Endoscopic Sinus Surgery in Cases of Cholesterol Granuloma of the Maxillary Sinus

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KIKUCHI, T., SO, E., ISHIMARU, K., MIYABE, Y., ABE, K. and KOBAYASHI, T. Endoscopic Sinus Surgery in Cases of Cholesterol Granuloma of the Maxillary Sinus. Tohoku J. Exp. Med., 2002, 197 (4), 233–237—Cholesterol granuloma is usually associated with middle ear disease and is very rare in the paranasal sinuses. We report a case of cholesterol granuloma originating in the maxillary sinus of a 52-year-old female. Endoscopic sinus surgery was performed on the left maxillary sinus, and the cholesterol granuloma was successfully removed by the middle meatal antrostomy. Light microscopic examination showed granulomatous tissue with typical cholesterol clefts, multinucleated foreign body giant cells, small areas of hemorrhage, hemosiderin-laden macrophages and plasma cells. We also describe the details of the endoscopic surgical techniques employed in the treatment of this disorder.—paranasal sinuses; cholesterol granuloma; pathology; endoscopic treatment; middle meatal antrostomy
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Cholesterol granuloma is a histopathologic term describing numerous clefts after cholesterol crystals have dissolved during processing, with surrounding foreign body giant cells, foam cells and macrophages filled with hemosiderin embedded in fibrous granulation tissue (Graham and Michaels 1978; Rath-Wolfson et al. 1993; Leon et al. 2002). It is usually associated with chronic middle ear diseases and is common in the mastoid antrum and air cells within the temporal bone (Leon et al. 2002). Cholesterol granuloma in the paranasal sinuses is known to be extremely rare (Marks and Smith 1995; Leon et al. 2002). Most of the cases have been treated with radical operative techniques, including Caldwell-Luc operation (Graham and Michaels 1978; Helquist et al. 1984; Milton and Bickerton 1986; Gunes et al. 1988;

We herein report a case of cholesterol granuloma in the maxillary sinus, and also describe the detailed endoscopic surgical procedure employed in the treatment of this disorder.

**Case Report**

A 52-year-old female patient presented with a history of pain in the left orbit for about 1 year. Anterior rhinoscopy did not show any abnormal findings in the bilateral nasal cavities. Computed tomography (CT) revealed an expansive soft tissue mass in the left maxillary sinus (Fig. 1). No remarkable destructive lesion was observed in the bony wall of the maxillary sinus. Other paranasal sinuses, including frontal, ethmoid and sphenoid sinuses, were clear and did not show any abnormal findings.

Endoscopic sinus surgery (ESS) was performed under general anesthesia. The polypoid lesion in the left maxillary sinus was successfully removed by the middle meatal antrostomy. Light microscopic examinations revealed a polypoid lesion in the maxillary sinus which was lined with respiratory epithelial cells and contained numerous small cholesterol clefts, which were the remnants of the dissolved cholesterol crystals (Fig. 2). Many multinucleated foreign body giant cells surrounded these cholesterol clefts. Small areas of hemorrhage, hemosiderin-laden macrophages and other chronic inflammatory cells were found in the edematous subepithelial layer. These pathological findings were consistent with those of cholesterol granuloma.

The postoperative course was favorable, and the endoscopic examination showed no

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**Fig. 1.** An axial computed tomography (CT) image. Soft tissue density (asterisk) is found in the left maxillary sinus. No destructive lesions are found in the bony wall of the maxillary sinus. Arrowheads indicate the expansion of the lesion to the nasal cavity.

**Fig. 2.** A paraffin section of the cholesterol granuloma in the left maxillary sinus stained with hematoxylin and eosin. Numerous typical cholesterol clefts (asterisks) are observed in the subepithelial connective tissue. A large number of inflammatory cells, hemosiderin-laden macrophages, and multinucleated foreign body giant cells (arrow) are also seen. Bar = 100 μm.
Fig. 9. A schematic illustration indicating the endoscopic removal of the cholesterol granuloma in the maxillary sinus. A 70-degree telescope is inserted into the maxillary sinus through the widely opened middle meatus, and the maxillary sinus cavity is inspected. The intra-antral polypoid lesion (asterisk) is successfully removed using a curved cup-shaped forceps (TM Matsui, Tokyo).

recurrence of the cholesterol granuloma.

SUBJECT AND METHOD

ESS with a wide middle meatal antrostomy was performed under general anesthesia. The uncinate process was removed with a upbiting Kerrison forceps, and the tip of the polypoid lesion, originating from the maxillary sinus, was seen in the middle meatus (Fig. 3). The anterior and posterior ethmoid sinuses were clear and were widely opened (Fig. 4). In order to achieve the complete removal of the intra-antral polypoid lesion through the middle meatus, the maxillary sinus ostium was enlarged with a curved through-cutting forceps and a back-biting forceps (Fig. 5), and the anterior and posterior fontanelles were widely removed. A polypoid lesion was clearly recognized in the maxillary sinus under the 70-degree angled telescope (Fig. 6). The inside of the maxillary sinus was found to be lined with slightly thickened smooth mucosa. The polypoid lesion was attached to the floor and the anterior wall of the maxillary sinus, and was removed completely using a curved cup-shaped forceps (TM Matsui, Tokyo) (Figs. 7-9).

DISCUSSION

We herein reported a case of cholesterol granuloma in the maxillary sinus, successfully treated with ESS. Most cases of the cholesterol granuloma have been managed by complete excision by means of radical operative techniques, including Caldwell-Luc procedure (Graham and Michaels 1978; Hellquist et al. 1984; Milton and Bickerton 1986; Gunes et al. 1988; Rath-Wolfson et al. 1993). However,
many side effects, including swelling of the cheek in the immediate postoperative period, a long recovery time, and late postoperative sequelae, such as numbness and anesthesia of the cheek and devitalization of teeth, have been reported after the Caldwell-Luc operation (Lavelle and Harrison 1971). In 1995, Marks and Smith introduced an endoscopic technique in the surgical treatment of cholesterol granuloma in the maxillary sinus, and suggested that endoscopic treatment with either complete excision or drainage through the middle meatus is an acceptable alternative to the Caldwell-Luc approach. To achieve the complete removal of the cyst through the middle meatus, they widely opened the maxillary ostium. In order to gain additional exposure of the floor of the maxillary sinus, they also removed the posterior-superior edge of the inferior turbinate and the medial sinus wall. Using this technique, they succeeded in removing the cholesterol granuloma completely. They suggested that complete removal of the lesion or wide drainage through the middle meatus is very important in the surgical management of the cholesterol granuloma in the maxillary sinus.

In the present study, we have reported details of the endoscopic surgical treatment of a cholesterol granuloma which originated in the inferior and the anterior wall of the maxillary sinus. The maxillary sinus opening was extensively enlarged using a curved through-cutting forceps and a back-biting forceps, and a wide opening in the anterior and posterior fontanelles was made. In this case, we were able to successfully remove the lesion in the maxillary sinus by means of a curved cup-shaped forceps without causing any damage to the inferior turbinate or the medial wall of the maxillary sinus (Fig. 9).

Kamel (1990) performed ESS in cases of antrochoanal polyp originating in the maxillary sinus, and reported that the intra-antral parts of the polyp were successfully removed through the middle meatus. It is suggested that ESS with a wide middle meatal antrostomy may be an acceptable surgical procedure instead of the conventional Caldwell-Luc approach. Further experience with this endoscopic treatment and long-term follow-up are needed to evaluate the efficacy of this surgical approach in cases of maxillary sinus cholesterol granuloma.

Acknowledgments

We would like to express our sincere gratitude to Ms. T. Yamakawa for her excellent technical assistance.

References