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Obliterative otitis media

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Introduction

'OBLITERATIVE otitis' denotes a condition in which the entire middle ear is filled up with fibrous tissue, the ear drum being intact but *not* retracted. Wullstein (1968) called this condition 'tympanofibrosis' and distinguished it from adhesive otitis by the lack of retraction of the ear drum, and from tympanosclerosis by the lack of tympanosclerotic masses in the tympanic cavity. Goodhill (1960) designated it 'diffuse progressive fibrosis'. The condition is relatively rare. Zöllner (1963) presented 11 cases of 'totaler Veröderung' (total obliteration) of the middle ear, treated with plastic tubes in the Eustachian tube. Gerhardt (1972) presented two cases which were treated with air-filled silastic cylinders placed above the round window. These few communications indicate that extraordinary methods must be applied in the treatment of this condition.

During the last 10 years, I have operated on 12 ears with obliterative otitis. The clinical picture, operative findings, and results are presented with the purpose of demonstrating that tympanoplasty probably offers the poorest solution to the problem of treating this condition.

Material, methods and results

Incidence: During a 10-year period from January 1966 to December 1975, in which the 12 patients with obliterative otitis were found, 1,200 ears with active, chronic otitis and its sequelae were operated upon. This gives an incidence of obliterative otitis of 1 per cent. During the same period 90 patients were operated upon with adhesive otitis, which was defined as having totally or partially retracted and adhesive drum, atelectatic middle ear and thickened mucosa as well as adhesive changes in the ossicular chain.

Clinical history: All ears have been dry for many years and the hearing impairment has persisted since very early childhood when the patients had recurrent ear pain or recurrent acute otitis, but apparently they have not had chronic otorrhea. The median age at operation was 54 years, the range being from 9–67 years. None of the patients had been operated upon earlier.

The drum was significantly thickened, *not* retracted but quite immobile with Siegle's speculum. The thickness of the ear drum was conditioned by the fibrous elements in the lamina propria, and in places tympanosclerotic elements were also seen. Paracentesis did not reveal any air-filled spaces in the tympanic cavity nor in the tympanic orifice of the Eustachian tube.

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The cellular system was significantly diminished and no certain air content could be demonstrated with X-ray.

The Eustachian tube was not patent in any patient using Valsalva's or Politzer's tests, and pre-operative tympanometry showed flat curves in all patients.

The hearing was significantly reduced (Fig. 1). All patients except one (case 3) had also a hearing impairment of perceptive type for the low frequencies and especially for the high frequencies (Fig. 2).

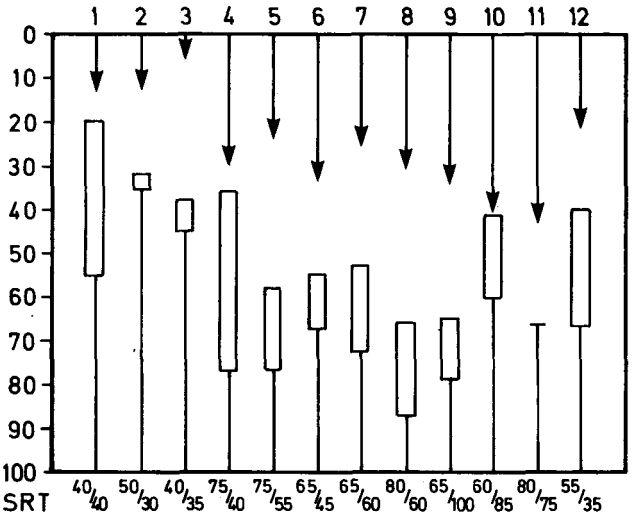


FIG. 1

Pre-operative hearing in frequency range 500–2,000 cps. Pre- and post-operative air conduction, hearing gain and pre-operative bone conduction. SRT before and after 2–10 years (below) after the tympanoplasty.

Operative findings: Tympanoplasty was performed enaurally with a wide opening for the tympanic cavity which was totally filled with fibrous tissue and many small cholesterol granulomas. The mucosal surface could not be demonstrated and there was no air in the middle ear. These changes extended from the tympanic orifice down to the osseous part of the tube which was anatomically obstructed here in 10 cases. After removal of the incus and resection of the head of malleus, the ear drum could be moved forward so much that pathological changes from the tube could be removed. A soft, $\frac{1}{2}$–1 mm-thick rubber bougie could then be passed down into the rhinopharynx in all patients except one. However, the tube was still stenotic in 9 patients.

The ossicular chain was intact in 6 cases; in the remaining cases the long process of the incus was defective, and so was the stapedial arch in two cases. All the ossicles were totally fixed and embedded in fibrous masses. The niches for the round and oval windows were totally obliterated,

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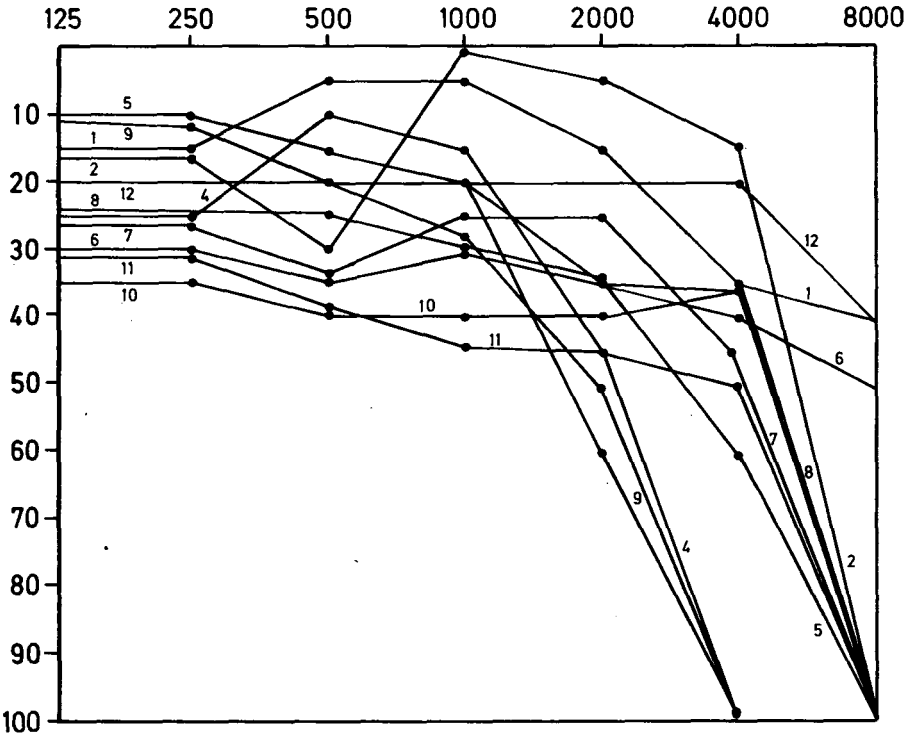


FIG. 2

Pre-operative bone conduction in eleven cases of obliterative otitis. The numbers correspond to the numbers in Fig. 1.

and dissection of fibrous tissue from the stapes was difficult. Tympanosclerosis was not seen in the middle ear. Changes similar to those in the tympanic cavity were also found in epitympanum.

Small pieces of silastic were placed around the stapes, and a larger piece on the promontory and in the tympanic orifice. After the ossiculoplasty, most frequently with a shaped incus interposed between the stapes and the malleus, the middle ear was ventilated with a grommet placed anteriorly in the drum.

Histopathology: Tissue was taken from different places in the middle ear from one patient and stained according to the PAS-alcian blue whole-mount method (Tos, 1970). The density of the mucous glands and the number of goblet cells were determined. The tissue was then serially cut and stained with a combination of the PAS-alcian blue and haematoxylin-eosin stain. Pathological mucous glands were found in all pieces of tissue investigated. The mean density was 3·2 gl./mm^2, and most of the glands were small. Even though numerous pieces of tissue, in total 46 mm^2, were cut and investigated, epithelium was found only in one place. It was thick, and pseudostratified without goblet cells or cilial cells. The histological picture was totally dominated by compact fibrous tissue.

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Results: The primary results 3–12 months after the operation were disappointing (Fig. 1). Only one patient (case 5) obtained hearing which was better than 30 dB in the frequency range 500–2,000 Hz, and 4 patients obtained an improvement of the air-bone gap below 20 dB. Average hearing improvement, however, was 18·3 dB, the average post-operative air bone gap 22·5 dB, and post-operative hearing 48·6 dB.

At follow-up investigation 2–10 years after the operation, the average hearing in the frequency range 500–2,000 Hz was 56·3 dB; thus, a deterioration of 7·7 dB had occurred compared with the primary result. This deterioration was especially due to the fact that, in two patients (Fig. 1, cases 9 and 10), who already had a considerable hearing impairment of perceptive type before the operation, the bone conduction deteriorated down to 100 and 85 dB, respectively. The average hearing improvement at the follow-up was 15 dB. SRT at follow-up, as shown in Fig. 1. In 5 patients only, it was 40 dB or more.

Post-operative tubal function: At follow-up 2–10 years after the operation, 3 patients had a middle ear pressure of −200 mm H_2O. Tympanometry showed flat curves in the remaining patients. Valsalva was negative in 7 patients. The ears were dry, but the ear drums immobile.

Discussion and conclusion

Our criteria for obliterative otitis have been an intact, thick, *not* retracted, immobile ear drum and a middle ear, including the tympanic orifice, totally obliterated with fibrous tissue without any indication of air. Following these criteria, the pre-operative diagnosis is easy to make and a paracentesis may offer additional help.

The post-operative results are poor compared with other pathological conditions, including adhesive otitis, in which obliterative changes may be localized either in the hypo- or epi-tympanum as well as in the niches.

Even though we tried to improve the passage of the tube, by placing a rubber bougie, to ventilate the middle ear and to insert silastic, it has only been possible to a minor degree to recreate the pneumatic space of the middle ear and its ventilation. Therefore, we do not find that surgical treatment of obliterative otitis is indicated, especially since the patients' only complaint is the hearing impairment which may be treated with a hearing aid without risking otorrhea. Furthermore, Wullstein (1968) states that the audiological prognosis is doubtful.

It is difficult to ascertain whether obliterative otitis is a condition *sui generis*, such as Goodhill (1960) and Wullstein (1968) suggest, or a severe form of adhesive otitis with specially pronounced and diffuse formation of cholesterol granuloma. It is certain that the disease first appears in childhood following a chronic secretory otitis which was untreated in all patients. Severe hearing impairment has persisted since early childhood and during this period there have been recurrent attacks of acute otitis. The histological picture is dominated by a large density of mucous glands

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and by fibrous tissue, as well as lack of epithelium; this is in contrast to the epithelium-lined adhesions in adhesive otitis (Tos and Bak-Pedersen, 1973). After destruction of the epithelium, caused by the acute otitis, the formation of granulation tissue dominates in the mucosa which fills up the entire middle ear and the tympanic orifice. The tube becomes anatomically obstructed, rendering mucocilial transportation and re-pneumatization of the middle ear impossible. Since the secretion of mucus continues from the increased number of mucous elements, mucus will gradually become organized, resulting in small cholesterol granulomas.

The essential stage in the development of this condition is apparently the obliteration of the Eustachian tube at the time when the secretory activity of the mucosa still is high. We have bouginated almost 1,000 ears with a soft rubber bougie and have very seldom found the tube to be obliterated, whereas this was found in nearly all cases of obliterative otitis as well as in some patients with old radical cavities. In these cases, however, the obliteration was probably caused by surgery.

Resumé

The clinical history, pathology and results of tympanoplasty in 12 patients with obliterative otitis are described. The condition is characterized by an intact, *not* retracted, thick drum and a middle ear totally filled with fibrous tissue and small cholesterol granulomas. The tube is anatomically obstructed in most cases. The results are poor and it is concluded that tympanoplasty is not indicated in this disease.

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