J Med Sci 2014;34(1):19-22

DOI: 10.4103/1011-4564.129384

ORIGINAL ARTICLE

Clinical Presentation and Treatment of Primary and Secondary Paranasal Mucoceles

Jih-Chin Lee[1], Keng-Kuang Tsai[1,2], Hsin-Chien Chen[1], Zheng-Ping Shih[1], Wen-Sen Lai[1,3], Yueng-Hsiang Chu[1], Chih-Hung Wang[1], Yaoh-Shiang Lin[1,4]

[1]Department of Otolaryngology – Head and Neck Surgery, Tri-Service General Hospital, National Defense Medical Center, [2]Department of Otolaryngology – Head and Neck Surgery, Tri-Service General Hospital Song-Shan Branch, National Defense Medical Center, Taipei, [3]Department of Otolaryngology – Head and Neck Surgery, Taichung Armed Forces General Hospital, Taichung, [4]Department of Otolaryngology, Kaohsiung Veterans General Hospital, Kaohsiung, Taiwan, Republic of China

Background: This retrospective study was conducted to describe and compare the clinical characteristics of primary mucoceles occurring in patients without a previous history of sinus surgery, the cause of mucoceles and secondary mucoceles resulting as a complication following endoscopic sinus surgery, and the Caldwell-Luc operation. **Materials and Methods:** This study reviewed 18 cases of primary mucoceles and 21 cases of secondary mucoceles, who were diagnosed and had received surgical intervention between 1995 and 2012. **Results:** The most common presenting symptoms in primary mucoceles were: Visual disturbance (18.6%), nasal obstruction (12.5%), and headache (12.5%). In secondary mucoceles, the most common symptoms were: Nasal obstruction (27.5%), rhinorrhea (15%), and postnasal drip (12.5%). The most common sites of origin for primary mucoceles were the ethmoid sinus (31.5%) and sphenoid sinus (31.5%). In secondary mucoceles, the maxillary sinus was the most common site of origin (40.7%), followed by the ethmoid sinus (29.6%). All patients with secondary mucoceles had a history of sinus surgery. **Conclusions:** Mucoceles are benign lesions of the paranasal sinus. Cases of secondary mucoceles that occur following sinus endoscopic surgery develop more frequently in the ethmoid sinus compared to those following the Caldwell-Luc procedure. Endoscopic intranasal surgery of mucoceles is a reliable therapeutic measure with a favorable long-term outcome.

Key words: Mucocele, endoscopic sinus surgery, Caldwell-Luc operation

INTRODUCTION

A sinus mucocele is a mucous collection lined by the mucous-secreting epithelium of a paranasal sinus. It occurs when a sinus ostium or a compartment of a septated sinus becomes obstructed, causing the sinus cavity to be mucous-filled and airless.[1] The obstruction is often inflammatory in nature, but may also lead to a tumor, trauma or surgical manipulation. It is the most common expansile lesion of the paranasal sinuses and leads to outward expansion, with bony remodeling.

Paranasal mucoceles are most commonly found in the frontal sinus, and are occasionally found in the ethmoid and sphenoid sinuses. Maxillary sinus mucoceles are relatively rare, accounting for no more than 10% of all the reported mucocele cases.[2] On the other hand, maxillary sinus mucoceles are more commonly reported in Asians, as a postoperative cheek cyst, typically occurring as a long-term complication of the Caldwell-Luc procedure.[3-5] The explanation for this discrepancy is not immediately apparent. Etiologies of mucoceles include chronic infection, allergic sinonasal disease, trauma, and prior sinus surgery; however, in many cases the cause remains unknown.

The purpose of this study was to describe and compare the clinical characteristics of primary mucoceles occurring in patients with no known cause or history of previous sinus surgery, and secondary mucoceles occurring as a complication following endoscopic sinus surgery (ESS) or the Caldwell-Luc procedure.

MATERIALS AND METHODS

We reviewed 18 cases of primary mucoceles and 21 cases of secondary mucoceles, who were diagnosed and

Received: May 1, 2013; Revised: June 7, 2013; Accepted: June 17, 2013
Corresponding Author: Dr. Yaoh-Shiang Lin, Department of Otolaryngology, Kaohsiung Veterans General Hospital, No. 386, Ta-Chung 1st Road, Kaohsiung 813, Taiwan, Republic of China. Tel: +886-2-87927192; Fax: +886-2-87927193. E-mail: doc30450@gmail.com

had received surgical intervention between 1995 and 2012. All cases of primary mucoceles had no history of previous sinus surgery, while all cases of secondary mucoceles had undergone ESS or the Caldwell-Luc procedure. Almost all patients were treated with the endoscopic approach; however, the Caldwell-Luc operation was performed in other patients, because they were less amenable to endoscopic treatment, due to a lateral-type mucocele, severe thickening of the medial bony wall, and compartmentalization of the mucocele. Diagnosis was made according to the previous history of sinus surgery and physical examination, including, nasal endoscopy, computed tomography (CT), and histopathological findings. Mucoceles are defined as an expansion of an existing sinus, with associated erosion of septations within the sinus and the walls of the sinus. Medical records were reviewed for patient demographics, the presenting symptoms, preoperative CT findings, surgical history, resolution of symptoms, and a need for revision surgery. The preoperative and postoperative complications were also assessed.

RESULTS

A total of 18 patients (nine men and nine women), with a mean age of 56.6 years (range 24-87 years), were included in the primary mucocele group. The secondary mucocele group comprised of 21 patients (fifteen men and six women) with a mean age of 51.9 years (range 16-76 years). All patients with secondary mucoceles had a history of sinus surgery (10 endoscopic sinus surgeries, 11 Caldwell-Luc operations). The time elapsed between the initial procedure and the development of symptoms, ranged from two to 31 years (average, 12.8 years).

The most common presenting symptoms in primary mucoceles were: Visual disturbance (18.6%), nasal obstruction (12.5%), and headache (12.5%). Nasal obstruction (27.5%), rhinorrhea (15.0%), and posterior nasal drip (12.5%) were most frequently reported in patients with secondary mucoceles [Table 1]. Preoperative CT scans were performed in all patients. The proportion of mucoceles located in the maxillary and ethmoid sinuses were both 30.6% (n = 49). The location of mucoceles in the operative field was also checked, and was found to be similar to the previous CT findings. The sites of origin of primary mucoceles were: The ethmoid (31.8%), sphenoid (31.8%), and maxillary (18.2%) and frontal (18.2%) sinuses. In secondary mucoceles, the maxillary sinus was the most common site of origin (40.7%), followed by the ethmoid (29.6%), and frontal (25.9%) and sphenoid sinuses (3.7%) [Table 2]. However, the most common mucocele site in patients who had previously undergone ESS, as opposed to the Caldwell-Luc procedure, was the frontal sinus (50.0%) [Table 3].

All the patients (n = 39) had undergone corrective sinus surgery between 1995 and 2012. The majority (94.4%) of patients with primary mucoceles underwent ESS. Only one patient underwent both ESS and the Caldwell-Luc procedure. In secondary mucoceles, 85.7% of the patients underwent ESS, 9.5% were managed with the Caldwell-Luc procedure, and 4.8% received both treatments [Table 4]. The mean follow-up period from the initial operation was 5.4 years (range 0.8-10.2 years) in the primary mucocele group and 3.9 years (range 1.4-6.8 years) in the secondary mucocele group. There were no reported intra- or postoperative complications during admission and follow-up visits.

Table 1. Involved sinus of primary and secondary mucoceles

Involved sinus	Primary mucocele no. (%)	Secondary mucocele no. (%)
Frontal	4 (18.2)	7 (25.9)
Maxillary	4 (18.2)	11 (40.7)
Ethmoid	7 (31.8)	8 (29.6)
Sphenoid	7 (31.8)	1 (3.7)
Total	22 (100)	27 (100)

Table 2. Symptoms of primary and secondary mucoceles

Symptoms	Primary mucocele no. (%)	Secondary mucocele no. (%)
Visual disturbance	6 (18.6)	2 (5)
Nasal obstruction	4 (12.5)	11 (27.5)
Headache	4 (12.5)	3 (7.5)
Rhinorrhea	3 (9.4)	6 (15.0)
Orbital pain	3 (9.4)	4 (10)
Periorbital swelling	3 (9.4)	1 (2.5)
Cheek pain	3 (9.4)	3 (7.5)
Posterior nasal drip	2 (6.3)	5 (12.5)
Cheek swelling	2 (6.3)	4 (10)
Orbital protrusion	2 (6.3)	1 (2.5)
Total	32 (100)	40 (100)

Table 3. Involved sinus of secondary mucoceles according to the surgical method

Involved sinus	After Caldwell-Luc operation no. (%)	After endoscopic sinus surgery no. (%)
Frontal	0	7 (50.0)
Maxillary	10 (76.9)	1 (7.1)
Ethmoid	2 (15.4)	6 (42.9)
Sphenoid	1 (7.7)	0
Total	13	14

DISCUSSION

Mucoceles of the paranasal sinus are benign pseudocystic lesions that develop following obstruction of the sinus ostium and drainage pathway.[1] It is reasonable to state that the higher incidence of mucoceles in the frontal sinus is caused by variations in the nasofrontal duct. Most mucoceles occur in the frontal sinus (60%), followed by the ethmoid sinus (30%), the maxillary sinus (10%), and very rarely in the sphenoid sinus.[2] However, the most common locations of primary mucoceles in this study are different from those previously reported. In this study, the most common locations of primary mucoceles are the ethmoid and sphenoid sinuses instead of the frontoethmoid sinus. Such a discrepancy may be due to the small number of primary mucocele cases in this research, which cannot actually reflect the prevalence of mucoceles in each sinus.

In secondary mucoceles, regardless of the surgical techniques involved, the most common location is the maxillary sinus. This finding is consistent with that previously reported and is related to the large number of Caldwell-Luc operations performed.[3-5] However, the most common location of secondary mucoceles after ESS is the frontoethmoid sinus instead of the maxillary sinus. The causes of secondary mucoceles after ESS are presumed to be the narrow sinus orifice and outflow tract stenosis, which may be due to the variable surgical anatomy and poor surgical view in this area. Moreover, the lateralization of the middle turbinate leading to synechiae after ESS may also play an important role in the development of secondary mucoceles. The basal lamellae of the middle turbinate should be preserved as much as possible during ESS, to prevent the synechiae from obstructing the sinus outflow caused by the lateralized middle turbinate. With the increasing popularity of ESS and abandonment of the Caldwell-Luc operation, the overall majority location of secondary mucoceles may shift from the maxillary sinus to the frontoethmoid sinus. The evolution may not be apparent immediately, as secondary mucoceles may occur decades after ESS. Secondary mucoceles following sinus surgery generally develop as a delayed complication, typically 10 to 30 years postoperatively.[6] Similar to that reported previously, the mean duration between the initial surgery and the development of secondary mucoceles was 13.8 years in the present study.

As in the previous research, the predominance of symptoms and signs reflected the localization of mucoceles. In this study, the clinical manifestations of primary and secondary mucoceles were mainly dependent on the location of the involved sinus. For example, the ocular manifestations were more common in the frontal, ethmoid, and sphenoid sinuses and the nasal or cheek symptoms were more common in the maxillary sinus.

With the wide use of ESS, most, but not all mucoceles, treated by ESS have reported satisfactory results and low morbidity rate [Table 5].[3-12] According to prior experience, the success of endoscopic treatment for mucoceles is determined by the intra-sinus location of the mucocele. This is because the primary conditions for successful endoscopic treatment of mucoceles are the ability to reach every closed compartment [Figure 1] and the ability to ensure their endonasal drainage pathways. Therefore, the most common unsuitable condition for endoscopic treatment of mucoceles is their being localized in the lateral part of the frontal and maxillary sinuses. In such cases, external approaches, such as the Caldwell-Luc operation, alone or combined with ESS is suitable.

In conclusion, primary and secondary sinus mucoceles may exhibit different profiles of locations and related symptoms.

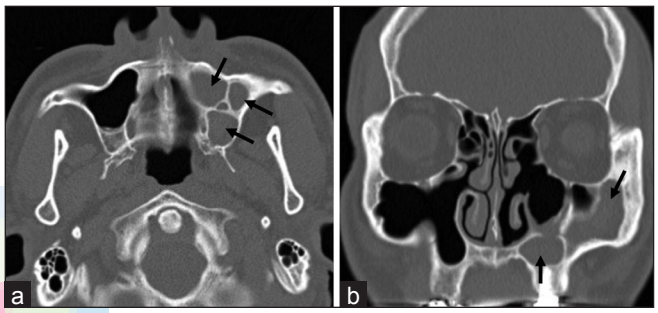

Figure 1. Axial (a) and coronal (b) views of computed tomography scans showing the secondary paranasal mucocele (black arrows) in the multiple closed compartments of the maxillary sinus

Table 4. Operation of primary and secondary mucoceles

Operation	Primary mucocele no. (%)	Secondary mucocele no. (%)
Caldwell Luc operation	0	2 (9.5)
ESS	17 (94.4)	18 (85.7)
Caldwell Luc operation + ESS	1 (5.6)	1 (4.8)
Total	18	21

ESS = endoscopic sinus surgery

Table 5. Comparison of the outcome and morbidity of paranasal mucoceles after endoscopic surgical intervention in English literature

	Our study no. of patients (n = 39)	Busaba *et al*.[3] no. of patients (n = 19)	Kim *et al*.[4] no. of patients (n = 93)	Har-El [10] no. of patients (n = 108)
Cerebrospinal fluid leak	0	0	0	1
Orbital hematoma	0	0	0	0
Postoperative hemorrhage	0	0	0	0
Nasal synechiae	0	2	0	0
Recurrence rate (%)	0	0	0	1 (0.9%)
Revision rate (%)	0	1(5.3%)	0	0

Their treatment philosophies both require removal of the obstructive tissue in order to enlarge the natural drainage sites. With its advancement, ESS could become the major treatment strategy for sinus mucoceles. However, some selective cases sometimes need the assistance of external approaches to open and drain all the closed compartments of mucoceles, especially the lateralized ones.

REFERENCES

1. Busaba NY, Salman SD. Maxillary sinus mucoceles: Clinical presentation and long-term results of endoscopic surgical treatment. Laryngoscope 1999;109:1446-9.
2. Arrué P, Kany MT, Serrano E, Lacroix F, Percodani J, Yardeni E, *et al*. Mucoceles of the paranasal sinuses: Uncommon location. J Larlyngol Otol 1998;112:840-4.
3. Busaba NY, Kieff D. Endoscopic sinus surgery for inflammatory maxillary sinus disease. Laryngoscope 2002;112:1378-83.
4. Kim SS, Kang SS, Kim KS, Yoon JH, Lee JG, Park IY. Clinical characteristics of primary paranasal sinus mucoceles and their surgical treatment outcomes. Korean J Otolaryngol - Head Neck Surg 1998;41:1436-9.
5. Hasegawa M, Kuroishikawa Y. Protrusion of postoperative maxillary sinus mucocele into the orbit: Case reports. Ear Nose Throat J 1993;72:752-4.
6. Kaneshiro S, Nakajima T, Yoshikawa Y, Iwasaki H, Tokiwa N. The postoperative maxillary cyst: Report of 71 cases. J Oral Surg 1981;39:191-8.
7. Evans C. Aetiology and treatment of fronto-ethmoidal mucocele. J Larlyngol Otol 1981;95:361-75.
8. Kennedy DW, Josephson JS, Zinreich SJ, Mattox DE, Goldsmith MM. Endoscopic sinus surgery for mucoceles: A viable alternative. Laryngoscope 1989;99:885-95.
9. Serrano E, Klossek JM, Percodani J, Yardeni E, Dufour X. Surgical management of paranasal sinus mucoceles: A long-term study of 60 cases. Otolaryngol Head Neck Surg 2004;131:133-40.
10. Har-El G. Endoscopic management of 108 sinus mucoceles. Laryngoscope 2001;111:2131-4.
11. Rombaux P, Bertrand B, Eloy P, Collet S, Daele J, Bachert C, *et al*. Endoscopic endonasal surgery for paranasal sinus mucoceles. Acta Otorhinolaryngol Belg 2000;54:115-22.
12. Har-El G, Balwally AN, Lucente FE. Sinus mucoceles: Is marsupialization enough? Otolaryngol Head Neck Surg 1997;117:633-40.