Abstract

The cholesterol granuloma is a particular form of granulation tissue developing as part of a variety of tissue reactions. It is usually associated with chronic middle ear disease and is common in the mastoid antrum of temporal bone. Cholesterol granuloma is rare in maxillary antrum.

A case is reported of cholesterol granuloma in the maxillary sinus of a 42-year-old man, with the unique feature that the soft tissue lesion is enclosed by thick bone, entirely within the sinus.
Cholesterol granuloma is a histopathological term which describes a fibrous granulation tissue consisted of cholesterol clefts, foreign body giant cells, foam cells and macrophages filled with hemosiderin pigments. It is usually associated with chronic middle ear diseases and is common in the mastoid antrum and air cells within the temporal bone. Cholesterol granuloma in the paranasal sinuses is known to be extremely rare\textsuperscript{4-28 and 11}. Most of the cases have been treated with radical operative techniques, including Caldwell luc operations\textsuperscript{10}.

Presumably the lymphatic drainage is insufficient to completely remove the lipid components of the red cells that remain, and they become crystals of cholesterol and its esters. A rare case is reported of cholesterol granuloma in the maxillary sinus of a 42-year-old man with the unique feature that the soft tissue lesion is enclosed by bony wall entirely within the sinus.

Report of the case

A 42-year-old man reported to a private hospital complaining of frequent headaches, pain and nasal congestion in the left side of the face for the past 6 months which was getting worse. His past medical history was unremarkable and there was no history of trauma in that area. A clinical diagnosis of sinusitis was given.

Radiographic evaluation revealed a round radiopacity in the left maxillary sinus. CT scan revealed mucosal thickening of left maxillary sinus along with edematous mucus obstructing the ostia. There was also evidence of sclerosis and remodelling of bone within the left maxillary sinus. There was no evidence of bony erosion or expansion. Retromaxillary fat was normal. Right maxillary and other sinus were normal (\textit{Fig. 1}).
Under general anaesthesia, through a vestibular incision from the region of the left maxillary lateral incisor to the region of the second premolar, Caldwell luc procedure was performed. The lesion was bony, hard and was rolling freely within the sinus. The lesion was removed and was sent for histopathological examination. There was no bleeding encountered during the procedure. Grossly, the lesion was whitish-grey in colour, soft in consistency and enclosed within the thick bone.

Histopathological examination of the lesion showed cholesterol clefts with a surrounding foreign body giant cell reaction and granulation tissue formation, together with evidence of old and recent haemorrhage. In addition, there was a dense infiltrate of lymphocytes and plasma cells. There was also evidence of bony trabeculae at the periphery of the lesion. Focally, there were remnants of respiratory-type epithelium (Fig. 2).
Discussion

Sinonasal cholesterol granuloma usually present in patients with a history of rhinitis or sinus disease with facial pain, headache, nasal obstruction and nasal discharge. Cholesterol granuloma is an uncommon condition when it affects areas other than the temporal bone. The diagnosis is rarely suspected before the material has been examined.

Radiographic features generally show non-specific changes which cannot be differentiated from allergic or inflammatory sinus disease, along with differential diagnosis of mucocele of antrum, non-secreting cysts and cysts of dental origin. In most reported cases, a cyst-like expansion accompanied by expansion of the bony walls of the involved antrum is the common feature. This patient did not show any bony expansion and a peculiar soft tissue walling by bone formation within the sinus was observed. Cholesterol granuloma is treated with radical surgical techniques and endoscopic approach.

The pathogenesis of cholesterol granuloma in the paranasal sinuses seems to be through haemorrhages liberated from degenerating paranasal sinuses. This results in a closed cavity with a long lymphatic drainage pathway and consequently slow drainage. It is also possible that the episodes of sinusitis can cause small, focal bleedings.

Cholesterol is found mainly in the membranes of erythrocytes and high density lipoprotein in serum. It is relatively insoluble, unstable in solution and needs time to dissociate from the lipoprotein complex and precipitate as crystals. Slow drainage in the sinus would give the time necessary for cholesterol to dissociate and precipitate as crystals. These cholesterol crystals initiate a granulomatous change resulting in the development of cholesterol granuloma.
The interesting and unique feature in this case was the presence of a shell of bone encasing the lesion. This could be attributed to changes in the microenvironment of the peripheral soft tissue and production of osteo-inductive growth factors like TGFβ1 and TGFβ2. These factors may have a paracrine effect on mesenchymal progenitor cells, thereby stimulating the osteoblastic differentiation and bone formation. TGFα produced by the giant cells and some stromal cells may play a role as a mediator for the attraction and/or proliferation of the precursor cells, and may alter the activity of osteoblasts.

In conclusion this case, which was totally excised through the Caldwell luc approach, presented with unique radiographic and CT findings in contrast to most cases in the literature. Nonetheless, the characteristic histopathology established the diagnosis of cholesterol granuloma.