Minimally Invasive Endoscopic Approach towards Management of Frontoethmoidal Mucocoele with Lateral Displacement of Eyeball and Proptosis - A Case Report

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Abstract

Rationale: Mucocoeles of paranasal sinuses are expansile and destructive lesions which can present with a variety of symptoms. If not treated early, they may lead to various complications. **Patient Concerns:** This report presents a case of a 26-year-old male patient with complaints of swelling of the left eye and double vision for 18 months. **Diagnosis:** Diagnosis of frontoethmoidal mucocoele with an unusual presentation of lateral displacement of the eyeball and proptosis was made based on patient history, clinical examination, and computed tomography. **Treatment:** The case was managed conservatively with marsupialization of the mucocoele using the transnasal endoscopic approach. **Outcome:** Complete resolution of the Mucocoele and its associated symptoms was observed, and frontal sinus ostium was found to be patent and completely epithelialized in 12-month follow-up. **Take-away Lessons:** The endoscopic approach toward the management of frontoethmoidal mucocoele is an effective alternative to conventional surgery with less patient morbidity and mortality.

Keywords: Frontoethmoidal mucocoele, minimally invasive, transnasal endoscopy

Introduction

Background

Mucocoele is a benign pseudocystic fluid-filled mass that may arise in any of the paranasal sinuses. They are expansile in nature causing displacement of adjacent structures and bone erosion. The most commonly involved site is the frontal sinus (70%–80%) followed by the frontoethmoidal region (10%–14%) and maxillary sinus (2.7%–10%). Sphenoid sinus mucocoele is very rare (1%–2%), but it may present with various complications due to its vicinity to vital structures such as dura, optic nerve, pituitary gland, internal carotid artery, cavernous sinus, and cranial nerves (III, IV, V, and VI). The exact pathophysiology responsible for the formation of frontoethmoidal mucocoele is not known; however, it is said to occur when there is an obstruction in the sinus ostium that could be due to mucosal inflammation, trauma, or tumour. If not treated early, it can extend into adjacent sinuses, the orbit, nasal cavity, nasopharynx, and cranial cavity. Secondary infection may accelerate the rate of expansion.[1-3] Various surgical approaches have been suggested for its management. Surgical approach is usually external as proposed by Bockhmul *et al.* and Weber *et al*. which includes the Lynch–Howarth incision and osteoplastic frontal sinusotomy. However, these procedures may be associated with significant morbidity and serious complications such as cerebrospinal fluid (CSF) leak, meningitis, and orbital cellulitis.[4,5] Marsupialization of mucocoele with transnasal endoscopy is a minimally invasive alternative to conventional surgery with reduced morbidity and a negligible recurrence rate.[6]

Uniqueness of the case

In this report, we present a case of frontoethmoidal mucocoele with an unusual presentation of lateral displacement of the

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eyeball and proptosis which was managed conservatively with transnasal endoscopy.

Case Report

Patient concerns

A 26-year-old male patient reported to the clinic with a chief complaint of swelling of the left eye and double vision occasionally for 18 months. The onset was insidious. The patient had no history of trauma, nasal obstruction, nasal discharge, headache, or epistaxis. On examination, there was mild proptosis as evident by visible conjunctiva between the cornea and upper eyelid [Figure 1a]. The vision was normal; however, the patient had diplopia on looking to his extreme right.

Diagnostic aids

Endoscopic examination was essentially normal except for a bulge in the upper part of the uncinate process in the middle meatus. The size of the lesion on CT scan was found to be 2.8×4.3 cm. The lesion extended into the left orbit causing lateral displacement of the left eyeball [Figure 1b]. The diagnosis of frontoethmoidal mucocoele was made.

Treatment

The patient was posted for surgery by endoscopic approach. Uncinectomy was done which directly led to the exposure of the mucocoele. Marsupialization procedure was carried out draining the contents of the cyst [Figure 1c]. The medial wall of the orbit was found eroded causing the exposure of the eyeball with periorbital fat [Figure 1d]. The ostium of the frontal sinus was widened with the help of mushroom forceps to facilitate draining of sinus secretions and prevent recurrence. The patient was recalled once a week for 1 month for nasal irrigation.

Outcome

The recovery was uneventful.

Follow-up

On 12-month follow-up, there was complete resolution of the symptoms with disappearance of proptosis and diplopia [Figure 1e]. CT scan revealed complete resolution of the cystic mass and normal position of the eyeball [Figure 1f]. Endoscopically, the frontal sinus ostium was found to be patent and fully epithelialized with healthy mucosa [Figure 1g].

Discussion

Strengths and limitations in approach to the case

The endoscopic management of mucocoeles was given by Kennedy. Marsupialization of mucocoeles with transnasal endoscopy is a conservative and a minimally invasive procedure with reduced morbidity. It helps to preserve the sinus architecture, avoid external incisions and scarring, cause minimal bleeding, decrease surgical time, and reduce hospital stay. It has been shown to have favorable outcomes with almost no recurrence.[6] However, endoscopic approach has its own limitations. Due to the proximity to vital structures such as the orbit, optic nerve, and brain, it requires skill and experience on the part of the surgeon and sound knowledge of anatomy to avoid unwanted complications such as CSF leak and blindness.

Comparison of the findings of the case with relevant literature

Paranasal sinus mucocoele was first described by Langenback in the 19th century. Mucocoeles can occur at any age with no gender predomination. Although benign, they are locally aggressive lesions. The accumulation of mucus and increasing

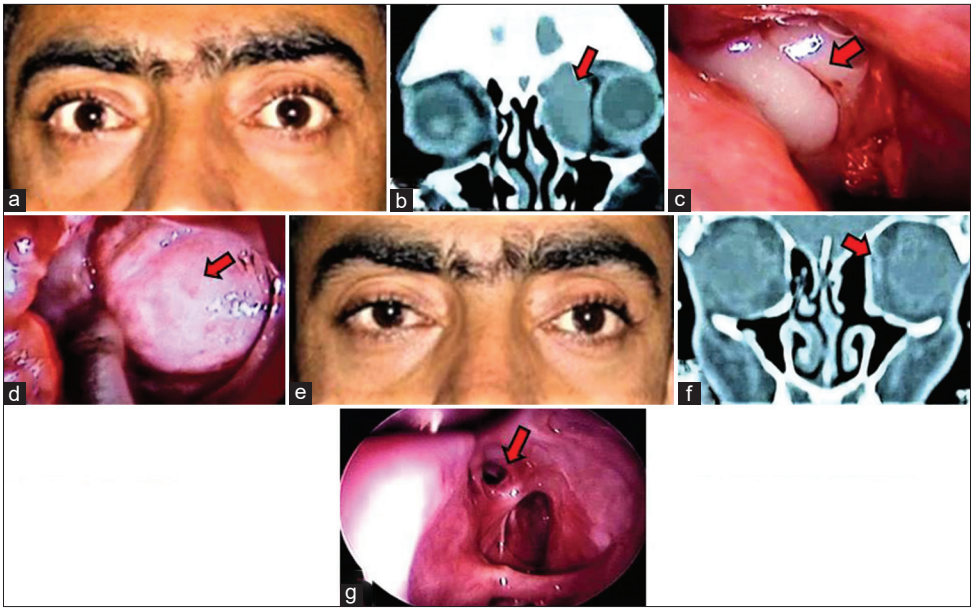

Figure 1: (a) Preoperative photograph showing proptosis of the left eye, (b) Computed tomography scan showing lesion with displaced eyeball, (c) Mucocoele exposed and drained, (d) Exposed eyeball seen due to erosion of medial wall of orbit, (e) Postoperative photograph showing resolution of proptosis, (f) Eyeball in normal position, (g) Patent frontal sinus ostium at 12-month follow-up

fluid content raises the pressure within the sinus causing bone erosion leading to displacement and destruction of adjacent structures. The lesion expands in the path of least resistance extending into the orbit, adjacent sinus, nasal cavity, or intracranial structures. Due to proximity to the brain, mucocoele may cause morbidity and potential mortality. The diagnosis is based on patient history, clinical examination, and radiological findings. Symptoms may include headache, facial pain, nasal obstruction, and dental pain. Proptosis is a common feature seen in case of frontoethmoidal mucocoele. Other features of orbital involvement are diplopia, pain, swelling, exophthalmos, and loss of vision. In severe cases, it may lead to complications such as meningitis, brain abscess, epidural abscess, and subdural empyema. Cranial nerve palsies are rare but can be seen in certain cases. The differential diagnosis of mucocoele causing unilateral proptosis may include inflammatory pseudotumour, dysthyroid eye disease, sinus tumour, retrobulbar orbital tumour, and metastatic lesion. Diagnosis can be aided by CT and magnetic resonance imaging (MRI). CT scan helps to determine the size and the extent of the lesion. On a CT scan, it is seen as an airless, expansile sinus mass with thin and eroded bony margins along with herniation into adjacent structures. MRI helps to rule out neoplasm in case of large mucocoele.[7]

Discussion of medical literature and take away lessons

The treatment of mucocoele is surgical. The external radical approach involves the complete extirpation of the mucous membrane along with obliteration of the sinus cavity. External approaches include osteoplastic sinusotomy of Macbeth, osteoplastic procedure of Goodale-and-Montgomery, and Lynch–Howarth procedure.[5] Osteoplastic flap procedure has higher morbidity, and postoperative radiographic imaging of the sinus becomes difficult. In case of intracranial expansion of mucocoele, the mucosal lining might become inseparable from the dura leading to incomplete removal of the mucocoele lining causing recurrence. Aggressive removal of the mucocoele lining may lead to dural injury and CSF leak. These procedures are extensive and more time-consuming and require prolonged hospitalization unlike marsupialization procedure. Marsupialization of mucocoele with transnasal endoscopy is an effective and efficient alternative to radical surgery with external approach. It leaves no cosmetic defect or scar and is associated with reduced morbidity and low recurrence rate.[8-10]

Conclusion

Even though endoscopic sinus surgery is a relatively safe procedure in the hands of an experienced surgeon, it does have a long learning curve and requires adequate experience, especially when it comes to dealing with cases like this where the eyeball is exposed due to erosion of the medial wall of the orbit. Recent advances in endoscopy such as image guidance surgery have helped to overcome these limitations. These systems use computerized tracking devices and help the surgeon with intraoperative anatomical localization. The use of navigation can further enhance the precision of the surgery in difficult circumstances such as distorted sinus anatomy or a revision sinus surgery making the procedure safer and further reducing patient morbidity.[11,12] However, the benefit of its application in all procedures requires further evaluation because of its high-cost factor.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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