Tuberculous otitis media

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The incidence of chronic tuberculous otitis has decreased dramatically during the period of antituberculous medication. In Finland the number of registered cases of pulmonary tuberculosis has fallen from the maximum incidence of 1·9 per cent in 1946 to 0·3 per cent in 1960. The number of annual new cases has diminished from 0·4 per cent to 0·1 per cent. In 1969 the new cases in men showed a maximum incidence, 0·3 per cent, in the age group 60 to 65. In women, the distribution was much more even, the maximum incidence of 0·15 per cent being found in the oldest age group of 75 years. Tuberculous meningitis occurred in only sixteen cases during the period 1962–67, all among patients older than 20 years. In 1969, four cases of tuberculous meningitis were recorded, the youngest 25 years of age. The disappearance of tuberculosis in children in this country is due to energetic measures: all newborn infants are subjected to Calmette (BCG) vaccination and, if one or both parents are tuberculous, the newborns are separated from them for the first year of life. Middle ear processes are therefore more likely to be found today in the adult age groups.

The incidence of tuberculous ear disease in various age groups may differ from country to country depending on many factors, particularly on whether and to what extent the combating of tuberculosis is organized. Thus Craig (1962) of Belfast reported on eight cases in small children, four of whom had had close contact with tuberculous adults and none had been BCG vaccinated. All eight had profuse painless otorrhea with granulation tissue in the meatus, were operated upon and placed on antituberculous medication. Healing was slow, but on follow-up examination ten years later, epithelialized ears were found in all except one. Hearing was greatly impaired in all, the best case showing a 30 dB hearing level.

Another fairly large recent series was reported by Guerrier *et al.* (1969), which consisted of ten cases seen during 1951–66. The ages of these patients (seven male and three female) varied from 1 to 70 years. The authors stressed the difficulty of making the diagnosis of tuberculosis even from biopsy specimens. On the other hand, all of the four adult cases reported by Harbert and Riordan (1964) showed acid fast bacilli in the granulation tissue or in the discharge, and guinea-pig inoculations were positive in three. In none was tuberculosis suspected before surgery and the operative intervention was stated to be probably the worst thing that could have been done, since in each instance signs and symptoms increased

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postoperatively. It was urged that tuberculosis should always be considered in the differential diagnosis of chronic middle ear disease which does not respond to the usual treatment.

Present material

During the period 1964–71, 1,638 chronic ears were operated at the Oulu University Department of Otolaryngology and fourteen (0·9 per cent) were found to show tuberculous otitis. Eleven of the patients were men and three women. The age and sex distribution is given in Figure 1. Most of the patients were between 20 and 40 years of age.

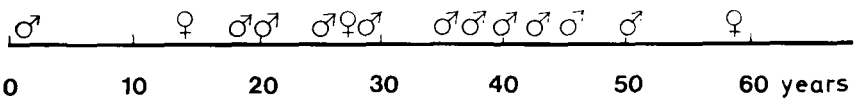


FIG. 1.
Age and sex distribution of cases with tuberculous otitis.

In six cases the diagnosis was made preoperatively; one was under treatment for active pulmonary tuberculosis, and another, a 6-months-old child, showed compact pulmonary hilar shadows. The remaining four had no pulmonary disease but two had scars resulting from tuberculous adenopathy in the neck in childhood. The diagnosis of aural tuberculosis was made by positive staining and culture of the discharge in all six cases. These patients were treated with antituberculous medication before operation with the single exception of the child in whom acute tuberculous mastoiditis necessitated early operation.

In the eight cases without preoperative diagnosis the thorax X-ray films showed inactive changes due to old pulmonary tuberculosis in two and in one there were also signs of healed fistulae in the neck. One patient had a dry ear and an intact ear drum, while in the others there was discharge of long duration. As the bacterial analyses generally showed either a pseudomonas, proteus or staphylococci infection the ears were treated with locally applied drops, mostly containing neomycin or tetracyclines and polymyxine.

The duration of the ear disease was several years in twelve ears and less than a year in two. The drum showed a central perforation in ten and a marginal perforation in two ears. These did not differ in any way from the drumhead pathology in ordinary cases of chronic otitis. In six the tympanic mucosa was granulomatous and in one formed polyps. Two of these ears had been operated earlier and one showed a granulating open cavity, the other a profusely discharging ear after an attempted myringoplasty with postauricular skin. In three ears there was a marginal semitotal or total pars tensa defect with a thick promontory mucosa traversed by whitish strands. This initially created the impression of cholesteatoma

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epithelium. However, on otomicroscopy there was no keratin in the mucosa, the white strands being formed of necrotic mucosa.

X-ray examination of the mastoid showed a sclerotic and small air cell system in five ears while in nine the pneumatic system was well-developed though cloudy (Fig. 2).

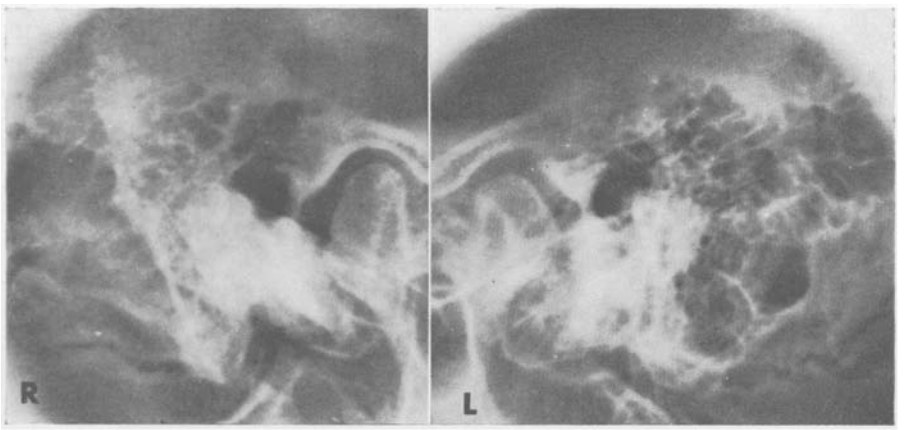


FIG. 2.

Typical mastoid X-rays of a patient with chronic tuberculous otitis media. The large mastoid air cell system in the right ear (R) is cloudy and tuberculous granulation tissue was removed from the antrum, adjoining cells and middle ear. The peripheral cells contained sterile fluid. The volume of the mastoid cavity was 15 c.c., the facial nerve was without bony cover but the labyrinthine capsule was intact. Tuberculous granulations extended into the Eustachian tube. The mastoid cavity was obliterated but no middle ear reconstruction was made. The ear healed well with antituberculous medication. The left ear (L) shows normal X-ray findings.

Among the preoperative complications were three cases of facial paralysis, and five cases were associated with preoperative vertigo. All recovered in due time postoperatively.

Correct diagnosis was reached, in five of the eight cases not diagnosed preoperatively, by means of staining and culture from the discharge while in hospital; the histological examination of granulations revealed tuberculous changes in three. Altogether tuberculous changes were found in eleven of fourteen ears in the biopsy specimens taken during the operation. In two ears the specimens showed no evidence of tuberculosis and in one the diagnosis was missed by the pathologists and, only after subsequent culture of bacilli, did re-examination of the original biopsies disclose unmistakable tuberculosis.

At operation a thick and granulomatous tympanic mucosa was generally found, the mastoid antrum and epitympanum being filled with granulation tissue. There was a distinct fibrotic element in the granulations if the patients had been treated with antituberculous drugs, but even then the disease had not been cured. In several ears without antituberculous medication the granulation tissue contained small areas of

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caseous necrosis and in one case the necrotic tissue filled the anterior part of the tympanum, exposing the carotid artery. Bone sequestration was found in two ears. In all except one case, the long process of the incus was necrotic and in seven cases the stapes footplate alone remained.

Because of the extensive pathology in the tympanic cleft, no reconstruction of the middle ear mechanism was made in five ears and the fascia was allowed to adhere to the promontory bone. In another five ears reconstruction was made with a two- or three-legged wire columella prosthesis (Palva *et al.*, 1971), and in two ears columellization on top of the stapes was carried out using the body of the incus. In one ear the ossicular chain was intact and was not interfered with.

To illustrate the variety of problems seen in these cases, three case records are presented in greater detail:

Case 1. Male, aged 18 years. This patient developed facial paralysis on the left side in September 1963 and was treated as a case of Bell's palsy until the ear began to drain in January 1964. Streptomycin sulfate, 1·0 per day, was given for a period of three weeks and there was some return of facial function at the end of January. When seen by us, X-ray films showed cloudiness of a large mastoid air cell system. Cortical mastoidectomy was performed and granulation tissue and fluid found in the air cell system. Bacterial specimens were negative and biopsy examination of the granulation tissue was reported to be negative. The patient's facial nerve recovered function, but in October 1964 the ear again began to drain profusely. The discharge was sterile and the patient was treated with various antibiotics both locally and systematically at home and at the hospital without permanent result. This continued until, in May 1965, acid fast bacilli were cultured from the discharge. With adequate antituberculous medication the ear became rapidly dry and has remained so.

As soon as culture for M. tuberculosis was reported positive we reviewed the original biopsy specimens and found in one area epithelioid and giant cell tubercles which had been missed by the pathologist (Fig. 3). The preoperative streptomycin course apparently caused the subsequent studies for M. tuberculosis to become negative.

Case 7. A male child aged six months. At the age of three months, in January 1969, the child had discharge from the left ear and was treated with penicillin. Later the culture showed proteus vulgaris and staphylococcus aureus and, even when medication had been adjusted according to the sensitivity tests, the ear continued to drain profusely. At six months an egg-sized tumorous bulging developed under the left mastoid process. Pulmonary X-rays showed compact hilar shadows. At this stage the clinical diagnosis of tuberculous mastoiditis was made and the cultures became positive. At mastoidectomy the cell system was filled with granulation tissue, contained bony sequestra and large caseous areas. The incus was missing but the stapes and the malleus were normal. The process had broken through the mastoid tip in the form of a Bezold abscess and more than 5 c.c. of pus was drained from the neck through the mastoid wound. No ossicular reconstruction was made at this stage and the patient was

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put on antituberculous medication. In the last follow-up examination at the end of 1971 the ear was dry, the drum was mobile in the anterior part and adherent posteriorly to the head of the stapes.

Case 8. A male, aged 39 years. At the age of 9 years the patient suffered from tuberculous adenopathy, which was treated by X-ray therapy. The fistulous tracks in the neck healed and his lungs showed inactive changes. In

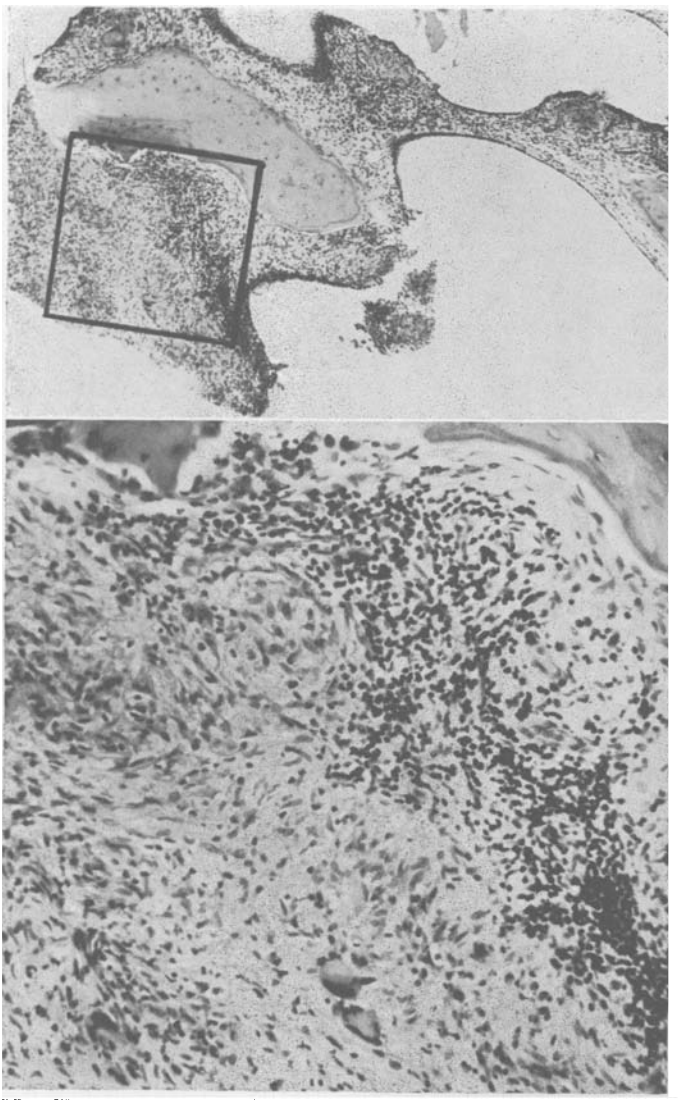


FIG. 3.
Histopathological examination of bone sequestrum surrounded by granulation tissue, reported negative initially postoperatively. Low power magnification (upper) shows tuberculous granulation tissue around the sequestrum. In a high power view (lower) tubercle formation is unquestionable.

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1964 polyps were reported to have been removed from the left ear. In 1970 the patient consulted an otologist because of impaired hearing and a mass behind an intact tympanic membrane was noted. He was referred to us and a tumour was found to fill the hypotympanum. It was slightly compressible and aspiration yielded blood-mixed fluid. Retrograde jugular venography was positive, the contrast stain extending to the jugular foramen but not to the sigmoid sinus (Fig. 4). At this time we felt fairly confident of a 'glomus jugulare tumour' diagnosis.

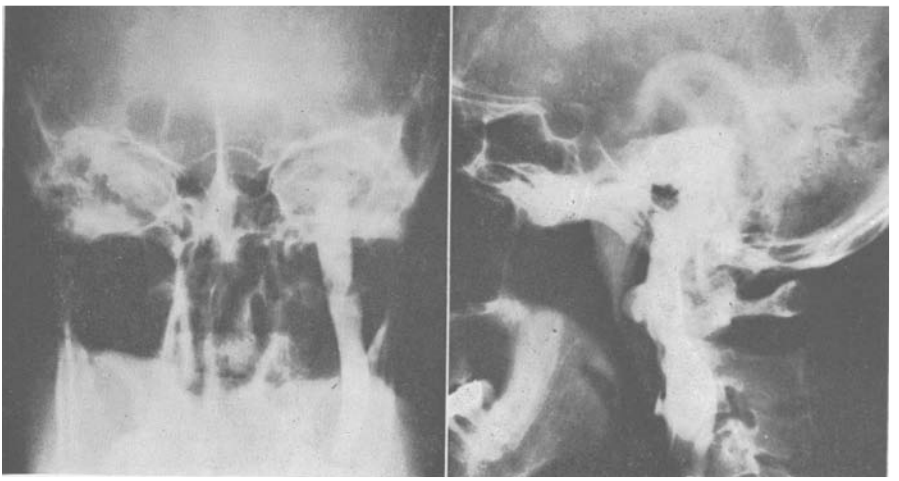


FIG. 4.

Jugular venography in A—P (left) and lateral (right) direction of a case with tuberculous adenopathy in childhood with recent tuberculoma formation behind an intact ear drum. No dye enters the sigmoid sinus.

Operation was performed with the object of removing the jugular bulb and the tumour. The sheath of the great vessels was dissected free, and finger tip-sized lymph nodes were found at the skull base. The internal jugular vein was ligated, a mastoidectomy made, and the sigmoid sinus lamina removed. A granulating process, not connected with the middle ear, was found in the antrum. At this stage a suspicion of erroneous diagnosis had already arisen; a tympano-meatal flap was created and the tympanum entered. A rounded tumour, 7 mm. in diameter, was found on the intact jugular bulb bone in the hypotympanum. This tumour, which was easily dissected out, proved to be a tuberculous granuloma (Fig. 5).

Postoperative outcome

Once the right diagnosis was made and antituberculous combination medication (streptomycin, isoniazid and para-amino-salicylic acid) started, the ears generally healed rapidly after operation. If the tuberculous etiology was missed, however, the postoperative discharge was stubborn and resistant to all usual methods of treatment. This was so in one of our cases in which diagnosis

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was not reached until almost a year after the operation and in another in which postoperative treatment was stopped after a period of three months.

The hearing results were not good (Fig. 6). Only two patients had practically useful hearing postoperatively; in one of them (Case 4) a two-stage operation had been performed after preliminary antituberculous medication.

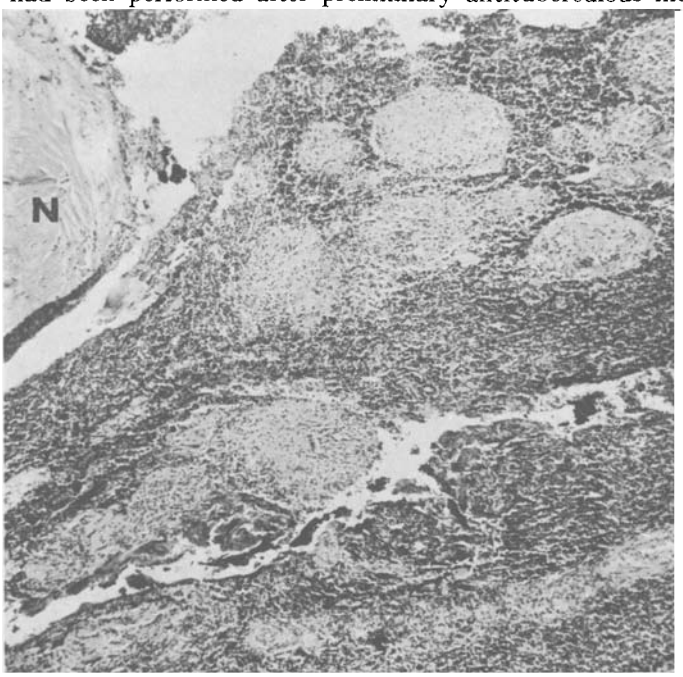


FIG. 5.

Low power view of the middle ear tuberculoma with epithelioid cell and giant cell tubercles and caseous necrosis (N).

The first stage of the operation consisted of radical mastoidectomy, filling the tympanum with paraffin wax, and reconstruction of the drum and the posterior ear canal wall with a fascial graft and a musculo-periosteal flap. Six months later (1968) the paraffin wax was removed and a 2-legged wire prosthesis placed from the stapes on to the promontory. In three other cases there was hearing gain of 20 dB or more, but final hearing did not reach the 40 bB level (ISO). In two cases a drop occurred from practically useful hearing to the levels of 50 and 65 dB. Adhesive middle ears developed in all of the cases with unchanged or poorer postoperative hearing.

Comment

There is no doubt that tuberculous otitis media has become a rare, but not non-existent, condition. The reports published indicate that these cases are seen in various geographic areas and we believe that our figure of 0·9 per cent incidence is a fair average in any chronic ear population.

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Suspicion of tuberculous otitis should be roused preoperatively by the pulmonary X-ray findings regardless of whether these present active or inactive disease. Another sign is neck scarring after fistulous cervical adenopathy. As far as the tympanum is concerned we agree with many recent writers that multiple perforations are a rarity and their absence is no sign against tuberculosis. In our experience the white strands of

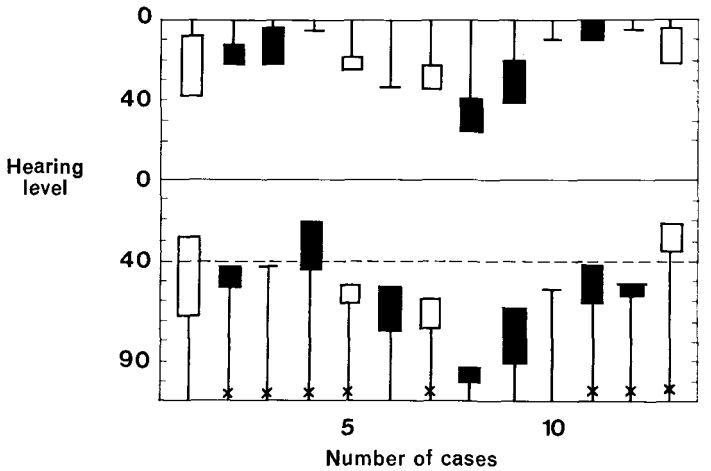


FIG. 6.

Individual hearing results in 13 adult patients. The black bars indicate postoperative hearing gain, the white bars a loss. The upper part of the graph refers to bone conduction, the lower part to air conduction. The crosses mark the ears in which middle ear reconstruction was attempted. ISO standard.

necrotis mucosa on the promontory have occurred only in tuberculous otitis and should arouse immediate suspicion of this etiology. The more common finding of granulomatous mucosa and polyps is not specific unless proven so by histological examination.

A mere suspicion in the otologist's mind should be sufficient to reach the diagnosis of tuberculous otitis. Provided the patient has not been treated with antituberculous medication or with neomycin ear drops, staining and culture of the discharge probably confirms the diagnosis. If no acid-fast bacilli are found, one can proceed with surgery. However, granulation tissue from the antral area and all removed pieces of middle ear mucosa should always be subjected to histological examination. It is easy for an experienced pathologist to establish the diagnosis and distinguish the foreign body giant cell (cholesterol) granulomata from tuberculosis. We agree with Harbert and Riordan (1964) in considering that, if these patients come to operation without previous diagnosis of tuberculosis, they will be much worse postoperatively. With antituberculous medication, the healing of a radically operated ear presents no problem. In our opinion, the suspicion of tuberculosis should quickly arise

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in any ear not brought under control postoperatively, and repeated cultures should be made from the discharge. It may be that, though preoperative and even intraoperative diagnosis may have been missed, the disease still is present and can be detected by a persistent search.

Our results as far as hearing improvement is concerned were disappointing. The ears healed well, with good epithelialization, but generally an adhesive middle ear cleft developed. For this reason we recommend a two-stage procedure in established tuberculous otitis media. After complete healing the middle ear can be opened again and a reconstruction made.

Tuberculous ear disease can appear in multiple forms. Even our small case series includes a case of mastoiditis with Bezold abscess, tuberculous granuloma formation behind an intact drum, and various types of changes in the middle-ear mucosa. Although the majority of cases of chronic ear disease can be handled without thought of tuberculosis, in any large series there will always be patients whose well-being depends upon the accuracy of the otologist in making this diagnosis and in handling such cases according to the established principles of tuberculosis therapy.

Summary

Fourteen cases of tuberculous otitis media were found in a series of 1,638 chronic ear operations, an incidence of 0·9 per cent. Suspicion of tuberculous otitis should arise once a patient presents active or inactive changes in the lungs, scars of old fistulous tracks in the neck, persistent discharge preoperatively, associated with granuloma and polyp formation or with necrotic tympanic mucosa. Staining and culture of the discharge should be made repeatedly before operation and all removed granulation tissue specimens examined microscopically. If the ear continues to discharge postoperatively in spite of adequate surgery, this should arouse suspicion of tuberculosis. Tuberculosis is best treated with conservative antituberculous medication followed by tympanomastoidectomy and two-stage tympanic repair under further antituberculous medication.

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