Int J Clin Exp Med 2015;8(10):18518-18522
www.ijcem.com /ISSN:1940-5901/IJCEM0006813

Original Article

Paranasal sinus mucoceles: our clinical experiments

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Received February 7, 2015; Accepted September 17, 2015; Epub October 15, 2015; Published October 30, 2015

Abstract: Objectives: We present the clinical and radiological features, treatment protocols, and medium-long-term results of our patients following surgery for paranasal sinus mucocele, along with a review of the relevant literature. Materials and methods: A total of 18 patients (11 women and 7 men) who underwent surgery for paranasal sinus mucocele at Kocaeli University Faculty of Medicine, Department of Otolaryngology, between 2006 and 2013 were examined retrospectively. The mean patient age was 41 (range 4-73). Demographic and radiological features, symptoms, treatment protocols, and postoperative outcomes were recorded. Results: The most frequently affected sinus was the maxillary sinus (n=9, 50%) followed by the frontal sinus (n=6, 33%) and sphenoidal sinus (n=3, 16%). The main symptom was headache. Endoscopic marsupialization of the mucocele was applied in all 18 patients, while frontal sinus exploration with the osteoplastic flap procedure was performed in one patient and the Caldwell-Luc operation was performed in another patient. The Caldwell-Luc procedure was subsequently required in one patient (6%) and endoscopic revision surgery was required in another patient (6%). Conclusion: Sinus mucocele that enlarges, eroding the surrounding bone tissue, and induces various clinical symptoms due to the impression of the expansile mass, is treated surgically, and must be planned carefully to prevent serious complications.

Keywords: Mucocele, paranasal sinus, sinus surgery

Introduction

Mucoceles are benign, cystic and slow growing lesions located in the paranasal sinuses, which are believed to form due to obstruction of the sinus ostia [1]. They are most commonly seen in frontal and ethmoidal sinuses, while rarely seen in maxillary and sphenoidal sinuses [2]. Patients commonly present with pain, nasal congestion, diplopia, and exophthalmos depending on the location of the lesion and the extent of bone erosion. The most widely accepted treatment protocol is endoscopic marsupialization of the mucocele [3]. Here, the clinical properties, radiological findings, treatment protocols, and medium-long-term results of patients undergoing surgery for sinus mucocele are discussed.

Materials and methods

A total of 18 patients (11 women and 7 men) who were treated surgically for paranasal sinus mucocele in Kocaeli University Faculty of Medicine, Department of Otolaryngology, between 2006 and 2013 were examined retrospectively. The mean patient age was 41 (range 4-73). All of the patients underwent computed tomography (CT) scans of the paranasal sinus and maxillofacial magnetic resonance imaging (MRI) examination before the operation.

Patients with homogeneous, cystic, and expansile lesions with bone erosion detected on radiological examination underwent surgery with a prediagnosis of mucocele. Demographic features, lesion location, clinical symptoms, operation type, and postoperative complications were investigated for each patient characteristics have been seen in **Table 1**.

Results

None of the patients had a relevant past medical history. The age range of the patients was 4-73 (mean age 41.7 ± 21.8). The most frequent symptom was headache (n=12, 66%). Four patients (22%) presented with the complaint of eye swelling, three patients had nasal congestion (16%), and three patients had facial swelling (16%). The most frequently affected sinus was the maxillary sinus (n=9, 50%) fol-

Table 1. Patient characteristics

Patient No	Sex	Age	Symptoms	Location	Surgery	Recurrence
1	M	32	Nas cong	Right frontoethmoid	End Ethm	No
2	F	59	Eye propitosis	Left frontoethmoid	End Ethm	No
3	F	13	Eye propitosis	Left frontoethmoid	End Ethm	No
4	M	4	Eye propitosis	Left frontoethmoid	End Ethm (the same operation also was performed in revision)	Yes
5	F	59	Eye propitosis, headache	Right frontoethmoid	End Ethm	No
6	M	73	Headache	Right Frontoethmoid (with lateral component)	osteoplastic flap procedure	No
7	F	67	Headache, facial swelling	Right maksiller	End Ethm, Mid M Antr	No
8	F	45	Headache	Left maksiller	End Ethm, Mid M Antr	No
9	M	73	facial swelling	Left maksiller	1st operation End Ethm, Mid M Antr 2nd Caldwell luc (for revision)	Yes
10	F	31	Headache, nas cong	Right maksiller	End Ethm, Mid M Antr	No
11	M	31	Headache	Right maksiller		No
12	M	53	Nas cong, headache	Right maksiller	End Ethm, Mid M Antr	No
13	F	50	Headache	Left maksiller	End Ethm, Mid M Antr	No
14	F	35	Headache	Left maksiller	End Ethm, Mid M Antr	No
15	F	67	Headache, facial swelling	Left maksiller	End Ethm, Mid M Antr	No
16	M	24	Headache	Right sfenoid	EndTransnasSphen	No
17	F	20	Headache	Right sfenoid	EndTransnasSphen	No
18	F	16	Headache	Left sfenoid	EndTransnasSphen	No

Nas Cong: Nasal Congesion, End Ethm: Endoscopic Ethmoidectomy, Mid M Antr: Middle Meatal Antrostomy, End Transnas Sphen: Endoscopic Transnasal Sphenoidotomy.

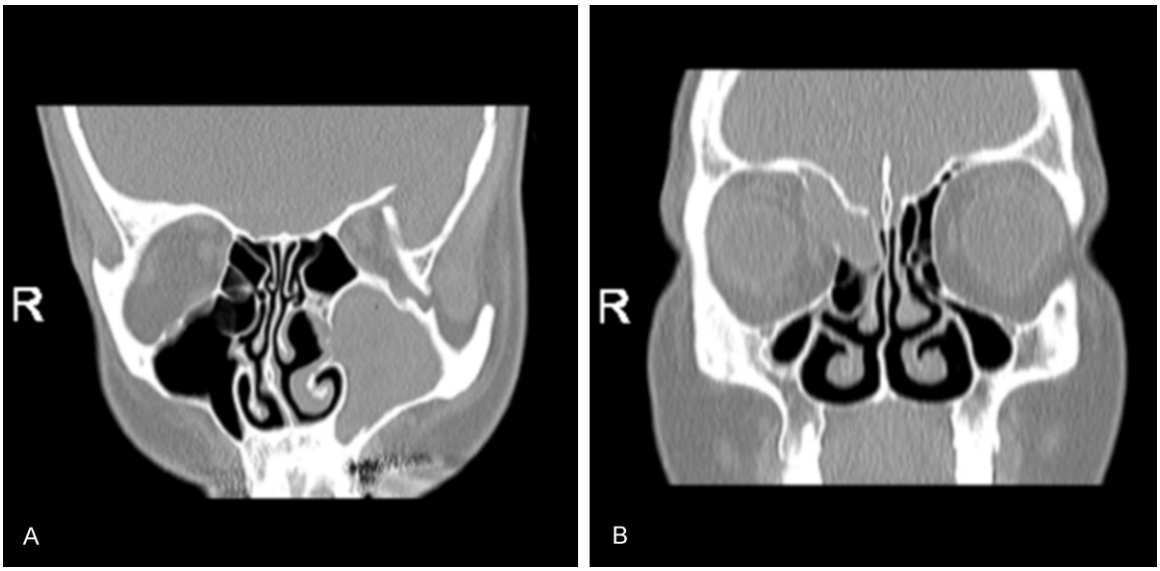

Figure 1. Computer Tomography Images of left maxillary sinus (A) and right ethmoidal sinus mucoceles (B).

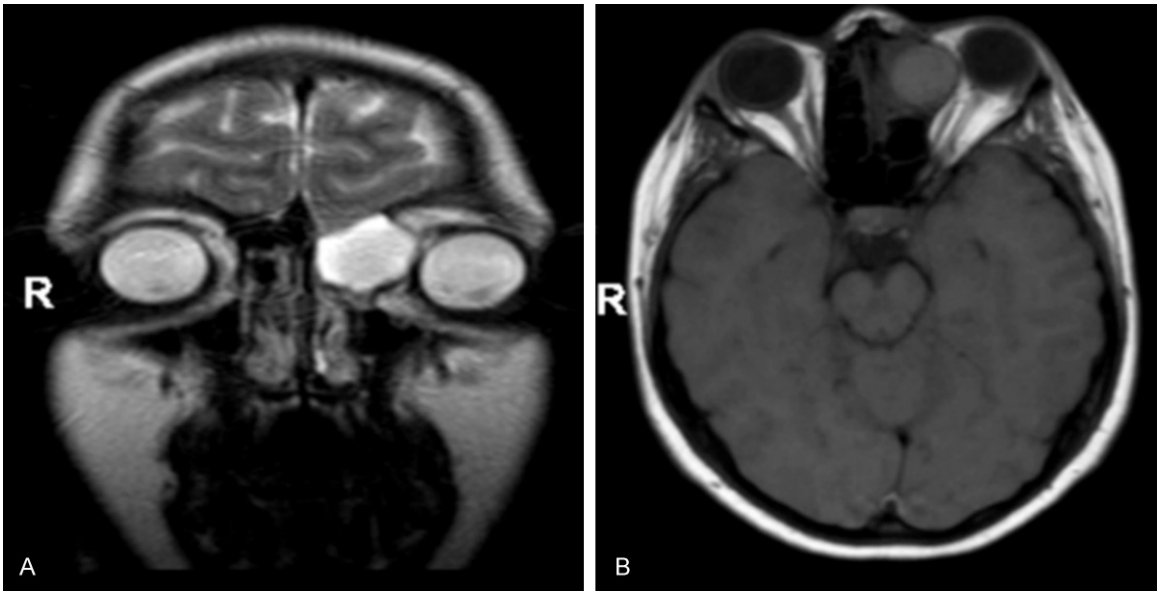

Figure 2. Magnetic Resonance images of ethmoid sinus mucocele (A and B).

lowed by the frontal sinus (n=6, 33%) and sphenoidal sinus (n=3, 16%). Sixteen patients underwent endoscopic sinus surgery; the osteoplastic flap procedure was performed in one patient because of lateral localization (impossible marsupialisation the frontal recess endoscopically) and the Caldwell-Luc operation was performed in another patient because of antral mucocele. Two patients, one with maxillary mucocele and the other with ethmoidal mucocele (11%), needed subsequent endoscopic revision operations with the Caldwell-Luc procedure in one patient (6%) and mucocele marsupialization in the other (6%). In the other patients, postoperative complication were not observed.

We examined all patients at least twice in the postoperative period.

Discussion

Mucoceles are slow growing, cystic, and benign lesions located in the paranasal sinuses. The

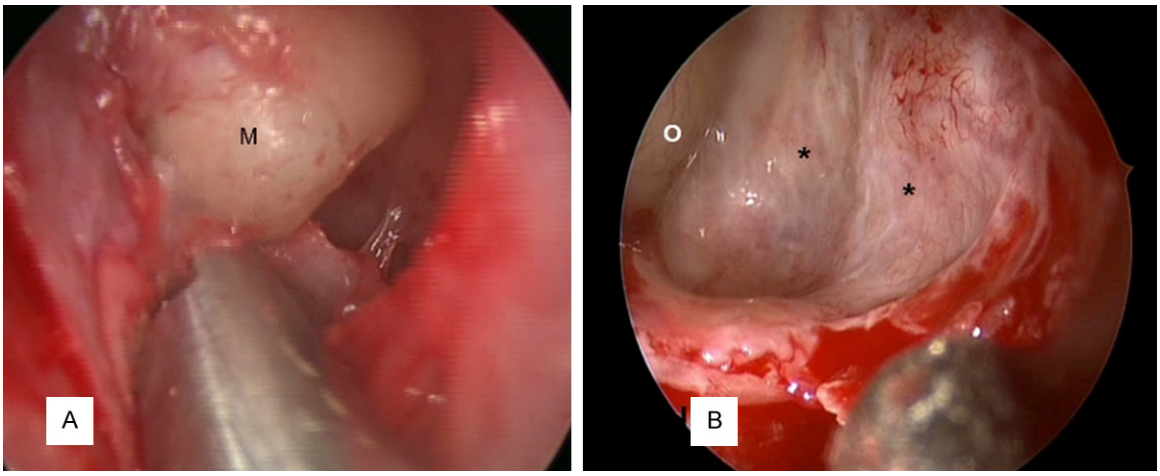

Figure 3. A. Preoperative Picture of the mucocele. B. Wall of the marsupialized (*) cyst and orbita (O).

cyst wall is lined by cubic or pseudostratified epithelia [4].

Mucoceles are thought to occur due to obliteration of the sinus ostia because of inflammation, allergic reactions, tumors, trauma, or sinus operations [5]. In our series, 16 patients (88%) did not have a history of operation, allergy, trauma, or inflammatory processes. Two patients (12%) had nasal polyps.

Mucoceles are most commonly seen in the frontal and ethmoidal sinuses, but rarely seen in the maxillary and sphenoidal sinuses. Nazar et al. reported mucoceles in the frontal and ethmoidal sinuses at a rate of 63%, in the maxillary sinus at 30.4%, and in the sphenoidal sinus at 6.5% [2]. In the present study, the most frequently affected sinus was the maxillary sinus at a rate of 50% (n=9) followed by the frontal sinus at 33% (n=6) and sphenoidal sinus at 16% (n=3).

Patients may be referred with symptoms of varying severity according to the lesion location, size of the bone defect, and symptoms due to compression, such as pain and nasal congestion, eye swelling, diplopia, loss of visual acuity, and intracranial complications in a spectrum from mild to severe. In our series, the most frequent symptom was headache at a rate of 66% (n=12). Four patients presented with eye swelling (22%), three patients had nasal congestion (16%), and three patients had facial swelling (16%).

We use paranasal sinus CT and MRI for diagnosis of mucocele. CT is the most important and beneficial method [4], and it reflects the imaging of homogeneous, cystic, expansile mass eroding the surrounding bone tissue [6] (**Figure 1**). Dermoid and epidermoid cysts, angiofibromas, neurofibromas, osseous fibromas, cylindromas, inverted papillomas, cholesterol granulomas, and odontogenic cysts may cause expansion similar to mucoceles in the sinus walls and, therefore, they should be included in the differential diagnosis [7].

MRI is used to determine the involvement of neighboring soft tissue and to distinguish the lesion from other soft tissue neoplasms. Mucoceles may show different forms on MRI due to the water-protein content. They may be hyperintense in T2 images due to the high water content, while those with high protein content may be isointense or hyperintense [6] (**Figure 2**).

Mucoceles are treated surgically. The location, magnitude, and expansion of the lesion are determinants of the appropriate surgical procedure [8]. The endoscopic approach is a faster procedure with less morbidity, reduced damage to the nasal structure and physiology, and a shorter time until the patient can return to their daily routine (**Figure 3**). However, it may be combined with Caldwell-Luc or osteoplastic flap procedures in cases with sinus wall erosion, lateral location, and expansion to the orbit. Generally, the recurrence rate is less than 10% [6], but the reported recurrence rates differ between series. Kennedy et al. [9] marsupialized 9 of 11 frontal mucoceles and Har-El et al. [10] marsupialized 11 frontoethmoidal mucoceles (nine frontal, two ethmoid) endoscopical-

ly and reported no cases of relapse. Devars et al. [11] reported relapse in 16 (23%) of 68 patients who underwent endoscopic surgery or a combined approach with a diagnosis of sinus mucocele. Mucocele marsupialization with the endoscopic approach was performed in 18 patients in our series, and one patient required frontal sinus exploration with the osteoplastic flap procedure in the same sitting, while another patient required the Caldwell-Luc operation. Two patients, one with maxillary mucocele and the other with ethmoidal mucocele (11%), required subsequent endoscopic revision operations with the Caldwell-Luc procedure in one patient (6%) and mucocele marsupialization in the other (6%).

Consequently, the treatment of choice for mucocele eroding the surrounding bone tissue and inducing clinical symptoms due to compression by the expansile mass is surgical (with endoscopic techniques). The location, dimensions, and expansion of the lesions are determining factors for the surgical procedure. The treatment should be planned carefully before serious complications can occur.

Disclosure of conflict of interest

None.

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