Paranasal sinus mucocele: endoscopic marsupialization and surgical outcome

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Received 19 February 2012
Accepted 19 February 2012

The Egyptian Journal of Otolaryngology
2012, 28:95–97

We report 10 cases of paranasal sinus mucoceles with/without orbital/intracranial extension who presented to the Otolaryngology Department at the University Kebangsaan Malaysia Medical Center (UKMMC). The clinical presentation, pathophysiology, and the endoscopic and combined endoscopic craniofacial approaches in mucocele removal are discussed. The authors recommend the endoscopic transnasal approach as the main surgical treatment for paranasal mucoceles and highlight its outcome.

Keywords:
craniofacial resection, endoscopic transnasal approach, intracranial involvement, mucocele, orbital involvement, paranasal sinus

Egypt J Otolaryngol 28:95–97
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1012-5574

Introduction

Mucoceles are a slow-growing benign entity with mucous-containing sacs in the paranasal sinus that are lined by pseudocolumnar respiratory epithelium. The pathophysiology is believed to be due to poor drainage of mucosal secretions from the obstructed sinus. The most common site is within the frontal sinus, followed by the ethmoidal sinus and the maxillary sinus, with the sphenoid sinus being the least common (1%). Another common site for the occurrence of a mucocele is within the supraorbital ethmoid region [1]. Mucoceles can lead to intracranial or intraocular extension, which often leads to more complications. Ophthalmologic symptoms are the most common clinical presentations [2], which include headaches, diplopia, and proptosis. When left untreated, mucoceles are known to progress intracranially with skull base erosion, causing possible third, fourth, and sixth cranial nerve palsies [3]. We discuss 10 cases of paranasal sinus mucoceles that presented to our hospital with/without orbital extension.

Discussion

Mucoceles were first described by Langenbeck in 1818 and Rollett in 1896. With no sex predilection, mucoceles tend to occur between the fourth and the seventh decades of life [1]. In our study, the male–female ratio was 6 : 4 and the age ranged from 39 to 75 years (mean age of 59 years). Common sites of the occurrence of mucoceles are in the frontal sinus [3], with only 1% of occurrence within the sphenoid sinus [4]. The demographic presentations of the 10 mucocele patients are listed in Table 1. In our study frontal, ethmoidal, sphenoid, and maxillary sinuses were involved in six, four, two, and one cases, respectively (Table 2). Various etiologies have been speculated and they have been categorized into obstructive and inflammatory causes.

Trauma, polyps, neoplasm, or previous surgeries are included in obstructive causes, whereas allergy associated with chronic rhinosinusitis [1] is due to inflammatory causes. In our 10 patients, six had inflammation, two had nasal polyposis, and two had complications with a history of previous surgeries.

Trauma and previous surgeries in particular to the frontoethmoidal region often lead to sinus obstruction and the formation of retention cysts. The slow and gradual accumulation of retained mucous secretion within a retention cyst will cause increased pressure within the cavity and ultimately expansile bone remodeling and thinning and pressure on the neighboring structures. Several theories related to inflammation have been put forward on the growth of the size of mucoceles. Mucocele aggressiveness has been hypothesized to be secondary to increased levels of cytokine mediators [5]. The increased protein content in the retained mucous secretions increases the osmolality of the developing cyst, which later causes the activation of osteoclast-activating factors such as prostaglandin, causing stimulation of bone resorption [6].

It is not uncommon for patients with mucoceles to have long symptom-free latent periods [5]. The classical presenting features are headache, diplopia, proptosis, and visual field defects (Table 3). Anterior extension of the mucocele may present as Pott's puffy tumor, which is classically an extradural/subperiosteal abscess with a transosseous fistula. Similarly, posterior extension of a mucocele may result in suppurative infections such as meningitis, epidural abscess, and subdural empyema [1,3]. Pressure effects on the cranial nerves can result in sudden focal neurological deficits such as blindness if the cavernous part of the carotid sinus is involved laterally. Two of our patients with sphenoid sinus involvement had reduced vision due to a mass effect on the optic nerve and a cavernous sinus. An isolated third nerve palsy has also been reported [3], being the most commonly involved cranial nerve.

1012-5574 © 2012 The Egyptian Oto - Rhino - Laryngological Society DOI: 10.7123/01.EJO.0000413428.64760.81

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Table 1 Demographic presentation of 10 patients with a mucocele

Patient number	Age, sex, race	Clinical presentation	Side of sinus involvement	Imaging	Type of surgery performed	Follow-up
1	40, male, Chinese	Supraorbital swelling no diplopia or nasal symptoms	Left frontal and ethmoid sinuses	CT scan: sinulith within maxillary sinus, left frontoethmoidal mucocele	Endoscopic marsupialization of frontoethmoidal mucocele	Symptom free at the 1-year follow-up, no sign of recurrence
2	59, male, Chinese	Right frontal swelling, diplopia	Right frontal sinus	CT scan: expansile cystic lesion pushing interfrontal sinus septum, orbital roof involvement	Bicoronal flap with frontal sinusotomy and cranialization (both external and endoscopic approach)	Symptom free at the 1-year follow-up, with no evidence of recurrence
3	40, male, Malay	Nasal block, rhinorrhea, anosmia nasal polyposis	Right frontal sinus	Right frontal mucocele with intracranial extension no evidence of mass effect or ring enhancement	Endoscopic right frontal sinusotomy and bilateral ethmoidectomy	Symptoms improved, with evidence of recurrence of nasal polyps at 6 months
4	55, female, Malay	Headache, right diplopia	Right ethmoid sinuses	CT scan and MRI: right ethmoidal mucocele with thinning of lamina papyracea	Anterior and posterior ethmoidectomy through an endoscopic transnasal approach	Symptom free at the 6-month follow-up, with no evidence of recurrence
5	59, male, Bengali	Headache, proptosis reduced left eye movement	Frontal sinus	CT scan bilateral frontal mucocele	Endoscopic transnasal approach drainage of pyocele, nasalization of frontal sinus	Symptom free at the 6-month follow-up, with no evidence of recurrence
6	73, male, Chinese	Reduced vision, eye pain, headache, nasal blockage	Sphenoid sninus	Expansile mass within sphenoid sinus compressing on optic nerve	Sphenoethmoidal recess debridement and marsupialization	Symptom free at the 1-year follow-up, with no evidence of recurrence
7	75, female, Chinese	Right epiphora, medial cantus swelling	Left Fronto-Ethmoid sinuses	CT scan showed mass occupying frontal and left ethmoidal sinuses	Anterior and posterior ethmoidectomy, marsupialization of frontal mucocele	Symptom free at the 1-year follow-up, with no evidence of recurrence
8	71, female, Chinese	Nasal blockage, rhinorrhea, sneezing, epiphora	Maxillary sinus	Hypodense mass in right maxillary sinus with remodeling of hard plate and maxillary wall	Marsupialization of maxillary mucocele	Symptom free up to 6 months of follow-up, with no evidence of recurrence
9	63, female, Chinese	Left eye reduced vision, eye pain, headache	Sphenoethmoidal sinuses	Bilateral ethmoid, and sphenoid involvement, with evidence of compression of optic nerve and cavernous sinus	Endoscopic ethmoidectomy, marsupialization of sphenoid and ethmoid mucocele	Symptom free at the 1-year follow-up, with no evidence of recurrence
10	39, male, Indian	Headache right eye protosis, and reduced vision	Right frontal sinus	MRI: mass within right frontal sinus with a mass effect on right superior and medial wall, optic nerve normal	Endoscopic right frontal sinusotomy and marsupialization	Symptoms improved, with no evidence of recurrence at the 1-year follow-up

CT, computed tomography.

Table 2 Sites of involvement of paranasal sinuses

	Frontal	Ethmoidal	Maxillary	Sphenoid
Number of cases	6	4	1	2

Computed tomography (CT) and MRI are the procedures of choice. However, CT imaging is more useful in terms of delineation of the bony framework and erosion. Mucoceles appear as a low attenuated fluid within the affected sinus, where sinus walls may appear remodeled or dehiscent [6]. In the MRI findings, the sinus may show a lack of internal enhancement with a thin peripheral margin of contrast, which helps in delineating a tumor from retained secretions. It also helps in differentiating a nasal mass with an intracranial extension from a cystic mass such as a meningocele [5]. In general, mucoceles should be differentiated from paranasal sinus tumors, for example, inverted papilloma or sinonasal carcinoma (most of these enhance), mucus retention cysts (no bony expansion), antrochoanal polyps (which protrude focally through the osteomeatal complex), and acute sinusitis (no bony expansion).

Preferably, all symptomatic cases of mucoceles should be treated surgically. Previously, a radical transfacial Lynch–Howarth approach has been typically used for patients with intracranial extension [1]. Several recent literatures have reported successful results in the management of mucoceles with endoscopic marsupialization as the main

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Table 3 Clinical presentation of head and eye symptoms

	Headache	Diplopia	Proptosis	Reduced vision	Reduced eye movement	Nasal symptoms
Number of cases	5	2	5	3	2	3

choice of treatment [5]. It has the advantage of magnification of the operative field, is minimally invasive, preserves the sinus architecture, and produces good long-term results with adequate postoperative care. Some conditions are not suitable for endoscopic surgery alone, including a laterally placed frontal mucocele, hypertrophic bone occluding the area of the frontonasal recess, and a mucocele arising secondarily from a malignancy [7]. With respect to case number 2, the extensive mucocele with intraorbital extension was removed using both an endoscopic and an external approach through bicoronal flap and cranialization.

Several factors need to be carefully considered before carrying out the endoscopic transnasal technique: for example, preventing trauma to the anterior ethmoidal artery in frontal mucocele cases, by avoiding a bloody operating field and easing the resection of the mass from the skull base and preventing the risk of cerebrospinal leak. The endoscopic-assisted transcranial approach can serve as an alternative to allow better manipulation and exposure in these difficult cases.

Inflammation within the nasal cavity and paranasal sinuses such as polyps and sinusitis need to be addressed first before marsupialization of a mucocele can be attempted.

As in any other endoscopic procedure in the nasal cavity, the important landmarks such as the medial orbital wall and the skull base should be carefully identified and approached with caution. With all precautions, the endoscopic technique is more advantageous in terms of conservative mucosal preservation, a better healing process, and a shorter hospitalization period for the patient. The authors recommend this endoscopic transnasal technique as the main surgical treatment for paranasal sinus mucocele marsupialization.

Conclusion

In our 10 patients, the endoscopic transnasal technique provided adequate access to mucoceles with intraorbital extension. All patients remained well, with no recurrence or complications on follow-up in the clinic. The choice of the approach largely depends on the expertise of the surgeon with detailed knowledge of anatomy and good preoperative CT mapping of the disease extension. In experienced hands, the endoscopic transnasal technique should be preferred and the more radical external approach should be reserved for more extensive lesions.

Acknowledgements

Conflicts of interest

There is no conflicts of interest.

References

1 McMains KC, Kountakis SE. Fronto-orbital-ethmoid mucoceles. Oper Tech Otolaryngol Head Neck Surg 2006; 17:19–23.

2 Lee TJ, Li SP, Fu CH, Huang CC, Chang PH, Chen YW, *et al.* Extensive paranasal sinus mucoceles: a 15-year review of 82 cases. Am J Otolaryngol Head Neck Med Surg 2009; 30:234–238.

3 Ehrenpreis SJ, Biedlingmaier JF. Isolated third-nerve palsy associated with frontal sinus mucocele. J Neuro Ophthalmol 1995; 15:105–108.

4 Kumagai M, Hashimoto S, Suzuki H, Matsuura K, Takahashi E. Orbital apex syndrome caused by sphenoethmoid mucocele. Auris Nasus Larynx 2003; 30:295–297.

5 Kennedy DW, Keogh B, Senior B, Lanza DC. Endoscopic approach to tumors of the anterior skull base and orbit. Oper Tech Otolaryngol Head Neck Surg 1996; 7:257–263.

6 Prasad KC, Alva B, Prasad SC, Shenoy V. Extensive sphenoethmoid mucocele – an endoscopic management. J Craniofac Surg 2008; 19:766–771.

7 Conboy PJ, Jones NS. The place of endoscopic sinus surgery in the treatment of paranasal sinus mucocoeles. Clin Otolaryngol Allied Sci 2003; 28: 207–210.

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