CASE REPORT
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Surgical Treatment of Maxillary Sinus Cholesteatoma Under Nasal Endoscopy

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ABSTRACT

In the present work, we reported 2 cases of maxillary sinus cholesteatoma and related studies. The maxillary sinus cholesteatoma is primarily characterized by compression symptoms, and sometimes there are no apparent signs. Imaging examination shows expansive swelling, bone compression, and absorption, and its density is slightly lower compared with the brain tissue. Surgery remains the primary therapeutic option, and appropriate surgical methods and approaches can be selected according to the location, size, and scope of lesions before the operation. Because endoscopic sinus surgery has a minor injury and does not damage the face, the prelacrimal recess approach can better expose the surgical field and achieve a complete radical cure.

Keywords: Sinus pathology , sinus, maxillary sinuses, endoscopic sinus surgery, dermoid

Introduction

Cholesteatoma is commonly detected in the external auditory canal and middle ear, while it can exceptionally occur in the sinuses. It has been reported that paranasal cholesteatoma frequently occurs in the frontal sinus, followed by the ethmoid and maxillary sinus.[1] In the present work, we described 2 cases of paranasal cholesteatoma diagnosed in our hospital due to a paranasal sinus mass. All patients underwent functional endoscopic sinus surgery to resect the mass. Postoperative follow-up showed no recurrence or complications. Moreover, we reviewed related literature about the formation, pathophysiology, and clinical manifestations and discussed the treatment plan of maxillary sinus cholesteatoma.

The first case of maxillary cholesteatoma was reported in 1941. A cholesteatoma usually occurs in the middle ear and external auditory canal. There are very few cases of cholesteatoma occurring in the sinuses, and only about 30 cases have been reported so far.[2] The most common site reported is the frontal sinus,[3] and most cases are unilateral.[4] A cholesteatoma consists of a keratin debris core, squamous epithelium, and fibrous stroma. Cholesteatoma should actually be called keratoma, keratocyte, epidermoid tumor, or epidermoid cyst.[5] Recent investigations have highlighted the role of tumor necrosis factor alpha, which stimulates the release of proteolytic enzymes.[6] Cholesteatoma is converted from respiratory epithelium with pseudostratified columnar epithelium, leading to various symptoms by compressing surrounding structures.[7]

Case Presentation

We approached 2 patients with maxillary cholesteatoma, who underwent maxillary sinus cholesteatoma resection via prelacrimal recess approach (PLRA).

The first case was presented due to left facial eminence 5 years ago, and there were no nasal congestion, runny nose, headache, tenderness, redness, visual acuity, and eye movement limitation. Imaging studies revealed a mass in the left maxillary sinus with compression of surrounding tissues. He had a 2-year history of hypertension with the highest blood pressure of 160/100 mmHg and irregular oral medication. There was no history of trauma or surgery. The patient underwent left maxillary sinus resection via PLRA under general anesthesia on August 12, 2016. During the operation, many white masses

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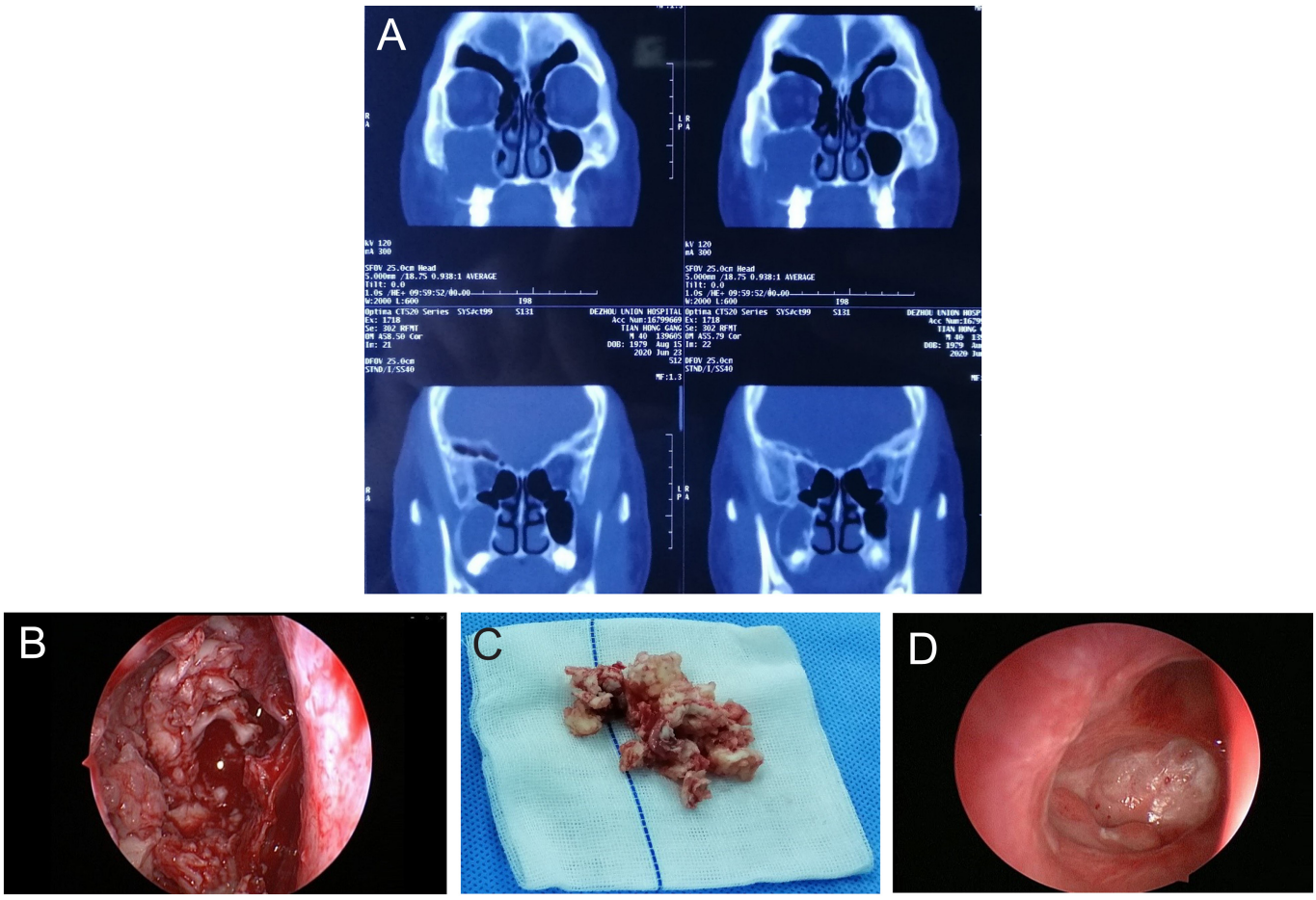

Figure 1. (A) The coronal computed tomography of maxillary sinus cholesteatoma. (B) The cholesteatoma in the right maxillary sinus during operation. (C) The cholesteatoma was removed. (D) The endoscopic review at 6 months after operation.

were found in the left maxillary sinus, some of the bone walls were compressed and absorbed, and the root of the bottom wall was exposed. Moreover, the tumor was removed entirely. The maxillary sinus mucosa recovered well 5 years after the operation, without recurrence (Figure 1D).

The other patient was admitted to the hospital 1 year ago because of a right-sided headache for more than 10 years, without nasal obstruction or a runny nose, visual impairment, and eye movement disorders. Computed tomography (CT) showed a cystic mass in the right maxillary sinus, and the bone wall of the right maxillary sinus was compressed and thin (Figure 1A). He had a history of a facial injury 14 years ago. The operation was performed under general anesthesia through the right PLRA (Figure 1B). A large amount of white pearl-like tissue was found in the right maxillary sinus during the operation (Figure 1C). In addition, bone defects in the lateral wall of the maxillary sinus were observed. The mass was completely dissected. Postoperative review showed good recovery and no signs of recurrence. This study was approved by the Ethics Committee of Shandong University (Approval No: KYLL-2021(KS)-089; Date: 24 Feb 2021).

All patients gave written informed consent.

Endoscopic resection of the maxillary sinus through PLRA was performed in both patients under general anesthesia. The maxillary sinus tumor, including all tumor epithelium, was removed entirely under a nasal endoscope, and postoperative pathology showed an epidermoid cyst (Figure 2). On the third day after the operation, they were discharged from the hospital and received reexamination on time after discharge. Both

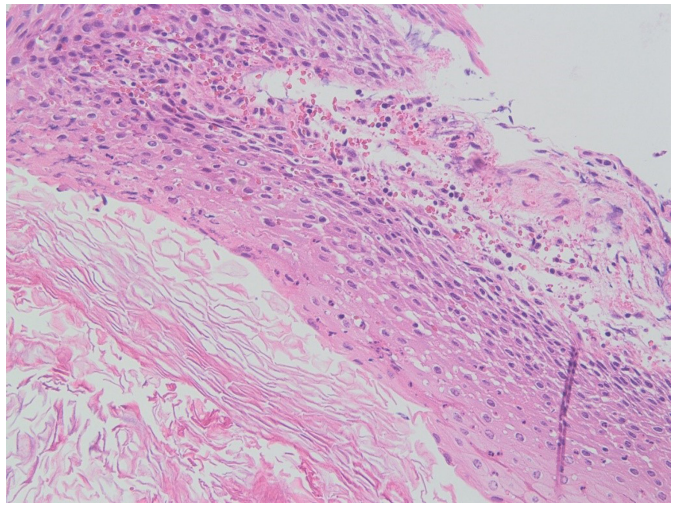

Figure 2. A stratified squamous epithelium with lamellar sheets of keratin (magnification, ×20 view).

patients had good wound recovery, and they had no recurrence and no discomforts, such as a runny nose.

Discussion

Some patients with maxillary cholesteatoma have a history of trauma. Moreover, most of the patients often have no apparent symptoms. Paranasal cholesteatoma presents chronic invasive growth, often accompanied by bone destruction, absorption, and reconstruction. It usually has no specific findings on CT. Besides, there is no indication or diagnosis of cholesteatoma on magnetic resonance imaging so far, although it provides a better soft tissue imaging. Therefore, all the chronic invasive lesions should be considered for the possibility of cholesteatoma. The final diagnosis should rely on nasal endoscopy and pathological examination.

At present, the exact etiology of cholesteatoma has been debated for more than a century. Moreover, there are mainly 4 hypotheses as follows: 1, the hypothesis of congenital epithelial residue, in which the ectoderm of the embryo is abnormally embedded at the fifth week, resulting in the ectopic squamous epithelium; 2, transplant hypothesis caused by trauma or surgery; 3, the hypothesis of migration from the nasal cavity or external auditory canal; and 4, the hypothesis that mucosal epithelium is stimulated by inflammation and leads to epithelial transformation.[8] In the first case, the patient had no history of trauma, while the second patient had a history of facial trauma. Maxillary sinus cholesteatoma is primarily unilateral, and its clinical manifestations are mainly facial swelling. Cholesteatoma involving the parietal wall may manifest protrusion and impaired eye movement, that involving sinus ostium of the medial wall can have yellow nasal discharge, headache, and other discomforts, and that involving the bottom wall of maxillary sinus may have a toothache, swelling of gums, hard palate, and other discomforts. The cholesteatoma imaging shows the expansion and growing mass in the maxillary sinus, which has a lower density than brain tissue, irregular and uneven edges, compressed surrounding tissues, and bone compression and absorption. This bone absorption is mainly attributed to 2 proteolytic enzymes, leucine aminopeptidase and nonspecific esterase, located at the junction of squamous epithelium and sub-epithelium. Magnetic resonance imaging showed low signal intensity on T1WI and high signal intensity on T2WI.[7] It is difficult to make a definite diagnosis through symptoms, signs, and imaging examination before operation. It is easy to misdiagnose malignant tumors by peripheral bone destruction before operation. It is mainly differentiated from benign mucocele, sebaceous gland cyst, inverted papilloma, and fibrohemangioma. Definite diagnosis often requires surgical exploration and pathological examination. Histologically, there is a well-differentiated, stratified squamous epithelium with lamellar keratin in the central core.

Surgery remains the primary treatment option for maxillary sinus cholesteatoma. To eliminate cholesteatoma thoroughly is the operation principle, including cholesteatoma epithelium. However, the residual cholesteatoma epithelium can lead to postoperative recurrence. Therefore, it is crucial to expose the surgical field as much as possible to facilitate the operation. The main surgical methods include the Cadwell–Luc approach and endoscopic sinus surgery,[7] and the choice of surgical option is mainly based on the location, size, and scope of lesions. With the development of endoscopic sinus surgery, it has gradually become the mainstream with less injury, wider field of vision, rapid recovery after the operation, and no influence on the face. In both cases, endoscopic sinus surgery was performed. Conventional middle nasal meatus fenestration is often inconvenient to operate and shows poor exposure, leading to residual cholesteatoma. The PLRA can better expose the medial wall and bottom wall of the maxillary sinus and prevent the residual cholesteatoma epithelium.

Maxillary sinus cholesteatoma should be considered an occupying lesion with expansive growth of the maxillary sinus, compression of surrounding tissues, and bone resorption. Endoscopic sinus surgery can be considered. The PLRA can be used for better observation and convenient treatment of the anterior wall and inner wall of the maxillary sinus and the anterior lacrimal recess. Moreover, PLRA can avoid the problem that cholesteatoma epithelium cannot be completely resected by nasal endoscopy. The PLRA helps eliminate the dead angle of the maxillary sinus visual field and reduces the recurrence rate after the operation.

Incomplete removal of keratin materials may lead to recurrence. Therefore, complete removal of the lesion is the primary operation principle.

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Informed Consent: Written informed consent was obtained from the patients/patient who agreed to take part in the study.

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