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Actinomycosis oto-mastoiditis

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Abstract
Actinomycosis of the temporal bone is uncommon. There have only been 24 cases previously reported in the English literature. The responsible organism is *Actinomyces israelii*, an anaerobic filamentous Gram positive bacterium. While the cervico-facial region is the most common site of the disease, involvement of the temporal bone is rare. The diagnosis can sometimes be made clinically by identification of sulphur granules in a glue-like substrate but in all cases involving the temporal bone, the diagnosis has been made at histopathology. Effective therapy consists of surgery followed by the long-term administration of penicillin.

Key words: Temporal bone; Actinomycosis; Mastoid, surgery

Introduction

Actinomycosis, while uncommon in the head and neck is still more rare in the middle ear and mastoid but involvement of these areas can be fatal (Risch, 1939; Townrow and Barrie, 1945; Miglets and Branson, 1993) Actinomycosis of the cervico-facial, abdominal and thoracic regions may be introduced by minor trauma (Smego, 1987; Tarabichi and Schloss, 1993). In the case of middle ear infection, it is presumed that direct spread occurs up the Eustachian tube from the nasopharynx where actinomycetes can be commensal (Risch, 1939; Leek, 1974).

In most, if not all reported cases, the diagnosis of actinomycosis in the temporal bone has been made on histological examination of biopsy material (Risch, 1939; Shelton and Brackmann, 1988; Olson *et al.*, 1989; Miglets and Branson, 1993; Tarabichi and Schloss, 1993), where a branched Gram positive non-acid fast bacterium is demonstrated. This bacterium is difficult to culture (Olson *et al.*, 1989; Tarabichi and Schloss, 1993). There is a tendency to recur after insufficient treatment. Penicillin is the treatment of choice (Smego, 1987; Russo, 1995).

Case report

A 10-year-old boy was referred to one of the authors with a one-year history of left intermittent otorrhoea. There was no history of trauma to the head and neck, dental manipulation or otological surgery other than the repeated necessity for ventilating tube insertion in the past. The external auditory canal appeared to be filled by a skin-lined polyp and an audiogram showed a 40 dB flat conductive hearing loss. Bone window computerized tomography (CT) (Figure 1) showed that the middle ear and moderately pneumatized mastoid air cell system were filled with water density material without evidence of bone destruction. At surgery, the polyp in the external auditory canal was found to be arising from the antero-inferior quadrant of the tympanic membrane. It was skin covered and after its amputation, there remained a pin-point perforation. The middle ear and mastoid air cell system were full of glairy, very viscous glue-like material in which no sulphur granules were noted. There was no bone destruction. An intact canal wall mastoidectomy and canal-widening procedure was carried out and a ventilating tube

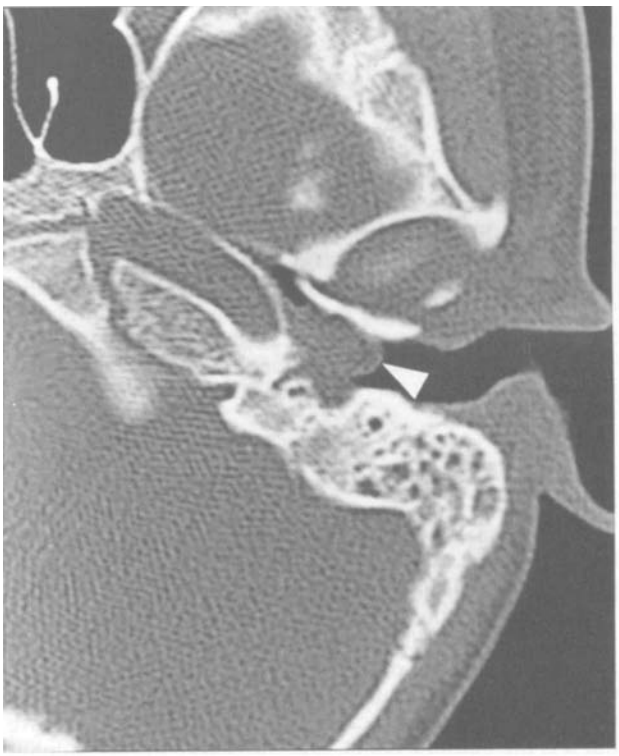


FIG. 1

CT showing moderately well developed mastoid air cell system. This and the middle ear are filled with water density material. An extension into the external auditory canal simulates a polyp (white arrowhead).

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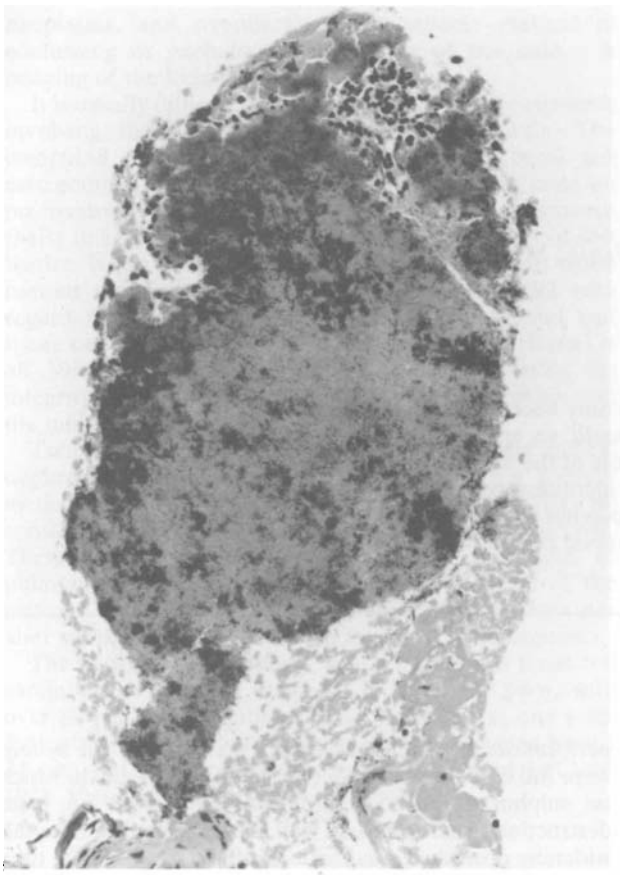


FIG. 2
Colony of *Actinomyces* species with adjacent neutrophils. (H & E; × 20)

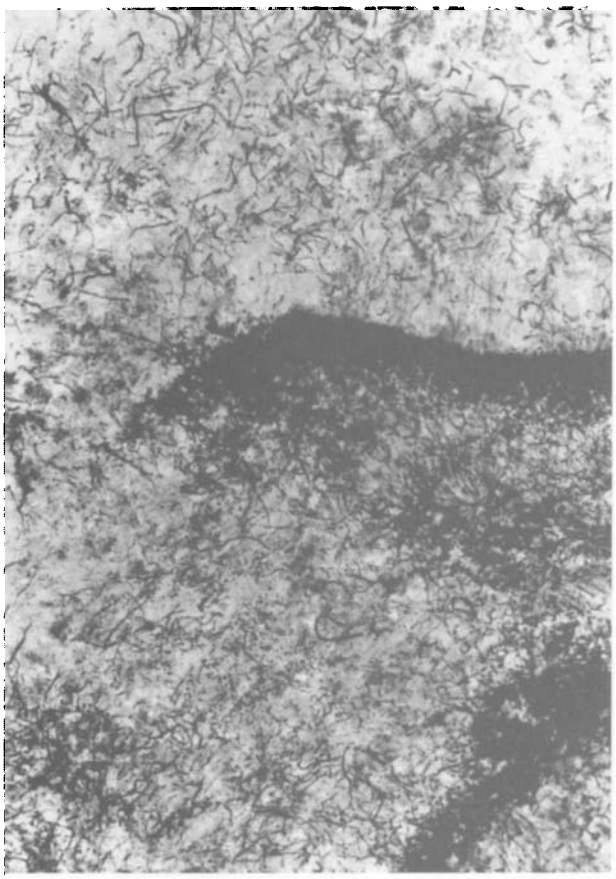


FIG. 3
High power view of colony showing filamentous bacteria, admixed with some gram-positive cocci. (Methenamine silver, × 40).

inserted. Histopathological examination of the aspirated material revealed the presence of acute suppurative inflammation of the tympanic membrane and middle ear. There were large colonies of filamentous, branching Gram positive non-acid-fast bacteria with peripheral neutrophils and eosinophilic 'clubs' typical of *Actinomyces* sp.

Aerobic and anaerobic cultures were negative. Penicillin was given intravenously for four weeks as an out-patient via a central line and continued for a total of three months orally. There was a minor wound breakdown which healed uneventfully and at follow-up the ear was healed and dry.

Discussion

Actinomycosis oto-mastoiditis was thoroughly reviewed by Tarabichi and Schloss (1993). They reviewed 23 previously published cases and added one of their own. This is the 25th published case.

It has been said that to make the diagnosis of actinomycosis, two of three criteria are required, viz a positive culture, sulphur granules and positive histopathology (Russo, 1995). This case satisfies only one of the above but it is the authors' belief, that the failure to note sulphur granules was probably due to the fact that the true diagnosis was not considered. Despite the criteria advocated by above, the authors believe that the histological criteria and clinical course presented here are sufficient to confirm the diagnosis.

Actinomyces is a normal inhabitant of the oral cavity, often seen in tonsillar crypts. It is a facultative anaerobic organism, which is difficult to culture. In the case presented and in many other reported cases (Leek, 1974; Olson *et al.*, 1989; Chang *et al.*, 1993; Tarabichi and Schloss, 1993), long-term culture remained negative.

Sulphur granules only form *in vivo* and in most cases, if not all, have been seen at histopathologic examination (Leek, 1974; Shelton and Brackmann, 1988; Olson *et al.*, 1989; Tarabichi and Schloss, 1993; Russo, 1995). Actinomycosis presents in the human as a chronic disease, most commonly in the cervico-facial region. The abdominal and thoracic regions are the next most commonly infected. In the female genital tract it may be seen in association with intra-uterine devices.

Spread in the temporal bone is non-haematogenous and a break in the mucosa is necessary for it to enter tissue planes (Smego, 1987; Chang *et al.*, 1993; Tarabichi and Schloss, 1993).

In all reported cases of chronic otitis media caused by actinomycosis, diagnosis was made either after surgery or at post-mortem. Intracranial extension was common in the pre-antibiotic days (Risch, 1939) and was uniformly fatal. However, all cases in the antibiotic era, recovered (Tarabichi and Schloss, 1993).

Tuberculosis and nocardiosis need to be differentiated from actinomycosis. The tuberculous bacterium is diagnosed by its shape and histopathological characteristics. *Nocardia* does not form granules in visceral tissues and may be stained by Fite-modified acid-fast stain (Russo, 1995).

The treatment of choice in actinomycosis is surgical clearance of the mastoid, followed by long-term penicillin therapy which is given intravenously in the first instance followed by prolonged oral administration.

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It is interesting to note that none of the published cases in whom the original treatment was a ventilating tube were cured by this treatment alone (Leek, 1974; Olson *et al.*, 1989).

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