two patients with frontal sinus mucoceles presenting with non-axial proptosis, and give details of their presentation, investigations and treatment. Possible ocular manifestations of mucoceles and the diagnostic imaging techniques used are discussed. The treatment of mucoceles is reviewed. It is stressed that a team approach involving the ophthalmologist, otolaryngologist and radiologist is essential for accurate diagnosis and management.

***Ann Acad Med Singapore* 1998; 27:744-7**

Key words: Choroidal striae, Endoscopic sinus surgery, Paranasal sinus, Visual loss

Introduction

Frontal mucoceles are collections of inspissated mucus which occur when there is obstruction to the outflow of the frontal sinuses.[1] The obstruction may be due to congenital anomalies, infection, trauma, allergy, neoplasms or surgical procedures in the nose.[2,3] With continued secretion and accumulation of mucus, the increasing pressure causes atrophy or erosion of the bone of the sinus, allowing the mucocele to expand in the path of least resistance. This may be into the orbit, adjacent sinuses, nasal cavity or through the skin. The mass may remain a simple mucocele containing mucus, or it may become secondarily infected, forming a pyocele. Frontal mucoceles may present with ophthalmic disturbances. They can encroach on the orbit with ocular displacement and proptosis. They are a common cause of long standing unilateral proptosis.[4] Ocular motility disturbance, lid distortion, and periocular pain are other important presentations.

Two patients with frontal sinus mucoceles presenting with non-axial proptosis are presented.

Case Reports

Case 1

A 38-year-old Chinese man presented with progressive painless proptosis of the right eye for two years. He had no previous medical history. His visual acuity was 6/6 in both eyes, and his colour vision was normal. The right globe was proptosed by 8 mm compared to the fellow eye and was displaced 8 mm inferiorly and temporally. It was firm to retropulsion. The ocular motility of his right eye was restricted in upgaze and horizontal gaze, with diplopia in all positions of gaze. The pupils were equal and reactive. The intraocular pressure was 30 mmHg in the right and 16 mmHg in the left eye. The optic discs were not swollen but the cup-disc ratio was 0.5 in the right and 0.3 in the left. Fundoscopy showed choroidal elevation superiorly, with choroidal folds over the macula in the right eye. The left fundus was normal.

Humphrey visual field testing showed no abnormalities in both eyes. Orbital ultrasonography revealed a retrobulbar cystic mass arising superiorly, indenting the posterosuperior aspect of the right globe. Computerised tomographic scan (CT) showed a right intraorbital extraconal isodense mass causing gross downward and outward displacement of the globe. A magnetic resonance imaging (MRI) of the orbit was suggested to better define the lesion. MRI showed that the mass was a mucocele arising from the frontal sinus causing inferior displacement of the orbital roof resulting in proptosis. The patient was started on Guttae Timolol 0.5% twice a day in the right eye for the treatment of raised intraocular

* *Senior Registrar*
Department of Ophthalmology
Changi General Hospital
** *Registrar*
*** *Consultant*
Department of Ophthalmology
Tan Tock Seng Hospital
Address for Reprints: Dr S K Yap, Department of Ophthalmology, Changi General Hospital, 2 Simei Street 3, Singapore 529889.

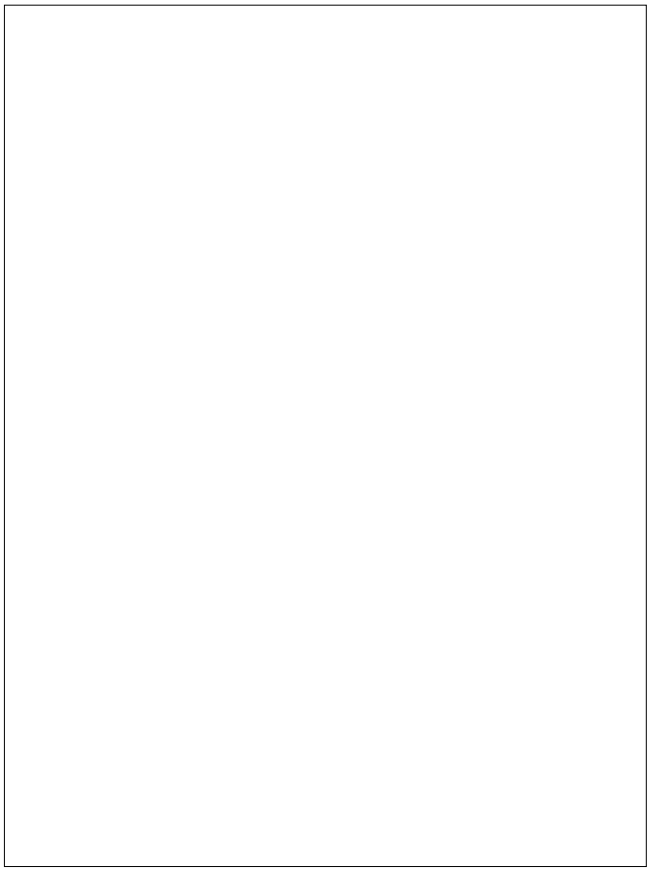

Fig. 1. Case 1 showing the marked proptosis of the right eye and displacement of the globe inferiorly and temporally.

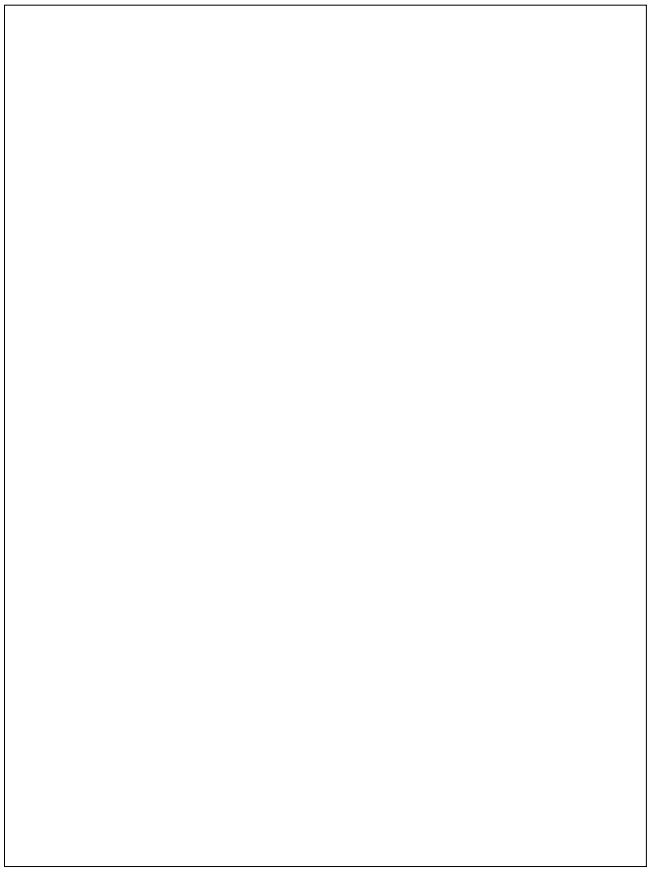

Fig. 2. Case 1 after completion of treatment showing resolution of the proptosis but there was residual inferior displacement of the globe.

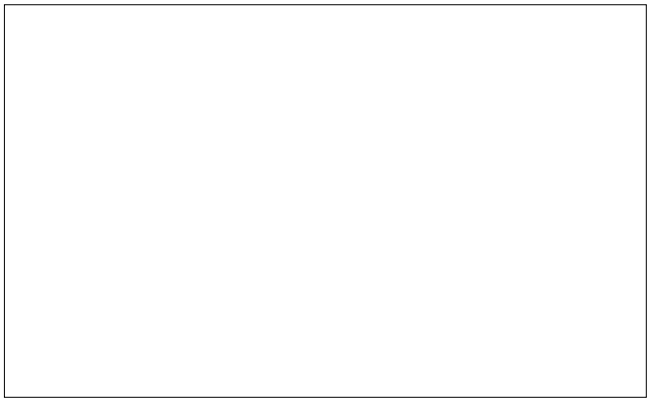

Fig. 3. B Scan ultrasonography of Case 1 illustrating a retrobulbar cystic mass indenting on the posterosuperior aspect of the globe.

pressure and was referred to an otolaryngologist. However, a few days after presentation, the patient complained of pain and blurring of vision in the right eye. His visual acuity had deteriorated to 6/24 in the right eye and there was colour vision defect on testing with Ishihara's charts. There was worsening of the proptosis to 11 mm compared to the fellow eye. Fundoscopy revealed choroidal folds and indentation of the superior hemisphere of the retina due to the retrobulbar mass. The patient underwent transnasal endoscopic fronto-ethmoidectomy and evacuation of the mucocele by an otolaryngologist. At one year postoperatively, the proptosis had completely resolved, but there was a residual inferior globe displacement of 2 mm. His ocular movements had returned to normal with no complaints of diplopia. Visual acuity was 6/7.5 and colour vision was normal. The intraocular pressure was normal without treatment. There were no choroidal folds on fundoscopy.

Case 2

A 45-year-old Chinese man presented with diplopia for 5 months associated with increased prominence of his left eyeball. He had no ocular pain or headache. There was no past history of note. Visual acuity was 6/6 in both eyes. The left globe was proptosed by 3 mm and displaced inferiorly by 5 mm. There was restriction of upgaze with attendant diplopia. Fundoscopy showed indentation of the superior retina and choroidal folds. There was no relative afferent pupillary defect and colour vision was normal. The intraocular pressures were normal in both eyes. Goldman visual fields were normal. Ultrasonography showed a cystic mass on the posterosuperior aspect of the left globe. MRI scan of the orbit showed a mucocele in the left frontal sinus causing

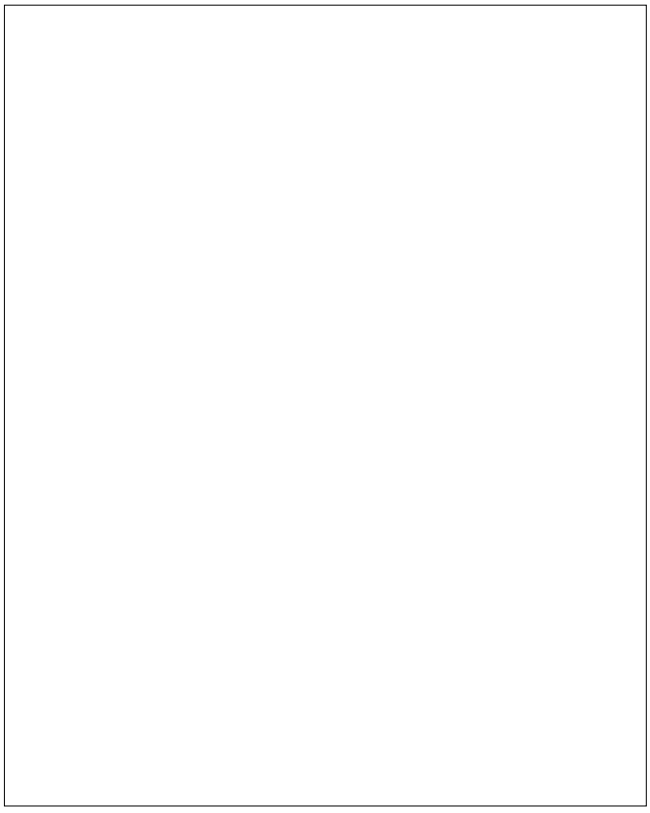

Fig. 4. Case 2 presenting with left proptosis and inferior displacement of the globe.

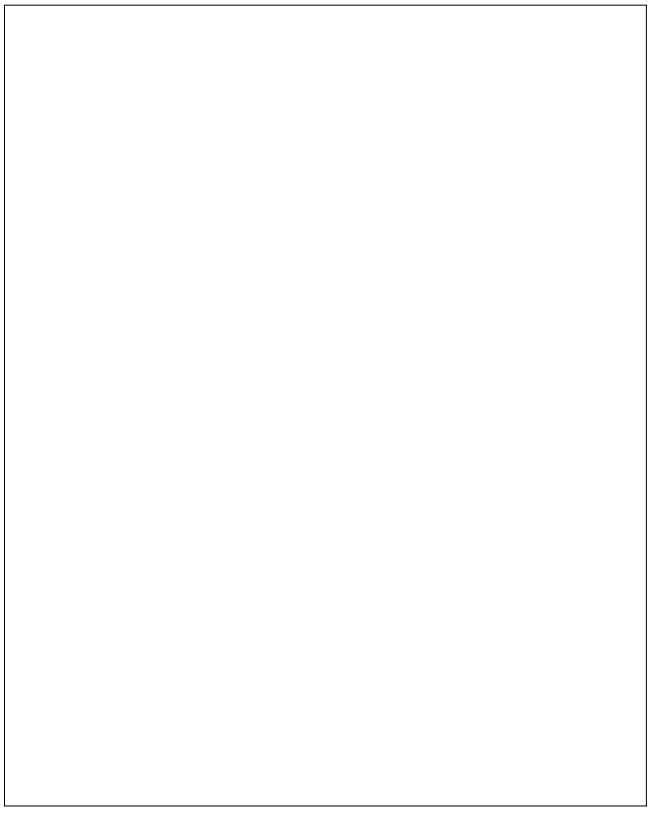

Fig. 5. Case 2 after treatment showing complete resolution of the proptosis.

an outward bulge of the sinus walls, resulting in downward displacement of the left orbital roof and globe. The patient underwent left transnasal endoscopic frontoethmoidectomy and evacuation of the mucocele by an otolaryngologist. Postoperatively at six months, there was complete resolution of the proptosis and the patient was asymptomatic.

Discussion

A gradual onset of unilateral proptosis poses a clinical diagnostic challenge to ophthalmologists. Included in the differential diagnoses are dysthyroid eye disease, retrobulbar orbital tumour, inflammatory pseudo tumour, sinus tumour, metastatic lesion and mucoceles of the paranasal sinuses. Progressive unilateral painless proptosis of gradual onset should make one suspicious of a mucocele involving the paranasal sinuses, the frontal and ethmoid sinuses being the two most common locations.[4-8] This is especially so if there is accompanying diplopia, orbital or forehead pain, and epiphora, which are frequently the presenting symptoms of mucoceles. The symptoms are produced by pressure against the globe and mechanical interference with its motility. The proptosis is usually non-axial with the globe being displaced away from the site of the mucocele. The amount of proptosis may fluctuate when the patient develops a common cold or has inflamed sinuses.[4] There may be an associated history of sinus or nasal pathology or injury.

The patient may occasionally complain of blurred vision and image distortion. Visual loss, field changes[9] and optic atrophy[10] are late manifestations which occur when the proptosis becomes marked. The cause of visual loss is varied. It may be due to direct compression of the optic nerve in the orbit,[6] a vascular or inflammatory process involving the optic nerve,[6,11,12] refractive errors induced by the indentation on the globe, exposure keratopathy or secondary glaucoma. The ophthalmic manifestations of the two patients described are not uncommon presentations of frontal mucoceles. Both presented with painless, non-axial proptosis with restriction of ocular movements. The second patient noted diplopia as well. They both had choroidal striae due to pressure on the globe from the mucoceles. In addition, the first patient had raised intraocular pressure which was initially treated with topical beta-blocker therapy, and returned to normal without treatment after drainage of the mucocele. There was also the possibility of optic nerve involvement causing deterioration of visual acuity and colour vision as in the first patient. Other known complications of frontal mucoceles include erosion of the anterior wall, resulting in a tender fluctuant mass beneath the periosteum of the frontal bone.[5] Erosion of the posterior wall may produce complications such as epidural abscess, meningitis, subdural empyema

and brain abscess. Rarely, cranial nerve palsies may also occur.[13]

The classic radiographic appearance of a mucocele is generalised thinning and expansion of the sinus walls and there may also be evidence of sinus disease as well as bony erosions. The mucocele usually appears homogenous and airless. Although plain radiographs do reveal the lesion, CT scans are much better in delineating the extent of the lesion and its relations to other surrounding structures. They can differentiate the high attenuated regions of mucus from the surrounding mucosa which appears as a region of low attenuation. The extent of bone destruction is also better appreciated on CT. MRI is able to show mucoceles but it can sometimes be misleading because inspissated mucus within the sinus may be mistaken for an aerated cavity.[14] With MRI, there is also a lack of contrast between the cortical bone margins of the orbit and adjacent air in the sinuses, making evaluation of the orbital walls difficult. In general, if the clinical features are highly suggestive of a sinus mucocele as the cause of proptosis, a CT scan of the orbit may be the first imaging choice. However, MRI may provide additional information in the examination of the orbit and may be the preferred imaging technique if other soft tissue tumours causing proptosis cannot be excluded. In difficult cases, the radiologist may be consulted as to the appropriate test. Orbital ultrasonography is another useful imaging tool as it helps to determine whether the lesion is a cystic or a solid mass.

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 aim of surgical management is to re-establish adequate drainage of the sinus without producing cosmetic or functional deformity. In addition, the lining of the cyst may be removed and 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.[2,15-17] Alternatively, functional endoscopic sinus surgery can be used to evacuate the mucocele.[18] However, these procedures become difficult if there is intracranial expansion, or anterior extension of the mucocele into the soft tissues. The overall prognosis for frontal sinus mucoceles is good with likelihood of cure, and a low incidence of recurrence. As the prognosis for visual function depends on the period of visual impairment, it is important that clinicians consider mucoceles as an easily remediable cause of visual loss. Prompt surgical therapy is needed to achieve good surgical outcome.

Conclusion

Frontal mucoceles may occasionally present with ophthalmic manifestations such as proptosis. Being benign and curable, early recognition and management of mucoceles is of paramount importance. A high index of suspicion and appropriate radiological studies are necessary for the diagnosis of mucocele. Transnasal endoscopic evacuation is a viable surgical option to more invasive procedures.

REFERENCES

1. Nugent G R, Sprinkle P, Byron M. Sphenoid sinus mucoceles. J Neurosurg 1970; 32:443-51.
2. Stiernberg C M, Bailey B J, Calhoun K H, Quinn F B. Management of invasive frontoethmoidal sinus mucoceles. Arch Otolaryngol Head Neck Surg 1986; 112:1060-3.
3. Diaz F, Latchow R, Duvall A J 3rd, Quick C A, Erickson D L. Mucoceles with intracranial and extracranial extensions. J Neurosurg 1978; 48:284-8.
4. Alberti P W, Marshall H F, Black J I. Fronto-ethmoidal mucocele as the cause of unilateral proptosis. Br J Ophthalmol 1968; 52:833-8.
5. Abrahamson I A, Baluyot S T, Tew J M, Scioville G. Frontal sinus mucocele. Ann Ophthalmol 1979; 2:173-8.
6. Avery G, Tang R A, Close G C. Ophthalmic manifestations of mucoceles. Ann Ophthalmol 1983; 15:734-7.
7. Natvig K, Larsen T E. Mucocele of the paranasal sinuses: retrospective clinical and histological study. J Laryngol Otol 1978; 92:1075-82.
8. Kaufman S J. Orbital mucopyoceles. Two cases and a review. Surv Ophthalmol 1981; 25:253-62.
9. Fazakas A. A contribution to the symptomatology of a mucocele in ophthalmology. Ophthalmologica 1953; 25:175-82.
10. Mortada A. Radiography in mucocele of the frontal sinus. Am J Ophthalmol 1967; 64:1162-7.
11. Imachi J. Rhinogenous retrobulbar neuritis: Pathogenic problems and case reports. Neuro-ophthalmol 1981; 1:273-80.
12. Fujitani T, Takahashi T, Asai T. Optic nerve disturbance caused by frontal and frontoethmoidal mucopyoceles. Arch Otolaryngol 1984; 110:267-9.
13. Ehrenpreis S J, Biedlingmaier J F. Isolated third nerve palsy associated with frontal sinus mucocele. Neuro-ophthalmol 1995; 15:105-8.
14. Toriumi D M, Sykes J M, Russell E J, Morganstein S A. Sphenoethmoidal mucocele with intracranial extension: Radiologic diagnosis. Otolaryngol Head Neck Surg 1988; 98:254-7.
15. Chandler J R Jr. Mucoceles:Their diagnosis and treatment. J Fla Med Assoc 1960; 46:825-31.
16. Goodale R L, Montgomery W W. Experiences with osteoplastic anterior wall approach to frontal sinus. Arch Otolaryngol 1958; 68:271-83.
17. Iliff C E. Mucoceles in the orbit. Arch Ophthalmol 1973; 89:392-5.
18. Gross W E, Gross C W, Becker D, Moore D, Phillips D. Modified transnasal endoscopic Lothrop procedure as an alternative to frontal sinus obliteration. Otolaryngol Head Neck Surg 1995; 113:427-34.