

A Case of Prelacrimal Recess Approach in a Patient with Maxillary Sinus Mucocele after Caldwell-Luc Operation

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Abstract

Maxillary sinus mucocele occurs several reasons, often forms several years after Caldwell-Luc operation. Various surgical methods can be considered to solve this disease including endoscopic approach, open approach, and marsupialization. In our case, a 59-years-old male visited the outpatient clinic with bilateral cheeks pain due to both postoperative cheek cyst (POCC). The authors experienced staged operation, performed Caldwell-Luc operation as the first surgery, and Prelacrimal recess approach surgery as the second surgery. This case shows a successful case of POCC and recurred maxillary sinus mucocele using open and endoscopic surgical approaches.

Keywords: Maxillary sinus mucocele; Caldwell-Luc operation; Postoperative cheek cyst; Prelacrimal recess approach

Introduction

Mucocele of the paranasal sinus often originates epithelium-lined cystic lesions to cause the obstruction of the sinus ostium. As mucus continued to be accumulated within the mucocele, it enlarges gradually, resulting in erosion and remodeling of the surrounding bone [1]. It is a cystic benign pathologic pattern, but it can cause substantial compression on the adjacent structures. Actually, the cause of mucocele generation remains uncertain. In recent published papers, the most common causes of mucoceles are chronic infection, allergic sinonasal disease, trauma, previous surgery [2-4]. Frontal and ethmoid sinuses are common locations for the

mucoceles with less frequent involvement of the sphenoid sinuses, while maxillary sinus mucoceles are relatively rare, accounting less than 10% [5,6]. Postoperative Cheek Cyst (POCC) occurs years or decades following Caldwell-Luc operation or maxillary sinus augmentation and is caused by epithelial residues at the surgical site [7,8]. For the treatment of POCC, open surgical approaches, such as Caldwell-Luc operation were favorable in the past. Recently, according that surgical technology advances and endoscopic system uses the real-world broadly, endoscopic surgical approach prefer to Caldwell-Luc operation due to ensure a good mucosal recovery, ventilation and drainage of the affected sinus. Also, Caldwell-Luc operation may be followed by annoying symptoms, numbness and edema of the cheek [9]. However, to completely remove recurring mucoceles or obtain the wider operation field, Caldwell-Luc operation is still effective. Recently, many papers introduced prelacrima recess approach to afford wide access to the entire maxillary sinus. The prelacrima recess approach has merits of having the rapid recovery, avoiding postoperative complications (facial numbness, maxillary sinus bony hypoplasia and so on), comparing with Caldwell-Luc operation. And, because the prelacrima recess approach preserves the inferior turbinate and nasolacrimal duct, it is considered less disruptive to nasal physiology than the medial maxillectomy or Denker's procedure [10,11]. The purpose of this article is to report our experience in case of POCC and recurred maxillary sinus mucocele using open and endoscopic surgical approaches successfully.

Case Presentation

The patient was 59 male patient who visited the Outpatient clinic Department (OPD) complaining of both cheeks pain. Furthermore, he expressed nasal obstruction and post-nasal drip. The patient had an underlying systemic disease, severe diabetes mellitus. He had undergone previous operation history of both Caldwell-Luc operation, 40 years ago. And, He had not experienced previous trauma history. Checking the nasal cavity of the patient with endoscopic device, the bulging mucosa and reddish discoloration of maxillary sinus outer-middle/inferior part were confirmed (Figure 1). Computed Tomography (CT) showed soft tissue density heterogenous lesion which is full-filled with both maxillary sinuses (Figure 2). Thereby, a diagnosis of the lesion was the recurrence of maxillary sinus cystic lesions. In consultation with the patient, and the surgery was planned to perform the Caldwell-Luc operation on the right maxillary sinus and the inferior meatal antrostomy on the left maxillary sinus because of the different location of the right/left maxillary sinus POCC and bony thickness. Under general anesthesia, both nasal cavity mucosa was put infiltrative 2% lidocaine and 1:100,000 epinephrine mixed solution. The injection site was the inferior turbinate mucosa, the mucosa of maxillary sinus outer-medial part, the uncinata process mucosa and the mucosa of canine fossa. The left POCC was removed via both the middle and inferior meatal antrostomy approaches (Figure 3A). The right POCC was accessed to perform the Caldwell-Luc operation via the canine fossa. To do the canine fossa trephination, the oral cavity and gingiva were disinfected doing betadine irrigation. And, epinephrine injection was done in the right buccal area point (infraorbital nerve point) where the mid-pupillary line and the inferior border of the nasal ala to prevent intraoperative massive bleeding and postoperative cheek swelling. After the horizontal gingival incision was done with knife No.11, the canine fossa was open with an endoscopic drill to approach right POCC (Figure 3B), the author confirmed the POCC outer sac with 45° and 70° endoscope, removing the right maxillary antero-inferior bony part. Then, the POCC of right maxillary sinus was removed. Postoperative bleeding was controlled with suction bovie.

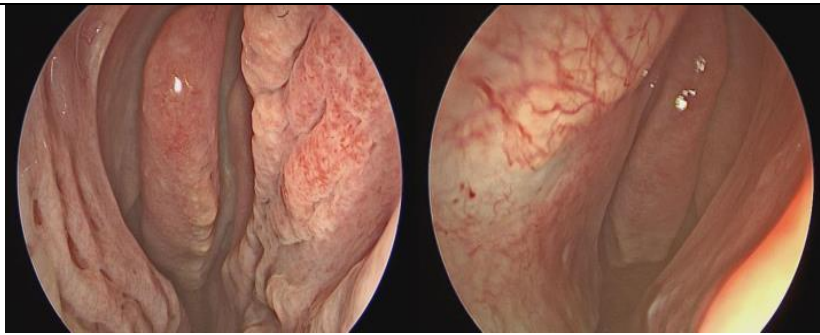


Figure 1: Preoperative endoscopic images of both nasal cavities at first OPD visit.

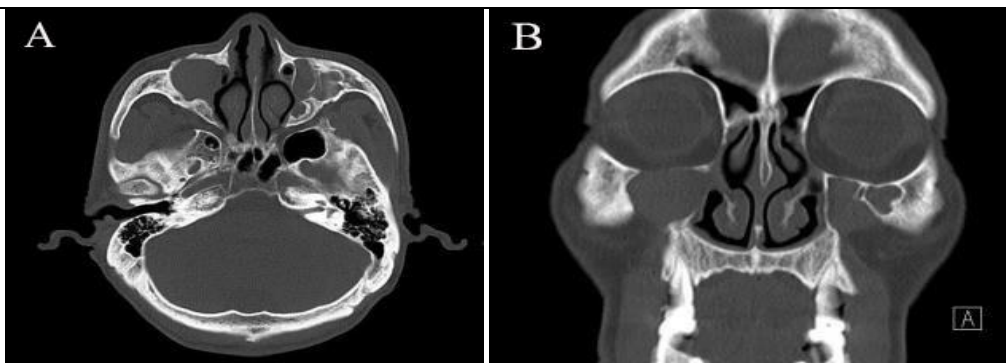


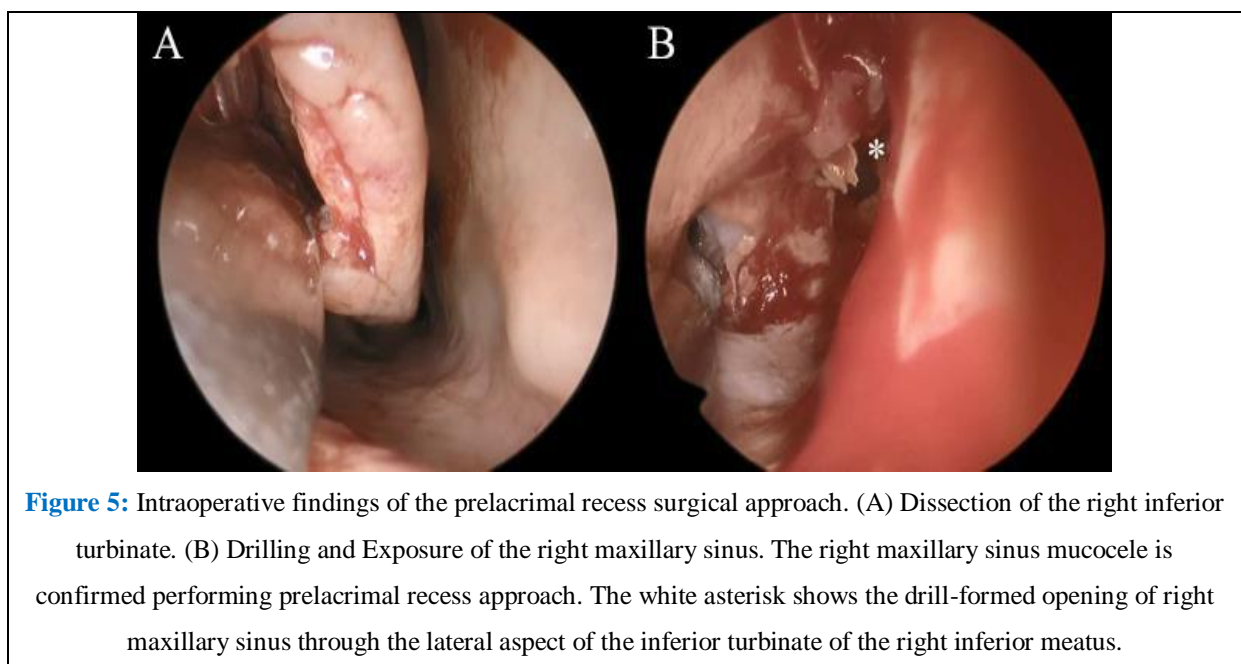
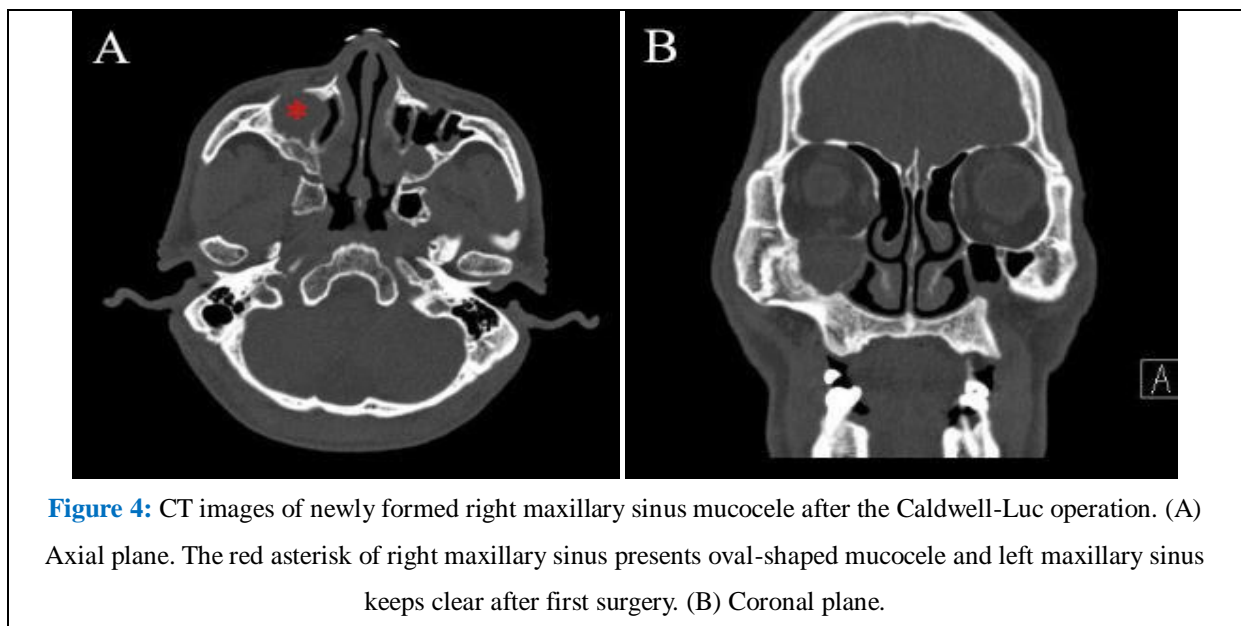
Figure 2: Preoperative CT axial and coronal images of both maxillary sinus POCC at OPD visit. (A) Axial plane, (B) Coronal plane.



Figure 3: Intraoperative findings of the first surgical treatment of the case patient. (A) Left maxillary sinus approached through Inferior Meatal Antrostomy (IMA). The asterisk presents the opening hole of IMA. The sharp shows left inferior turbinate. (B) Exposed canine fossa mucosa and right maxillary sinus anterior bony wall through Caldwell-Luc operation.

6 months after the removal both maxillary POCC operation, the patient was re-admitted for the surgery of a newly found mucocele in the right maxillary sinus (**Figure 4**). Because of 40 years ago operation history and recent operation history, the right maxillary sinus was transformed to bony hypoplasia and very thin bony

boundary. So, the author planned additional surgical approach, prelacrimal recess approach. To approach the maxillary sinus mucocele, the right inferior turbinate mucosa was dissected (**Figure 5A**), and the maxillary sinus medial bone was opened with a diamond burr (**Figure 5B**). The author checking the nasolacrimal duct, the duct was spared. After the mucocele was identified, it was removed with suction and endoscopic debrider. The mucosa of inferior turbinate was re-positioned. To prevent postoperative bleeding, appropriate electrocauterization was performed and absorbable packing material was used. After surgery, the author confirmed the postoperative condition at an outpatient clinic. Until postoperative 2 months later, the chief complaint symptom of the patient, both cheeks pain was disappeared. Following up the postoperative lesion, the mucosal state of inferior turbinate was good (**Figure 6**).



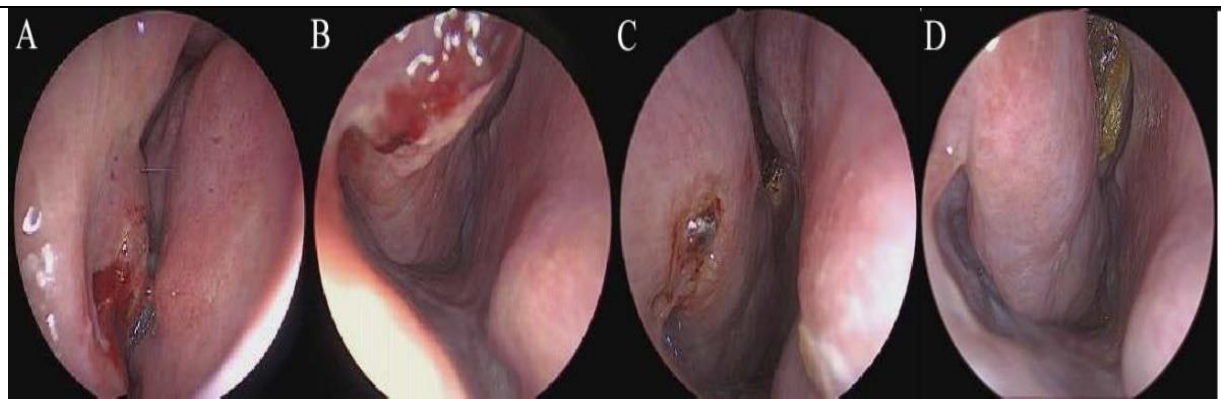


Figure 6: Postoperative endoscopic findings. (A) Follow up 1 week. (B) Follow up 2 weeks. (C) Follow up 3 weeks. (D) Follow up 2 months.

Discussion

Epithelium-lined, mucus-filled cystic tumors called paranasal sinus mucoceles develop as a result of blocked sinus ostia [12]. Mucocele of the paranasal sinus are most often found in the frontal and ethmoidal sinus, but mucocele of the maxillary sinus is not usually common [4-6]. Etiology of the disease is not certain, some literatures reported that endoscopic sinus surgery is the most common cause because the endoscopic surgical approach prevent paranasal sinus mucous from draining to sinus ostium naturally. So, Mucoceles are believed to form following obstruction of the sinus ostium, causing fluid retention within the mucosa sac [5]. Primary causes of ostia obstruction include cystic dilatation of mucosal glands and polyp degeneration, in addition to inflammatory obstruction [13]. Secondary reasons are usually caused by prior sinus surgery or facial injuries [13]. Especially, maxillary mucocele that recurs after the Caldwell-Luc operation is commonly known as POCC in Korea and Japan, and is often reported as one of the delayed postoperative complications of the operation, which generally develops 10-20 years after the surgery [6]. POCC was first reported in 1927 by Kubo in Japan [14]. Rarely reported in West countries, POCC is more prevalent in Asia, particularly in Japan [15,16]. According to the size of POCC, there are diverse response of patients, from asymptomatic response to severe pain of maxillofacial area. The lack of awareness of POCC may lead to misdiagnosis as an odontogenic infection and delayed treatment [17]. The average latency time was 4-22 years [18]. Because of the long latent timing, the periodic follow-up of radiologic evaluation is essential not to miss the POCC. Computed Tomography is useful tool for preoperative diagnosis and postoperative follow-up. Postoperative CT can detect bone erosions, osteosclerotic changes, and calcification [13,19,20]. Magnetic Resonance Imaging (MRI) is used to determine the mucocele's duration and to distinguish it from neoplastic lesions that can obstruct natural sinus openings and impede drainage [20]. During early development, the mucocele content is typically aqueous, which results in hypo-intensity on T1-weighted MRI and hyperintensity [19]. The lesion is confirmed as benign respiratory mucosa with histopathological inspection of a slide stained with hematoxylin and eosin [21]. Mucus buildup promotes sinus bone wall extension and mass enlargement which are thought to be prerequisites for this entity, osteolysis is aided by prostaglandins and collagenases, which also make the cyst more expansile [12]. Although a lot of studies were reported related to multiple the mucocele generation evidences and hypothesis, immunological genesis of mucocele is still not revealed thoroughly. The differential diagnoses include dermoid

and epidermoid cysts, angiofibroma, neurofibroma, osseous fibroma, cholesterol granuloma, and odontogenic cysts [13]. Mucoceles may erode into the intraorbital or intracranial spaces [22]. Of the symptoms associated with paranasal mucoceles, ophthalmologic symptoms most commonly occur because of the intrusion on adjoining orbital structures. A study found that 44.9% of mucoceles had an intraorbital extension, intracranial extension, or both [22]. The treatment of maxillary is surgical including external approaches, marsupialization, Caldwell-Luc operation. Due to the anatomy of the maxillary sinus, classic open approaches that are used in order to remove the attachment site of the mucocele completely. Caldwell-Luc operation has several limitations which bring about facial numbness, provoke postoperative bony hypoplasia, cause oroantral fistula and facial external defect. To overcome these limitations, prelacrimal recess approach was selected to attain a full exposure of the mucocele. Prelacrimal approach was first introduced by Zhou in 2007, later refined and described by others [11,25]. The prelacrimal recess approach provides wide access to the entire maxillary sinus, especially the frequently difficult to access anterior wall [23]. Its merit is that it preserves the inferior turbinate and nasolacrimal duct. Compared with the medial maxillectomy or Denker's procedure, this surgical approach is more defensive procedure to preserve nasal cavity structures entity and physiology. Although the prelacrimal recess approach provides a wide view of the multiple aspects of the maxillary sinus, complications such as paresthesia, cheek and tooth pain could be presented following up the postoperative patient's state [24]. Actually, studies have shown that prelacrimal recess approach to be a safe and effective approach for the excision of primary or recurrent inverted papilloma in the maxillary sinus with low recurrence rates [10,25]. Simmen et al. [26] proposed a classification of the lacrimal duct based on the distance between the anterior wall of the maxillary sinus and the nasolacrimal duct describing three types: type I (< 3mm), type II (3-7 mm) and type III (>7 mm). This classification system allows a surgeon to predict the difficulty in performing the prelacrimal recess approach, with the type I being the least feasible [26]. Simmen et al. [26] evaluated the feasibility of accessing the maxillary sinus through a prelacrimal access. In their study, the incidence of type I, II and III was 31.5%, 56.5% and 12.5%, respectively. Luan Viet Tran et al. [10,11] showed that this prelacrimal recess approach using a diamond burr is effective for access and safe for the preservation of the nasolacrimal duct as an approach for type I lacrimal duct. Most surgeons preferred to do osteotomies using a chisel to create the prelacrimal recess approach. Performing this surgical approach, the important point of this technique is the use of a diamond burr to avoid nasolacrimal duct injury. At first, doing this surgical approach, the surgeon should focus the site being anterior and inferior to the opening of the valve of Hasner to avoid nasolacrimal duct injury. The nasolacrimal duct could then be exposed safely with a diamond burr, or a Kerisson punch upon thinning of the bony canal wall anterior and lateral to the nasolacrimal duct [23]. There was a case of postoperative complication such as temporary hypoesthesia of the upper lip and the face, after prelacrimal recess surgical approach [23]. This temporary postoperative complication is generated because of the osteotomy using procedure adjacent to the anterior edge of the piriform aperture. Nearby the region performed the procedure, anterior superior alveolar nerve and its branches actually pass medially inferior to the infraorbital foramen across the canine fossa towards the alveolus along the anterior wall of the maxilla [27]. Typically, the percentage of patients having this complication is around 7% [10]. Postoperative treatment, for examples, nasal irrigation of the nasal cavity/oral cavity with isotonic saline for keeping the postoperative lesion clean and improvement of mucociliary function, and oral corticosteroids for relieving the wound pain and the mucosal swelling could be considered. Moreover, after the surgical treatment, meticulous endoscopic evaluation and periodical

postoperative follow-up radiologic evaluation are also recommended. One of the limitations of this study was that follow-up CT scans was not performed, the patient suffering from the postoperative cheek pain because of his economical crisis. And weak recommendation of long-term follow-up outpatient clinic to him was another point of limitations considering the possibility of recurrence.

Conclusion

Mucocele of the paranasal sinus often originates epithelium-lined cystic lesions to cause the obstruction of the sinus ostium. Maxillary sinus mucocele occurs several reasons, often forms several years after Caldwell-Luc operation. The Gold standard treatment of mucocele is the surgical treatment. Various surgical methods can be considered to solve this disease including endoscopic approach, open approach, marsupialization, and prelacrimal recess approach. Considering the symptoms, anatomical structures and previous operative history of a patient, appropriate surgical approach should be chosen.

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