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Compartmentalized maxillary sinus mucocele

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Abstract
A rare case of compartmentalized maxillary sinus mucocele 12 years after a Caldwell-Luc operation is reported. The two separate mucoceles were drained intranasally by endoscopic sinus surgery. The clinical features of this mucocele are presented and the incidence, presentation and theories on formation of post-operative mucoceles are reviewed.

Key words: Mucocele; Paranasal sinuses; Surgery, operative, complications

Introduction

Maxillary sinus mucoceles are the least common form of mucocele occurring in the paranasal sinuses (Natvig and Larsen, 1978). The condition is reported to be associated with previous nasal surgery notably the Caldwell-Luc operation (Hasegawa *et al.*, 1979; Kaneshiro *et al.*, 1981). It is rare in the West but in comparison the reported incidence of post-operative maxillary sinus mucoceles is much higher in Japan (Hasegawa *et al.*, 1979; Kaneshiro *et al.*, 1981; Hasegawa and Kuroishikawa, 1993). We report an unusual case of a post-operative mucocele in which the maxillary sinus is compartmentalized, each compartment forming a separate mucocele.

Case report

A 31-year-old Chinese woman presented with a four-month history of right facial numbness that also affected the right upper molar teeth. She also suffered from chronic recurrent purulent nasal discharge. She had undergone a right-sided Caldwell-Luc operation and bilateral total turbinectomies 12 years ealier. Endoscopic examination of the nasal cavity showed that the right inferior meatal antrostomy was occluded by soft tissue. The natural ostium of the right maxillary sinus was not well visualized and a small amount of mucopus was noted in the area of the anterior ethmoid sinus opening. There was no evidence of dental disease. A computerized tomographic scan (CT) of the paranasal sinuses showed a completely opaque right maxillary sinus with a tissue density typical of mucus (Figure 1). There was a smooth bony defect noted in the posterolateral wall of the maxillary sinus with protrusion of a soft tissue swelling. The mass was noted to have eroded into the orbit, pushing the inferior orbital wall and the orbital contents upwards. The lesion did not enhance with contrast. A diagnosis of a maxillary sinus mucocele was made. The most striking feature was the appearance of a septum arising from the proximity of the previous Caldwell-Luc osteotomy site extending to the medial maxillary wall, compartmentalizing the mucocele (Figure 2).

The patient underwent endoscopic sinus surgery under general anaesthesia during which both of the compartments of the mucocele were opened. The superolateral

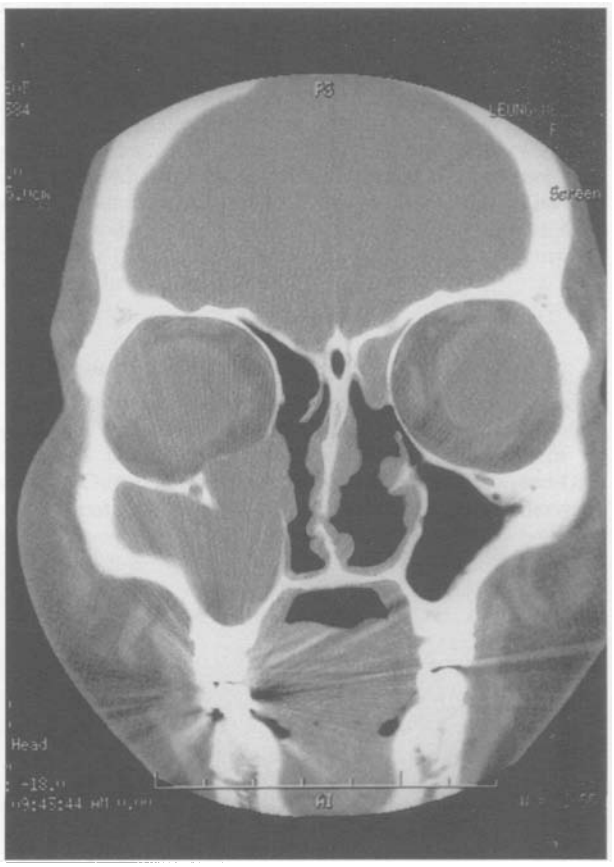


FIG. 1
CT scan of paranasal sinuses in coronal plane showing a right maxillary sinus mucocele.

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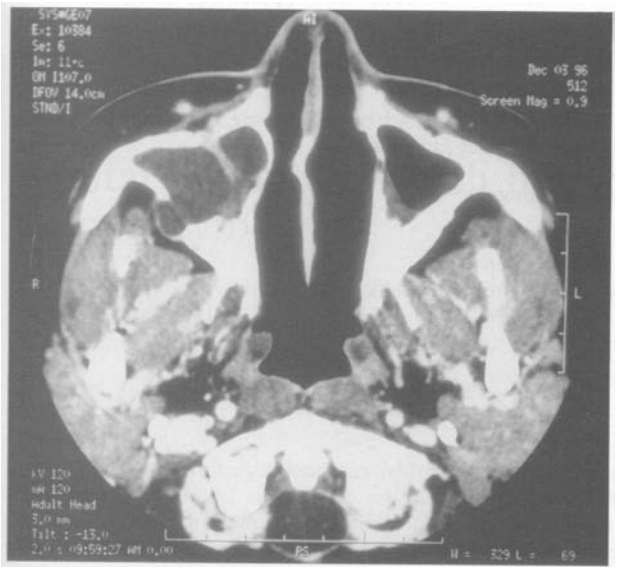


FIG. 2

CT scan of paranasal sinuses in axial plane with soft tissue window showing a fibrous septum compartmentalizing the maxillary sinus mucocele.

compartment was drained into the middle meatus via the enlarged natural ostium of the maxillary sinus, whilst the inferomedial compartment was drained into the inferior meatus via an inferior meatal antrostomy. A fibrous septum was observed in the maxillary antrum, separating the two mucoceles. The two compartments were joined by creating a large hole in the fibrous septum. This was confirmed by free flow of irrigation fluid. An ethmoidectomy was performed to treat the associated sinusitis. Histological examination of the mucocele wall revealed a dense inflammatory infiltrate and mild hyperplasia of submucosal glands. Post-operative endoscopic examination of the nasal cavity showed both the middle meatal antrostomy and inferior meatal antrostomy were patent and there was no accumulation of mucopurulent material. The patient remains symptom-free one year after the surgery.

Discussion

Mucoceles of the paranasal sinuses are benign epithelial-lined cysts containing mucus which may expand in size and be locally destructive. Maxillary sinus mucoceles are the rarest of all mucoceles of the paranasal sinuses, accounting for only three to 10 per cent (Natvig and Larsen, 1978; Som and Shugar, 1980). They have a tendency to occur in sinuses having previously undergone a Caldwell-Luc operation (Hasegawa *et al.*, 1979). In Hasegawa's large series, 131 out of 132 cases of maxillary sinus mucocele had a previous history of Caldwell-Luc operation (Hasegawa and Kuroishikawa, 1993). Kaneshiro *et al.* (1981) and Maeda *et al.* (1987) also reported 71 and 100 cases of post-operative maxillary sinus mucocele respectively. Hasegawa commented that the condition was 'frequently encountered in Japan' (Hasegawa and Kuroishikawa, 1993). Han *et al.* (1995) from Korea described 17 out of 20 maxillary sinus mucoceles occurring nine to 21 years after Caldwell-Luc operations. In contrast, the condition has rarely been reported in the West. DeFreitas and Lucente reviewed 670 patients who had undergone a Caldwell-Luc operation but failed to identify a single patient who had developed a mucocele up to 10 years after surgery (DeFreitas and Lucente, 1988). It has been suggested, however, that post-operative mucoceles appear more than 10 years after the initial Caldwell-Luc surgery and Hasegawa reported that the Caldwell-Luc procedure is performed no differently in Japan to Western countries (Hasegawa and Kuroishikawa, 1993). What exactly causes the difference in the reported incidence of this condition remains unclear.

Various theories have been proposed on the formation of mucoceles. It is generally thought that mucoceles are formed as a result of obstruction to the outflow of mucus from the sinus resulting in the formation of retention cysts. The pressure build-up in the cysts causes expansion and bony destruction of the sinus wall (Natvig and Larsen, 1978). Lund and Milroy proposed that the obstruction to sinus outflow in combination with superimposed infection caused the release of cytokines from lymphocytes and monocytes (Lund and Milroy, 1991). The cytokine release would stimulate fibroblasts to secrete prostaglandins and collagenases, which in turn could stimulate bone resorption leading to expansion of the mucocele.

Congenitally compartmentalized maxillary antrum is a recognized condition (Som *et al.*, 1984). Mucoceles forming in the two compartments are extremely rare, with only three cases having been reported (Yue *et al.*, 1994). Som and Shugar (1980) proposed that the compartmentalization of the maxillary antrum may result from post-operative adhesions, which could lead to obstruction of the distal compartment of the sinus and formation of a mucocele. In our patient, it was clear that the fibrous septum arose from the region of the Caldwell-Luc osteotomy site and extended to the medial wall of the maxillary antrum. Flow of mucus from the superolateral compartment would be blocked by this fibrous septum resulting in the formation of the upper mucocele. This observation suggests that the theory of Som and Shugar (1980) correctly described the pathogenesis of this mucocele. The cause of the formation of the mucocele in the medial compartment is less apparent. It is likely that the inferior meatal antrostomy closed following the Caldwell-Luc operation and impeded drainage from this compartment. Alternatively, there may initially have been a single antral mucocele and with subsequent formation of the fibrous septum compartmentalization took place. Whichever may have been the case, the obstruction to drainage of mucus is thought to be vital in the formation of a mucocele.

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