Available online at www.sciencedirect.com

ScienceDirect

www.elsevier.com/locate/amjoto

Case reports

A nasal mucocele originating from complex facial fractures☆

Yi-Chun Carol Liu, MD[a,*], Nipun Chhabra, MD[a], Steven Houser, MD[b], Andrea Jarchow, MD[c]

[a] Ear, Nose, Throat Institute, Case Western Reserve University, University Hospitals Case Medical Center, Cleveland, OH
[b] Department of Otolaryngology-Head and Neck Surgery, MetroHealth Medical Center, Cleveland, OH
[c] Department of Otolaryngology-Head and Neck Surgery, University of North Carolina, Chapel Hill, NC

ARTICLE INFO

Article history:
Received 7 April 2013

ABSTRACT

Mucoceles are benign, epithelial-lined mucous cysts. Commonly mucoceles form secondary to obstruction of a sinus outflow tract or from mucosal gland entrapment from chronic infection, inflammation, iatrogenic trauma, external trauma, or neoplasm. We present a rare case of a nasal mucocele in a 37-year old male arising from a remote history of maxillofacial trauma. To our knowledge, mucoceles associated with nasal bone fractures have not been reported in the literature.

1. Introduction

Patients with mucoceles frequently present due to complaints of frontal pressure, headaches, facial swelling, or visual disturbances [4]. These symptoms correlate with the most common occurrence of mucoceles in the frontal and ethmoid sinuses. Mucosal entrapment or sinus outflow obstruction leads to the development of the locally expansile lesion. Increasing content of the mucocele will gradually alter the surrounding bony structures and has the potential for bony erosion. Here we describe a rare case of nasal mucocele associated with complex nasal bone and LeFort II fractures.

2. Case report

A 37-year-old male presented to our clinic with progressive external nasal swelling in the region of nasofrontal angle and nasal dorsum. He specifically noted his eyeglasses no longer fit across his nasal bridge. The patient also reported associated symptoms of increasing nasal congestion and hyposmia. He denied visual changes, facial pain, epistaxis, fevers, or clear rhinorrhea. Upon reviewing the patient's history, he reported suffering facial fractures approximately nine years earlier during a work related accident. The mechanism of injury was described as blunt force trauma by a metal pipe dislodged from an industrial machine. Computed tomography (CT) scan at the time of injury revealed multiple facial fractures, including bilateral LeFort II, comminuted nasal bone, medial orbital wall, and comminuted maxillary dentoalveolar segment fractures. Shortly thereafter, the patient underwent uneventful open reduction and internal fixation with plating for the noted LeFort II. Orosurgical splints were used to stabilize the comminuted dento-alveolar segments. The nasal fractures were addressed with a rigid, external dorsal splint and internal nasal packing.

Upon presentation to our clinic nine years later, the external examination demonstrated widening of the upper vault on frontal view and blunting of the nasofrontal angle on profile. Palpation of the region revealed a soft mass that was mildly tender to palpation. Intranasal examination revealed a large amount of anterior and superior septal cartilage.

Further work-up included computed tomography (CT) of the sinuses and Magnetic Resonance Imaging (MRI) of the

☆ The authors have no funding, financial relationships, or conflicts of interest to disclose.
* *Corresponding author*. Ear, Nose, Throat Institute, Case Western Reserve University, University Hospitals Case Medical Center, Cleveland, OH 44106. Tel.: +1 216 844 8433 (Office:); fax: +1 216 983 3180.
E-mail address: yichun.liu@uhhospitals.org (Y.-C.C. Liu).

0196-0709/$ – see front matter © 2014 Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.amjoto.2013.05.005

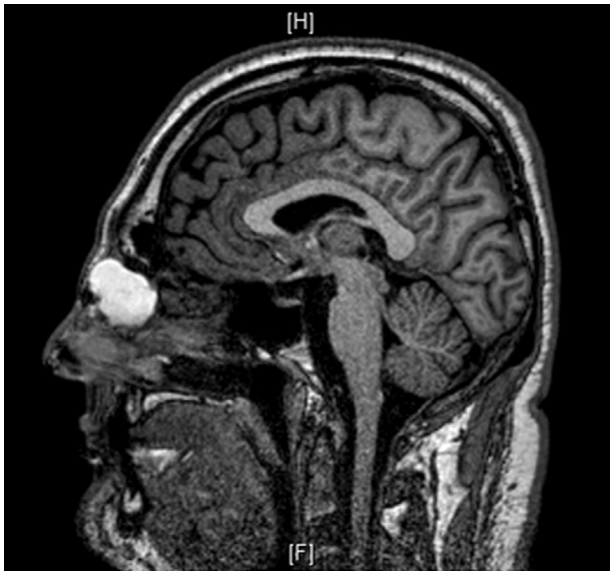

Fig. 1 – Sagittal T1 MRI without contrast through the brain showing the nasal mucocele.

head to rule out intracranial communication as well as a Fine Needle Aspiration (FNA) of the mass. The CT sinus demonstrated a cyst-like mass enveloping the superior–anterior septum which displaced the nasal bones laterally. There was no significant sinus disease noted. The MRI with gadolinium defined a lesion confined to the superior aspect of the nasal cavity measuring approximately 2 × 3 × 2 cm. The lesion appeared hyperintense on T1 & T2-weighted images without evidence of intracranial extension (Fig. 1). FNA cytology demonstrated mucoid material. History and workup were most consistent with the diagnosis of a nasal mucocele.

The option of an endoscopic approach for the removal of the mucocele was considered. However, the location of the mucocele resulted in tremendous difficulty for visualization and the complete removal of the lining via endoscopy, even with the use of seventy degree scope, was felt to be a suboptimal option. Thus, after extensive discussion, the patient elected for surgical removal of the mucocele via a direct, external approach using a shortened gull-wing incision. Intraoperatively, the mass was removed in its entirety from the surrounding structures (Fig. 2). In addition, a septoplasty for bony and cartilaginous harvest was undertaken to reconstruct the operative defect. The harvested bony septum was fashioned to fit the defect in the nasal bones created by the mass and secured in place to the frontal bone with a titanium Y-plate (Fig. 3a). The harvested cartilage was then morselized and draped over the bony reconstruction to minimize future contour irregularities as healing progressed (Fig. 3b). There were no operative or immediate post-operative complications. The final pathology of the mass revealed an inflammatory central nasal polyp with fragments of bone most consistent with a mucocele.

Fig. 2 – The defect after the mucocele was removed.

On post-operative follow-up the patient exhibited good signs of healing and has noted significant improvement in his nasal breathing and adequate fitting of his eyeglasses. He has remained asymptomatic and without recurrence of the mucocele.

3. Discussion

The human nose is predisposed to soft-tissue injury and fracture due to its prominent position and delicate bony framework. The most common causes of facial fractures are assaults and motor vehicle accidents, followed by sports injury and industrial accidents [1,2]. Complications of nasal fractures can occur at the time of trauma but may also present in the post-injury setting [3]. Early complications of nasal fractures include edema, ecchymosis, epistaxis, hematoma, infection, and CSF rhinorrhea. Delayed complications include airway obstruction, fibrosis, contracture, synechiae, saddle nose deformity, and septal perforation [4].

Mucoceles are epithelial-lined cavities filled with mucous [4]. Mucoceles can occur as a secondary obstructive complication from chronic sinusitis and polyposis. They may also occur as a result of trauma, surgery, or neoplasm. Mucoceles are most commonly due to iatrogenic trauma involving the paranasal sinuses [12]. Serrano et al. reported on a series of 60 patients with paranasal sinus mucoceles and found that 45% of patients had some form of prior nasal surgery, while only 2% sustained traumatic injuries [10]. Mucoceles occurring as a complication of facial trauma are usually associated with frontal sinus fractures but less commonly with other facial fractures [4]. Mucoceles occur most often in the frontal sinus, followed by ethmoid, maxillary, and sphenoid sinuses, respectively [3]. Mucocele formation has also been reported following zygomaticomaxillary complex (ZMC) and orbital floor fractures, but is extremely rare [3].

Mucoceles associated with facial trauma form from the regrowth of viable sinus mucosa. This mucosa is ectopically seeded in a new location due to fracture displacement and becomes obstructed or entrapped. A mucus filled cyst then develops and presents as a mass [5–7,12,13]. These masses are usually slow-growing and are associated with various symptoms depending on the location and extent. Patients may complain of nasal obstruction, pain, visual changes, or recurrent infections [8,9]. These cysts have the potential for bony erosion and subsequent extension to adjacent structures, including the paranasal sinuses, orbit, or brain [3].

Radiographic imaging is of central importance to the workup of mucoceles. A CT scan is the best modality and will often demonstrate a homogenous mass with or without surrounding bony changes [11]. CT imaging also serves to delineate the extent of the mass [10]. MRI is useful only for evaluation if intracranial or intraorbital extension is suspected.

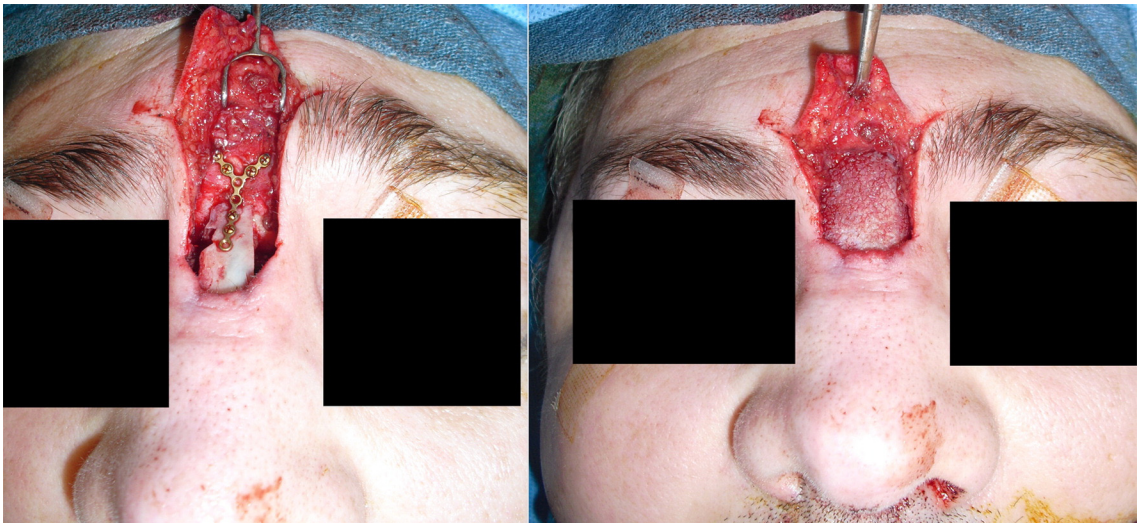

Fig. 3 – (A) The harvested bony nasal septum secured in place to the frontal bone with a titanium Y-plate. (B) Morselized nasal draped over the bony reconstruction to minimize future contour irregularities.

The treatment of mucoceles depends on the size and location. For smaller lesions, enucleation with complete removal of the cyst lining is recommended. For larger mucoceles, marsupialization may be completed if total extirpation is not possible.

Surgical methods include traditional open approaches such as the Caldwell–Luc approach for paranasal maxillary sinus mucoceles or open versus endoscopic approaches for frontal sinus mucoceles [13]. Endoscopic approaches obviate the need for external incisions and have also gained popularity [16–19]. The majority of paranasal mucoceles, including frontal sinus mucoceles, can be resected or marsupialized through an endoscopic approach. Certain frontal and maxillary sinus mucoceles amenable to endoscopic resection have recurrence rates close to 0% [10]. However, factors that limit the endoscopic resection approach include inability to fully visualize the mucocele with the endoscope, difficulty to marsupialize the mucoceles and the extension of the mucocele into surrounding structures, i.e. intraorbital or intracranial invasion.

4. Conclusion

This is the first reported case in the English-language literature of a mucocele arising as a sequela of nasal bone fracture. There have been reports of ectopic mucosa entrapment leading to mucoceles in the orbit and pterygomaxillary space, but none secondary to complex nasal trauma [14,15]. Regardless of the location of the disease, the treatment of paranasal and nasal mucoceles remains primarily surgical. The otolaryngologist and maxillofacial surgeon should be aware of this very rare, but potential complication of nasal bone fractures.

REFERENCES

[1] Gwyn PP, Carraway JH, Horton CE, et al. Facial fractures-associated injuries and complications. Plast Reconstr Surg 1971;47:225–30.

[2] Scherer M, Sullivan WG, Smith Jr DJ, et al. An analysis of 1423 facial fractures in 788 patients at an urban trauma center. J Trauma 1989;29:388–90.

[3] Reiter ER, August M, Varvares MA, et al. Mucocele of the infratemporal fossa as an unusual complication of midfacial fracture. Ann Otol Rhinol Laryngol 2000;109:522–5.

[4] Bailey BJ, Johnson JT, Newland SD. Head and neck surgery–otolaryngology. 4th Ed.. Wilkin: Lippincott Williams & Wilkins; 2006.

[5] Rohrich RJ, Hollier LH. Management of frontal sinus fractures: changing concepts. Clin Plast Surg 1992;19:219–32.

[6] Manolidis S, Hollier LH. Management of frontal sinus fractures. Plast Reconstr Surg 2007;120(7 suppl 2):32S–48S.

[7] Weitzel EK, Hollier LH, Calzada G, et al. Single stage management of complex front-orbital mucoceles. J Craniofac Surg 2002;13:739–45.

[8] Donald PJ, Montgomery WW, Calcaterra T. Frontal bone defect with frontal sinus mucopyocele. Head Neck Surg 1987;10:59–62.

[9] Rodriguez ED, Stanwix MG, Nam AJ, et al. Twenty-six-year experience of treating frontal sinus fractures: a novel algorithm based on anatomical fracture pattern and failure of conventional techniques. Plast Reconstr Surg 2008;122:1850–66.

[10] Serrano E, Klossek JM, Percodani J, et al. Surgical management of paranasal sinus mucoceles: a long-term study of 60 cases. Otolaryngol Head Neck Surg 2004;131:133–40.

[11] Diaz MCG, Schmidt RJ. Ethmoid mucocele presenting as an orbital mass. Pediatr Emerg Care 2008;24:845–6.

[12] Zizmor J, Noyek AM. Cysts, benign tumors and malignant tumors of the paranasal sinuses. Otolaryngol Clin North Am 1973;6:487–508.

[13] Kaneshiro S, Nakajima T, Yoshikawa Y, et al. The postoperative maxillary cyst: report of 71 cases. J Oral Surg 1981;39:191–8.

[14] Stewart MG, Patrinely JR, Appling WD, et al. Late proptosis following orbital floor fracture repair. Arch Otolarynol Head Neck Surg 1995;121:649–52.

[15] Stack Jr BC, Klotch DW. Mucocele of the pterygomaxillary space. Ann Otol Rhinol Larynol 1995;104:246–7.

[16] Kennedy DW, Josephson JS, Zinreich SJ, et al. Endoscopic sinus surgery for mucoceles: a viable alternative. Laryngoscope 1989;99:885–95.

[17] Mark SC, Latoni JD, Mathog RH. Mucoceles of the maxillary sinus. Otolaryngol Head Neck Surg 1997;117:18–21.

[18] Benninger MS, Marks S. The endoscopic management of sphenoid and ethmoid mucoceles with orbital and intranasal extension. Rhinology 1995;33:157–61.

[19] Zrada SE, Isaacson G. Endoscopic treatment of pediatric ethmoid mucoceles. Pediatr Otolaryngol 1996;17:197–201.