



Frontal Muco-cele: Case presentation and update

◦Prepared By:

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Case

- 29 yr old Saudi male presented to our hospital post RTA 3 yr ago.
- C/O:
 - nasal obstruction
 - Anosmia.
 - Right eye blurred vision

Case

- O/E:
- Nose exam: ITH and DNS
- Ct scan: Pansinusitis
- Pt was seen and evaluated in local hospital and he underwent FESS, septoplasty and PIT.

Post op

- Pt was FU in the clinic .
- Found to have protrusion of eye and displacement downward and lateraly.
- Plan:
 - Referral to ophthalmology
 - CT scan was ordered

Para-nasal sinuses Mucocele

Definition:

- Slow growing, benign expansile lesions of the paranasal sinuses.
- Cyst –like structure lined with respiratory epithelium and filled with mucus.
- Infected mucocele is also known as mucopyocele.
- Locally destructive causing bony resorption and displacement of adjacent structures (orbital content).

Mucus retention

- A mucus retention cyst is just a cyst along the sinus lining.
- It's a fluid filled sac but a retention cyst **does not expand.**
- Cystic degeneration of a **seromucinous gland.**

Mucus retention cyst

- Very common.
- In fact about **30-40%** of people with absolutely no complaints of sinus problems will have cysts of the sinuses when they have a CT scan performed.
- Most retention cysts of the sinuses **spontaneously shrink** or don't change over the long term, based on a study by JH Wang in 2007

Epidemiology

- Frontal sinus is the most common involved.
 - 60-89% of mucocle involve Frontal Sinus.
 - 8-30% involve ethmoid sinus.
 - And less than 5% involve the maxillary sinus.
 - Rare involvement of sphenoid sinus.
 - Skull base destruction in 10%.
 - Intracranial extension in 55%.
- Uncommon sites include pterygomaxillary space, orbital floor and middle turbinate.

Epidemiology

- Usually diagnosed at 40-60 of age.
- Males and female equally affected.
- Extremely rare in pediatrics and reported association with Cystic Fibrosis.

Histopathology

- lined by **pseudostratified columnar epithelium** with **squamous metaplasia**.
- There may also be associated **goblet cell hyperplasia**.
- The cellular infiltrate present within the lining mucosa include components of both **acute and chronic inflammation**.

Pathogenesis:

- Three main theories of pathogenesis are available:
 1. Pressure erosion
 2. Cystic degeneration of glandular tissue
 3. Active bone resorption and regeneration

Patho-physiology

Frontal recess obstruction

Secondary

infection



Stimulation of lymphocytes and monocytes

Cytokines

Lining fibroblasts



Promote bone resorption and remodeling

expansion

Of mucocele

Patho-physiology

- Bone erosion results from mass effect as well as from the presence of cytokines such as **IL-1 and IL-6**.
- Cultured **fibroblasts** derived from frontoethmoidal mucocoeles have been shown to produce significantly elevated levels of **prostaglandin E2 and collagenase**.
- This suggests that the lining fibroblasts represent a major source of bone-resorbing factors .

Etiology

Table 9.1. Paranasal sinus mucoceles: common etiologies

Chronic rhinosinusitis
Previous sinus surgery
Previous maxillofacial trauma
Allergies
Tumors
Idiopathic

Microbiology

Culture of the aspirated mucocele contents can sometimes confirm the presence of infection. A study demonstrated that the most common isolates were *Staphylococcus aureus*, alpha-hemolytic streptococci, *Haemophilus* species, and gram-negative bacilli. The predominant anaerobic isolates were *Propionibacterium acnes*, *Peptostreptococcus*, *Prevotella*, and *Fusobacterium* species [4].

Presentation



Presentation

Table 9.2. Paranasal sinus mucoceles: common clinical presentations

Orbital symptoms: proptosis, globe displacement, diplopia, blurred vision, epiphora

Nasal symptoms: obstruction, mucopurulent rhinorrhea

Headaches

Facial or frontal swelling

Diagnosis

- Based on:
 - History
 - Physical exam
 - Radiology (key tool)

Physical exam

- Palpable mass in the frontal region or in the area of the medial canthus accompany the proptosis and globe displacement.
- Office nasal endoscopy should assess other possible intranasal findings
 - such as polyposis,
 - nasal septal deviation, etc., that may be addressed at the time of surgery.

Radiology

- CT scan
 - imaging of choice
 - well-delineated, cyst-like, homogeneous lesion originating in a paranasal sinus and
 - compressing surrounding structures.
 - content demonstrates homogeneous mucoid attenuation



MRI

- Useful when the diagnosis is **uncertain**.
- Differentiate between different types of soft tissues (mucocele formed secondary to a neoplasm).
- Assess I.C extension .
- for a mucocele **are low T1** and **high T2**, but

MRI

- Contrast-enhanced MRI is especially useful for **delineating secondary mucocele** formation: the nonenhancing mucocele is differentiated from the causative lesion (e.g. an obstructing tumor).
- It should be remembered **that MRI does not provide the surgeon with the same bony detail that is available from CT.**

Classification

The following classification system was devised in order to standardize frontal sinus mucocele evaluation and management [11]:

- Type 1. Limited to frontal sinus (with or without orbital extension)
- Type 2. Frontoethmoid mucocele (with or without orbital extension)
- Type 3. Erosion of the posterior sinus wall
 - A. Minimal or no intracranial extension
 - B. Major intracranial extension
- Type 4. Erosion of the anterior wall
- Type 5. Erosion of both anterior and posterior wall
 - A. Minimal or no intracranial extension
 - B. Major intracranial extension

Treatment

- The **goals of surgery** are
 1. eradication of the mucocele with minimal morbidity and prevention of recurrences.
- Surgical approaches are based on the **size**, **location**, and **extent** of the mucocele.
- In the presence of infection, adjuvant **antibiotic treatment** is indicated.
 - Since many of these lesions have an intracranial or intraorbital component, ideally the surgery should not be performed in the setting of an infection.

Management

Traditional teaching in the United States emphasized that the entire lining of a sinus mucocele must be completely removed. Historically, surgical therapy involved an external approach (Lynch-Howarth frontoethmoidectomy) or osteoplastic flaps with sinus cavity obliteration. These procedures carried significant morbidity and cosmetic deformity, as well as a significant rate of recurrence [29]. Additionally, post-operative radiographic follow-up became difficult after obliteration.

- More recent reports have shown that complete removal of the sinus lining is not necessary, and marsupialization is sufficient as long as ventilation of the sinus cavity is maintained [11]

Management

Lynch-Howarth



- Curved incision from inferomedial eyebrow, along upper third of nose
- Medial wall of orbit perforated

Management

Osteoplastic Flap



- Cut is made through eyebrows
- Scalp is lifted
- Frontal sinus obliterated with fat
- Bone replaced
- Better cosmesis

Endoscopic management of 108 sinus mucoceles.

Har-El G.

Author information

Abstract

OBJECTIVES/BACKGROUND: Traditional teaching has emphasized the need for complete removal of sinus mucoceles to achieve a cure. However, with the introduction of endoscopic sinus surgical instruments and techniques, there has been a trend toward transnasal endoscopic management of sinus mucoceles. The aim of this study is to establish the efficacy of endoscopic management of sinus mucoceles.

STUDY DESIGN: Retrospective review.

PATIENTS AND METHODS: Between 1988 and 2000, 103 patients with 108 paranasal sinus mucoceles were treated endoscopically. This series includes 66 frontal and frontoethmoid, 17 ethmoid, 7 sphenoid, 12 sphenoid, and 6 maxillary mucoceles. Ninety patients (83.3%) had intraorbital extension and 85 of them presented with some degree of proptosis or eye displacement. Sixty patients (55.5%) had erosion of the skull base with varying degrees of intracranial extension of the mucocele. Follow-up ranged from 1 to 131/2 years with a median of 4.6 years.

INTERVENTION: All patients underwent endoscopic-wide marsupialization of the mucocele cavity. Stents were used in frontal mucoceles only.

RESULTS: Recurrence of a frontal mucocele was seen in 1 patient (0.9%). In 5 patients, out of 23 patients who presented with massive pansinus polyposis in addition to the mucocele, recurrent polyposis

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RESULTS: Recurrence of a frontal mucocele was seen in 1 patient (0.9%). In 5 patients, out of 23 patients who presented with massive pansinus polyposis in addition to the mucocele, recurrent polyposis required revision surgery. However, the mucoceles did not recur in those patients.

CONCLUSIONS: There is increasing evidence in the literature that endoscopic management of sinus mucoceles results in long-term control with recurrence rates at or close to 0%. Rhinologic surgeons should consider the endoscopic technique as the surgical treatment of choice.

In-office balloon dilation and drainage of frontal sinus mucocele

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ABSTRACT

Treatment of frontal sinus disease represents one of the most challenging aspects of endoscopic sinus surgery. Frontal sinus mucocele drainage may be an exception to the rule because in many instances, the expansion of the mucocele widens the frontal sinus recess and renders surgical drainage technically undemanding. Recently, there has been an increased interest in in-office procedures in otolaryngology because of patient satisfaction and substantial savings of time and cost for both patients and physicians. Similarly, the past few years have witnessed an increased use of balloon dilation devices in sinus surgery. Previously, we have described the in-office use of this device in treating patients who failed prior conventional frontal sinusotomy in the operating room. In this report, we describe our step-by-step in-office experience using this tool for drainage of a large frontal sinus mucocele.

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Frontal sinus disease management has been a difficult undertaking in endoscopic sinus surgery. The challenges faced during frontal sinusotomy can be attributed to the difficult and narrow anatomy of the frontal sinus recess and significant mucosal trauma sustained during frontal sinusotomy. Hence, numerous new techniques and instrumentation have been developed to address the variety of frontal sinus pathologies.^{1–6} Frontal sinus mucocele drainage may be an exception to the rule because the expansion of the mucocele significantly widens the frontal sinus recess and can render surgical drainage technically straightforward.

Recently, there has been an increased interest in in-office procedures in many subfields of otolaryngology.^{7,8} Analyses of in-office procedures in laryngology, otology, and rhinology revealed them to be safe and satisfying for patients, with substantial savings of time and money for both patients and physicians.⁸ In-office balloon dilation of the sinuses has recently gained significant popularity.⁹ Although still controversial be-

cause of a lack of definitive substantiating evidence and prospective randomized control trials to support its efficacy,^{10,11} proponents of this technology have reported favorable outcomes with its use.⁹ To our knowledge, this device has not been described for the in-office drainage of large frontal sinus mucoceles. Previously, we have described the in-office use of balloon dilation in treating patients who failed prior conventional frontal sinusotomy in the operating room.¹² Given the many advantages of in-office procedures for patients and physicians, our familiarity with the balloon dilation device, and the relative straightforwardness of accessing a widened frontal sinus recess from mucocele expansion, we have used and are describing our step-by-step in-office experience using this tool to drain a large frontal sinus mucocele.

ILLUSTRATIVE CASE

Subject

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ILLUSTRATIVE CASE

Subject

A 68-year-old woman presented with a 2-year history of asymptomatic progressive right eye proptosis and pressure. She denied changes in visual acuity; diplopia; or history of sinusitis, anosmia, nasal congestion, or previous trauma. Oculoplastic examination revealed 4 mm of right proptosis, and 20/20 visual acuity. Nasal endoscopic examination revealed a deviated nasal septum to the left side and a widened right middle meatus and frontal sinus recess. The patient had a medical history significant for systemic hypertension, 38 pack-years of tobacco usage, pulmonary hypertension, and severe chronic obstructive pulmonary disease.

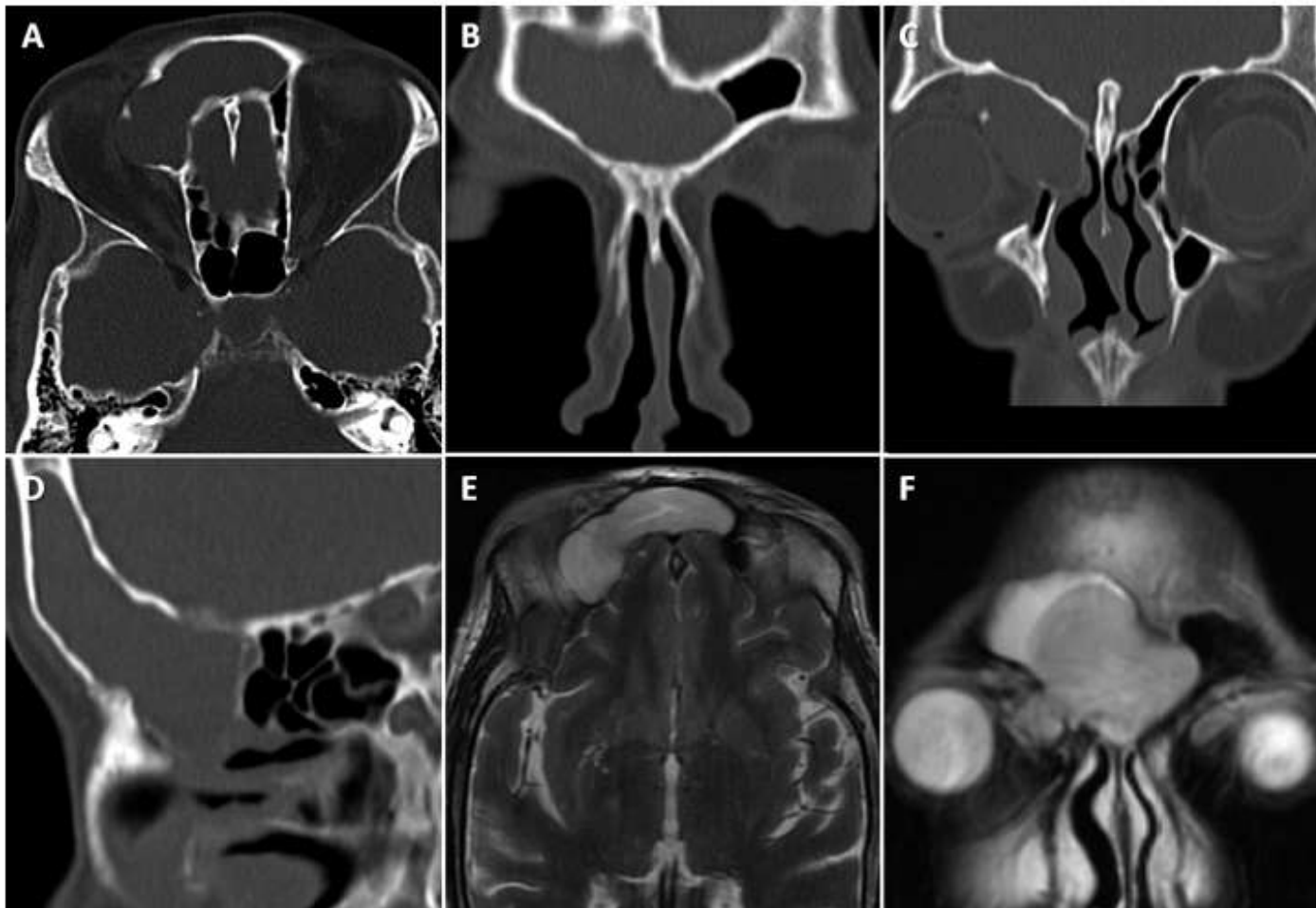


Figure 1. (A) Axial, (B and C) coronal, and (D) sagittal computed tomography scans of the orbits and paranasal sinuses show an expansile right frontal sinus mucocoele with downward and lateral compression and displacement of the globe. (E) Axial and (F) coronal T2-weighted magnetic resonance imaging show a hyperintense right frontal sinus mass consistent with a mucocoele.

Surgical Technique

Thirty minutes before the in-office rhinologic procedure, the patient was asked to take 2 tablets of oxycodone/acetaminophen (5/325 mg). The patient was then placed in the seated position and vital signs were assessed. The bilateral nasal cavities were decongested and anesthetized with a combination of oxymetazoline hydrochloride 0.05% and topical lidocaine hydrochloride 4%. After 5 minutes had elapsed, the right nasal cavity was packed with cottonoids soaked in topical lidocaine hydrochloride 4% and oxymetazoline hydrochloride 0.05% solution. Care was taken to lay the cottonoids in the middle meatus, anterosuperiorly in the region of the frontal sinus recess and against the nasal septum and anterolateral nasal wall to anesthetize the path of potential instrument contact. Ten min-

utes was subsequently allowed to elapse with the cottonoids in place against the nasal mucosa. Using a tuberculin syringe with a 25G needle, the areas surrounding the frontal sinus recess (upper uncinate process, upper middle turbinate, and anterior superior face of the bulla ethmoidalis) were injected with 1% lidocaine hydrochloride with 1:100,000 of epinephrine solution. After 5 minutes was allowed to elapse for an adequate anesthesia effect, the mucocele content was partially drained with a 21G needle. The frontal sinus recess area was subsequently cannulated using the transnasal balloon dilation probe (Entellus Medical, Inc., Maple Grove, MN) under direct endoscopic visualization with a 30 or 70° endoscope (Karl Storz and Co., Tuttlingen, Germany; Fig. 2). The content of the mucocele was collected for culture and pathological examination. The balloon was subsequently advanced, and the ostium was repeatedly dilated until an adequate diameter was achieved (≥ 5 mm).^{13,14}

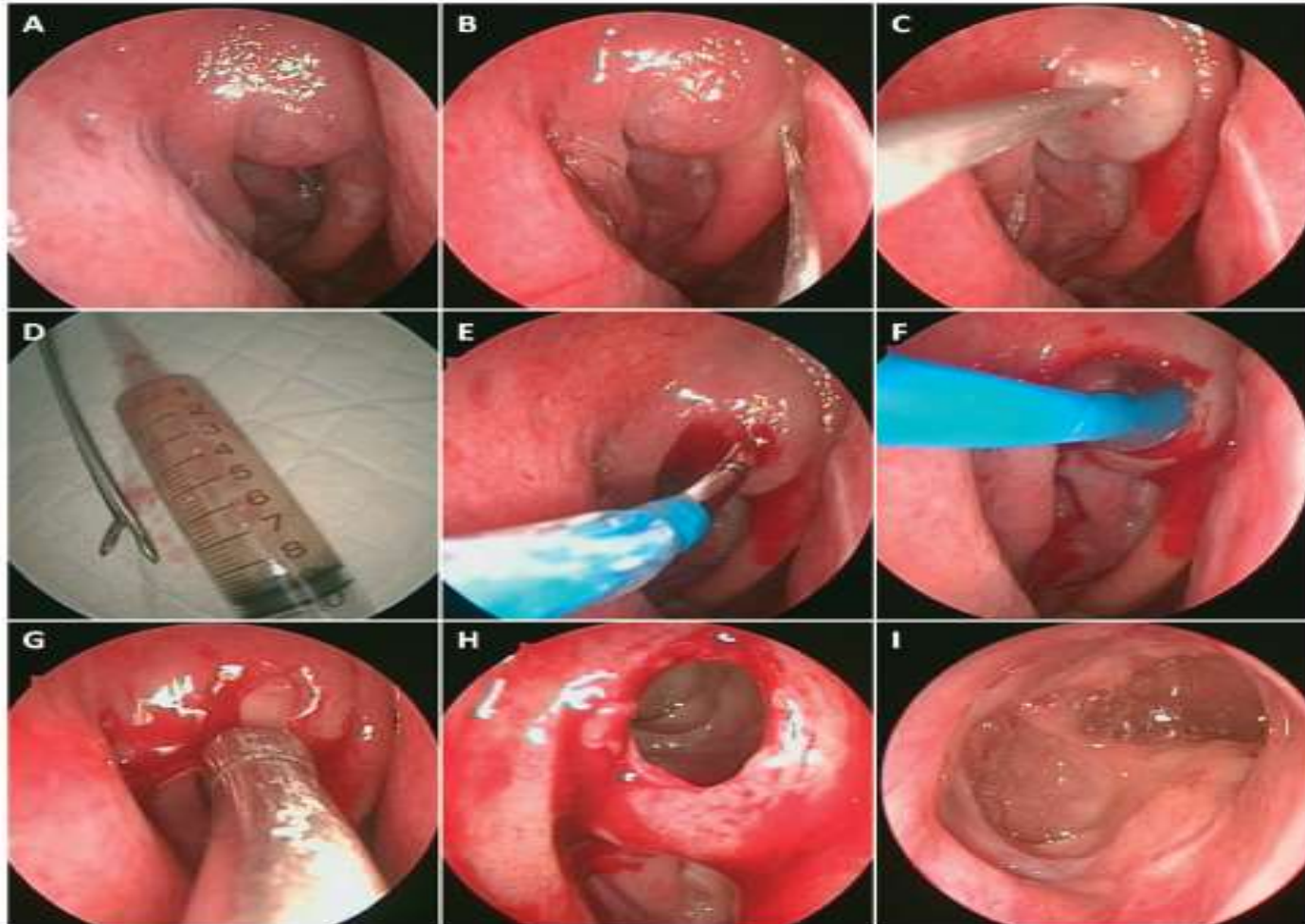


Figure 2. (A) In-office 30° endoscopic view shows expansion of the frontal sinus recess with bulging of the mucocele in the middle meatus. (B) After the nasal cavity was decongested and anesthetized, it was injected with 1% lidocaine with 1:100,000 of epinephrine solution. (C and D) The mucocele content was partially suctioned using a 10-mL syringe with a ZIG needle. (E) The mucocele was then cannulated (F) with the balloon dilation probe and dilated. (G) The contents of the mucocele was subsequently evacuated, followed by repeated dilation using the balloon dilation device. Endoscopic (H) 30° and (I) 70° view of the opening and cavity after dilation.

Postoperative Care

Postoperatively, the patient was treated with 10 days of an oral corticosteroid, a β -lactamase resistant penicillin, oxycodone/acetaminophen (5/325 mg) as needed for pain, and a topical nasal corticosteroid was started at the first postoperative visit (~7–10 days).

Follow-Up

Postoperatively, the patient's proptosis was significantly decreased. She maintained full extraocular movements and normal visual acuity with resolution of eye pressure. Her postoperative CT scan showed a widely patent right frontal sinus cavity (Fig. 3). She had a patent drainage pathway at her 8-month follow-up without signs of contraction.

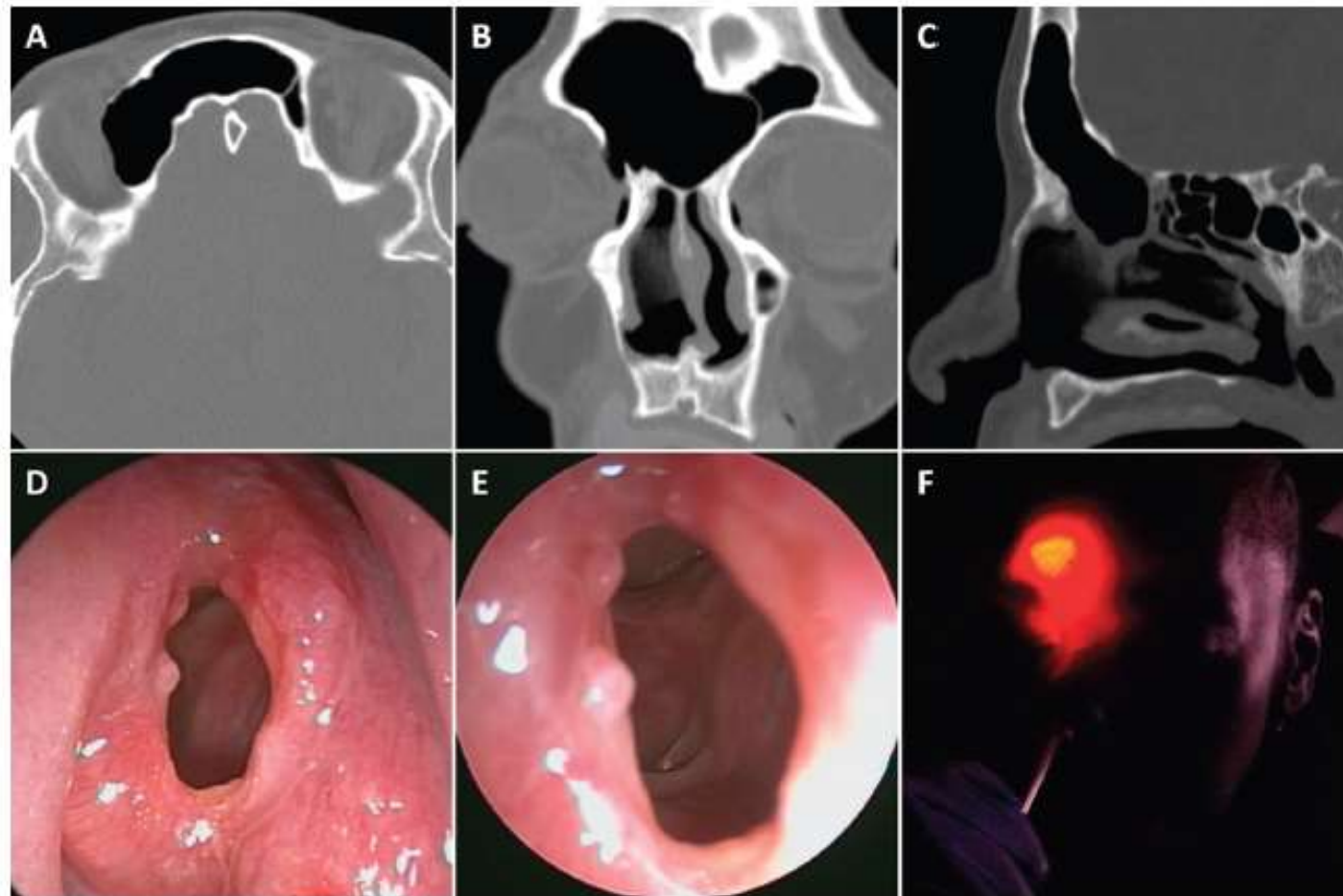


Figure 3. Postoperative (A) axial, (B) coronal, and (C) sagittal computed tomography scans of the orbits and paranasal sinuses show a patent right frontal sinus cavity. (D and E) Postoperative 70° nasal endoscopy shows a patent dilated opening. (F) Postoperative photograph of illuminated right frontal sinus cavity.

- **Key steps to preventing complications in this setting include:**

- (a) meticulous and systematic analysis of preoperative imaging with special consideration of areas of dehiscence at the skull base and lamina papyracea,
- (b) adequate patient selection (as for most in-office procedures, this case may not be appropriate for anxious patients),
- (c) adequate local anesthesia during the procedure,
- (d) suctioning of mucocele content to confirm the diagnosis before balloon dilation,

(e) aiming of the balloon probe away from known dehiscent area,

(f) ensuring correct positioning of the balloon catheter device within the mucocele through

transillumination or fluoroscopy if available, and

(g) care to only introduce a small portion of the probe and

balloon into the mucocele.

Limitations of this study include all limitations inherent to a single case description. Although studies of this type are good in reporting novelty, a case study can not be used to make generalized recommendations. However, this novel technique should promote discussion and be the basis for future investigations in this area.

CONCLUSION

In-office frontal sinus mucocele drainage using balloon dilation appears to be a feasible technique and potential alternative to conventional endoscopic procedures in the operating room. In properly selected patients (similar to the case described), this technique can obviate the need for general anesthesia and the operating room and potentially reduce surgical cost.

Core Messages

- Mucoceles are the most common benign tumor of the paranasal sinuses, and have a predilection for the anterior ethmoid cavity, most likely due to the labyrinthine nature of the anatomic region
- Treatment of mucoceles is surgical, with emphasis on the newer, less invasive endoscopic techniques.
- Evaluation is best carried out by CT scanning, with MRI and nasal endoscopy as adjuncts
- Great care must be taken in the postoperative period to keep the opening of a drained mucocele patent until normal mucociliary clearance is able to be re-established

Thank you!!

