

REFERENCES

Alberti P W R M (1964) *J. Laryng.* 78, 808
 Armstrong B W (1954) *Arch. Otolaryng.* 59, 653
 (1968) *Laryngoscope (St Louis)* 78, 1303
 Bezold F (1891) *Z. Ohrenheilk.* 21, 252
 Cawthorne T E (1956) *J. Laryng.* 70, 559
 Eigler G (1949) *H.N.O. (Berl.)* 1, 436
 Hinton J (1869) *Guy's Hosp. Rep.* 29, 149
 Milligan W (1921) *Proc. roy. Soc. Med.* 14, Sect. Otol. p 2
 Politzer A (1867) *Wien. med. Wschr.* 17, 244
 Stinson W D (1936) *Arch. Otolaryng.* 24, 600
 Tumarkin I A (1961) *J. Laryng.* 75, 487
 Wittmaach K (1918) *Über die normale und die pathologische Pneumatisation des Schläfenbeines.* Jena

Mr Stuart R Mawson and Mr John Brennan
 (Ear, Nose and Throat Department,
 King's College Hospital, London)

Long-term Follow Up of 129 Glue Ears

Previous communications from the Department have dealt with methods of treatment of glue ears and we felt that, if a period of two years had elapsed after treatment, some idea of its efficacy might be obtained. We therefore decided to review as many as possible of our patients who had middle ear effusions proven at operation at least two years previously. The majority of these effusions had been thick, but some were of the thinner serous type. Patients whose ears had not contained effusions at the time of operation were not included in this study.

We were able to re-examine 78 patients, with 129 ears affected, in this category. Their ages ranged from 7 to 18 years with an average of 10 years 9 months. The longest follow up was five years ten months. Fifteen patients (23 ears) had been treated initially by tympanotomy and aspiration; 33 patients (55 ears) by myringotomy aspiration, instillation of α -chymotrypsin and reverse politzerization; and 30 patients (51 ears) by

simple myringotomy aspiration. Certain other patients followed up for shorter periods will be mentioned.

We first enquired after the patient's subjective assessment of his hearing at home and at school, confirmation being sought from the parents; subjective hearing was recorded as 'satisfactory' or 'unsatisfactory'. Any episodes of earache or discharge were noted. About 25% had had occasional earaches and about 12% acute otitis media with otorrhœa.

In the examination, particular attention was paid to the appearance of the tympanic membranes. Any membrane whose features could not be distinguished with certainty by use of the headlight or auriroscope was examined under the Zeiss microscope. Of the 129 ears examined, 79 were considered abnormal in appearance and the incidence in each group is as shown in Fig 1.

Abnormal Appearances

(1) The membrane appeared normal until massaged by the pneumatic speculum, when a flimsy-looking postero-superior segment flipped rapidly in and out. The lower border of this segment runs as a crescent from slightly above the umbo almost to the annulus.

(2) This lax segment was indrawn or, occasionally, ballooned out. Ballooning occurred with successful inflation of the middle ear by Valsalva's or Politzer's manœuvres and, in one case, during normal respiration.

(3) Increasing degrees of retraction caused the tip of the long process of the incus to be seen in relief through the lax segment.

(4) In the severest degrees of retraction, the collapsed membrane was wrapped round the long process of the incus, stapedius tendon and stapes superstructure, and was adherent to the promontory and margins of the round window niche. The posterior margin of the membrane was tucked away under the annulus. The average hearing loss in 9 such cases was 30 dB.

(5) In 2 cases it was possible to see a gap between the tip of the long process of the incus and stapes head.

(6) The stapes head could be seen standing in isolation under the retracted membrane. In 5 such cases, not all in the two-year follow-up group, the average hearing loss was 15 dB.

These appearances have been described as a progression and can readily be envisaged as such, though this sequence was not observed in any one patient in this series. As has been often observed, any of these appearances may be seen in an adult unaware of any previous ear disease. Whether the slighter abnormalities represent failure to progress to, or partial recovery from, a more severe form it is difficult to say.

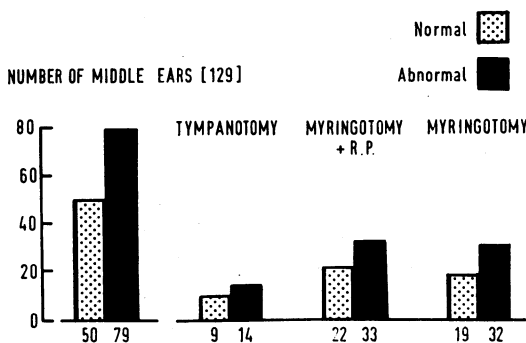


Fig 1 Normal/abnormal ratio otoscopy findings (see text)

Other Appearances

(7) Mild retraction of the whole membrane which seemed otherwise normal.

(8) Gross retraction of almost the whole of the central part of the membrane which appeared weak and thin.

(9) Gross attic retraction.

(10) Small scars in the position of the myringotomy incision.

(11) Localized small depressions in the membrane.

(12) Polypoid granulations at the tympanic annulus.

(13) An aural polyp.

(14) Cholesteatoma: One boy had a small attic cholesteatoma at the time of his first operation, when a copious thick effusion was aspirated from his middle ear. Another boy had a small white shadow beneath the pars tensa just in front of the upper part of the malleus handle; the ear was explored and a small unilocular cholesteatoma removed.

(15) In addition, appearances of recurrent fluid were found.

The frequency of these appearances is shown in Table 1. There was little difference between the two groups of myringotomies and they have been combined. The obvious difference between the tympanotomy and myringotomy group is the occurrence of recurrent effusions in the latter. It will be noted that the grosser abnormalities are a relatively small proportion, about 12% of the ears examined.

Table 1

Middle ear abnormalities (79 ears)

	No. of ears treated by:	
	Tympanotomy	Myringotomy
Tympanic membrane scarred or lax segment	4	18
Tympanic membrane moderately retracted	3	14
Tympanic membrane grossly retracted	5	10
Cholesteatoma	1	1
Post-marginal granulations	1	—
Dry perforation	—	1
Effusion	—	21
Total	14	65

Hearing

The hearing level was determined by pure-tone threshold audiometry. The worst hearing level was an average of 60 dB. Eight ears were at 40 dB or worse. All patients with subjectively satisfactory hearing had levels of 30 dB or higher, i.e. they were in Educational Grade I. Four children with hearing within this range claimed difficulty in hearing at school. The proportion of satisfactory to unsatisfactory subjective hearing levels is shown in the upper part of Fig 2. Considering the

Table 2

Number of operations (129 ears)

No. of operations	No. of ears treated by:			Total
	Tympanotomy	Myringotomy plus reverse politizerization	Myringotomy alone	
One	16	32	34	82
Two	3	18	15	36
Three	3	3	2	8
Four	1	2	0	3

individual ears, and taking the stricter criterion of a hearing level of 20 dB or higher as satisfactory, the proportion of satisfactory to unsatisfactory ears is shown in the lower part of Fig 2. As these patients were examined between December 1967 and March 1968, it is possible that their hearing was likely to be at its worst at this time.

Certain other points emerged from this study:

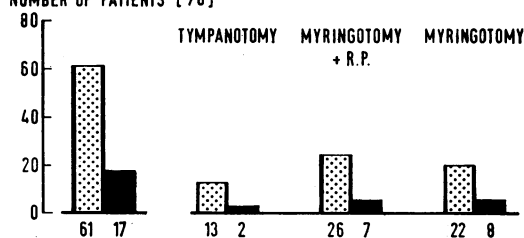
The number of operations on each ear is shown in Table 2. Two-thirds had only one operation, and just over a quarter had two operations. Three ears were operated on four times.

Adenoidectomy: The time of removal of the adenoids was checked in 100 patients. The adenoids were removed either separately or with the tonsils. In 46 cases adenoidectomy was performed at least six months before the first ear operation; deafness had been noted in 25 of these before adenoidectomy was performed. In 43 cases adenoidectomy was performed at the same time as the ear operation and in one it was done afterwards. It was not carried out in 10 cases because the adenoids were small or non-existent.

Eustachian function: Each patient was asked to perform Valsalva's manœuvre and Toynbee's

HEARING

NUMBER OF PATIENTS [78]



NUMBER OF EARS [129]



Fig 2 Follow-up hearing levels (see text)

manoeuvre of occluding the nostrils and swallowing. Eleven were able to produce movement of the tympanic membrane. Their ages ranged from 8 to 18 years, with an average of 12 years. Hearing was satisfactory in all, with an average hearing level of 15 dB. The tympanic membranes were normal, or only slightly abnormal, and there was no evidence of recurrent effusion.

Grommets: The fate of 40 Shepard grommets inserted, and in a few cases reinserted, through 34 tympanic membranes of 22 children is as follows: 13 were still *in situ* (up to 10 months), 21 had extruded (up to 8 months), and 6 were removed (between one and 7 months). The hearing levels with the grommets *in situ* varied between 30 and 0 dB. Hearing fell from 10 to 40 dB on removal of one grommet (at 7 months) and spontaneous extrusion of two others at 6 and 8 months.

The first grommets were placed through a posterior myringotomy incision. We now prefer to place them anteriorly – but this may not be possible if the meatus is extremely narrow. Two grommets passed into the middle ear; one had to be removed, the other was later extruded.

Discussion

The conclusions that may be drawn from this investigation are few. The numbers concerned are also relatively few. Although we have a numerically larger list of recorded operations, only those 78 patients who had one or both ears – 129 ears in all – operated upon for chronic non-suppurative effusion (glue) could be re-examined after a minimum interval of 2 years, which represents about 85% of our cases.

The 15 tympanotomy cases (23 ears) first reported by Mawson (1964) have been followed the longest and seem to have done best of all as regards hearing, but whether this resulted from tympanotomy or natural evolution of the condition over a longer period of time is difficult to say. We always felt tympanotomy offered the most certain access for the most thorough evacuation of all effusion, including that from the eustachian tube, and that failure to clear the middle ear cleft completely might be a possible cause of further recurrence of effusion and deafness. But it is a bigger procedure and cannot, like simple myringotomy and aspiration, or insertion of grommet, be performed on a half-day basis in the outpatient department.

In 33 cases (55 ears), reported by Mawson (1967), on whom we performed the now discredited (because dangerous) reverse politzerization after myringotomy, aspiration and instillation of α -chymotrypsin, the hearing was found to be satisfactory, i.e. above 20 dB, in about 70%. Most of those in whom the hearing was unsatisfactory were suspected of recurrent effusion at recall examination and this has been confirmed in

some. The appearance of the membrane was also abnormal in about 60%. In addition, therefore, to its main disadvantage of being potentially lethal, it appears that this procedure fails to produce good long-term results.

Following the abandonment of reverse politzerization we adopted simple myringotomy and aspiration as the first treatment for glue ears, to be followed by insertion of a Shepard grommet as the operation of choice in cases of recurrence. Fifty-one of these simple myringotomies, followed for two years, reveal a similar success rate as regards hearing but, again, abnormal appearances of the membrane in 60%. These abnormalities include scarring, retraction or laxity. Effusion was definitely shown to have recurred in 14%. It is possible that these abnormalities result from insertion of sucker ends through the incision, as the opening in the membrane is generally larger at the end of operation than at the beginning.

We have too few cases with too short a follow-up in the primary use of grommets to make any useful assessment. But of 40 grommets inserted as a secondary procedure, and followed up to 10 months, it can be said that some of the best hearing is attained when the grommet is functioning properly and that poor hearing may return when the grommet is extruded or removed.

Schuknecht *et al.* (1964) reported 82 ears with indwelling polythene tubes, of which 25 recurred after 5 to 8 months. Silverstein (1966) reported 40 out of 50 children treated with arrow tubes, followed 5 to 8 months, as free from effusion. But this would seem to us a short rather than a long-term assessment.

Oppenheimer & Siegel (1967) last year published a report on 300 patients treated with myringotomy, aspiration and insertion of polythene tubes as already showing a recurrence rate of 10%. But they considered alleviation more certain with tubes than with myringotomy alone and we gathered they always use a tube in the first instance.

Fuërstein (1966) has used a split plastic tube in 191 patients and the recurrence rate in his cases was also 10%, the tubes remaining in for an average of 5 weeks.

The largest published series bear out our own experience. When faced with a child whose hearing is impaired by a chronic middle ear effusion, the question of which of several possible procedures should be followed has still to be answered. Simple myringotomy is the simplest and can easily be performed under general anaesthesia in out-patients. But results on the whole are not good – 40% recurrence rate of fluid after the first incision and 30% overall unsatisfactory hearing after 2 years. Tympanotomy allows the most efficient evacuation of the fluid and this may have

something to do with our own better long-term results in this method. Insertion of a grommet or similar device as first choice still seems to carry about a 10% fluid recurrence-rate in the short term and, if put in, there is the question of when, if ever, to remove it, and whether or not the child should be allowed to go swimming.

Consideration of these facts indeed raises the whole question of whether anything at all should be done to the ear.

Kersley & Wickham (1966), in presenting the results of treatment in 250 cases of adenoidectomy, paracentesis and retrograde eustachian tube inflation, considered there was a marked improvement after puberty. Stevens (1962), on the other hand, found that of 53 deaf children he reported on in 1958, 15 (28%) had irreversible changes four years later. If it is true that a marked improvement occurs after puberty, then it may be equally valid as treatment to provide a hearing aid for a younger child and await improvement rather than operate. However, if the brighter face of the present surgical results is looked at, 70% to 90% of children, according to method, appear to gain permanent relief from their deafness.

It would seem that Schuknecht's explanation of the cause of the condition is probably correct – that for whatever reason it develops, a poorly functioning eustachian tube results in a negative pressure with accumulation of fluid of one type or another (Schuknecht *et al.* 1964). The words 'whatever reason' seem to us advisedly non-committal. Jordan (1949), who was one of the first in the field and is credited with having introduced the term 'glue ears', felt the most constant finding in his patients was marked hypertrophy of tonsils and adenoids in an allergic child. Archard (1967) and Thorburn (1965) have suggested that the correct management of presumed secretory otitis media in childhood should be directed towards the upper respiratory tract. But we do not consider that the relationship of tonsils and adenoids to this condition has yet been established; 50% of our cases were without any significant adenoids when their first ear operation for deafness from effusion was done.

Whitcomb (1965) found secretory otitis media in 48% of 100 allergic children but it is not clear whether the effusion was of the thick or thin variety. Derlacki (1957) also considered that allergy played a dominant role. But Senturia *et al.* (1960) feel the basic cause is infection of nasal origin, retrograde inflammation and oedema of the tube. In work with experimental animals, they found a notable lack of eosinophils in the fluid, as did Lecks (1961), who studied the electrophoretic patterns of middle ear fluid in 82 children and found it similar to blood plasma, concluding that the fluid was a transudate rather than an exudate.

He found no evidence of viral aetiology, nor did Fishman (1960), nor has Adlington (1969).

Some have considered that the prime factor in the aetiology is the treatment of acute otitis media with inadequate antibiotics and our first impressions of this disease inclined us to this view. Now we would only observe that non-suppurative middle ear effusion is apparently promoted by eustachian tube dysfunction, but there may be other middle ear factors still to be determined.

REFERENCES

- Adlington P (1969) *J. Laryng.* 83, 161
 Archard J C (1967) *J. Laryng.* 81, 309
 Derlacki E L (1957) *Trans. Amer. Acad. Ophthal. Otolaryng.* 61, 91
 Fishman L J (1960) *Arch. Otolaryng.* 72, 25
 Fuerstein J S (1966) *Laryngoscope (St Louis)* 76, 686
 Jordan R (1949) *Laryngoscope (St Louis)* 59, 1002
 Kersley J A & Wickham H (1966) *J. Laryng.* 80, 26
 Lecks H I (1961) *N. Y. St. J. Med.* 61, 2737
 Mawson S R
 (1964) *J. Laryng.* 78, 853
 (1967) *J. Laryng.* 81, 147
 Oppenheimer R P & Siegel J R
 (1967) *GP (Kansas)* 35, No. 3, p 105
 Schuknecht H F, Silverstein H, Lindeman R C & Miller G
 (1964) *Clin. Pediat. (Philadelphia)* 3, 718
 Senturia B H, Gessert C F, Carr C D & Baumann E S
 (1960) *Trans. Amer. Acad. Ophthal. Otolaryng.* 64, 60
 Silverstein H (1966) *Laryngoscope (St Louis)* 76, 993
 Stevens D M (1962) *Lancet* ii, 216
 Thorburn I B (1965) In: *Diseases of the Ear, Nose and Throat*. 2nd ed. Ed. W G Scott-Brown *et al.* London; 2, 426
 Whitcomb N J (1965) *Ann. Allergy* 23, 232

Mr K G Malcomson (*Bristol*) said that when speaking of chronic exudative otitis the main difficulty was not the management of the condition but its recognition. Without this one could not proceed to discuss it. The textbooks had not yet fully described the drum appearances which were fundamental in its detection. Moreover it was most important to recognize that fluid might be present in the middle ear even with a normal audiogram; there was no direct correlation between the drum appearances and the degree of hearing impairment.

During the last eleven years he had kept a record of the various features of the condition in over 1,000 patients. In two-thirds the condition was painless. The drum might be dull, indrawn, indrawn with concentric reflections of light from the region of the normal light reflex (ripple sign), pale, dark, slate-coloured, gun-metal in colour, blue, plum, bright red (shiny or dull), hyperaemic with generalized pinkness; it might show an apparently extra-white malleolar handle due to contrast with a dark drum, orange tinting (this usually meant thin mucus but it might be glue-like) usually in the lower half, a hair-line (always thin fluid), bubbles (always thin fluid), sago-grain texture of the drum-head, gross indrawing with the drum clinging to the inner tympanic wall usually indicating an attic effusion, postural deafness (hearing normally in recumbent posture). More than one of these features could co-exist.

Mr Malcomson enumerated 18 different appearances, a wider spectrum than for most other ear

conditions. If one was unfamiliar with these, how could a diagnosis of exudative otitis be made?

Air-lock was not an uncommon situation and was not necessarily associated with fluid. On one occasion he had found an isolated cholesteatoma in the mastoid in the presence of a middle ear effusion in a child; it was common to see fluid in cholesteatomatous ears at operation but rare to find them separated.

One of the common reasons for rejection of the grommet or stopple was leaving the wire too long; this was caught up and migrated with wax to the introitus.

In one instance he had encountered a boy of 16 who had had an effusion in his ears for eight years; he had had his adenoids removed and the postnasal space irradiated. This produced a complete impermeable stenosis of one eustachian tube. His hearing was restored completely on one side by one paracentesis. On the closed side the effusion continued. Unfortunately Mr Malcomson had lost track of him before the introduction of stopples which acted in lieu of the eustachian mechanism.

After stimulating the pre-trematic branch of the second arch (tympenic branch of the glossopharyngeal) in cats in 1954 in the hope of establishing that the condition was one of over-secretion, no evidence could be shown that this produced effusions. No one knew the secretomotor nerve to the eustachian tube, but it would not be unreasonable to conjecture that it was Jacobson's nerve. Notwithstanding the absence of proof, in the first patient in whom he had divided the nerve for persistent effusion after 13 paracenteses, the effusions stopped and had not recurred in ten years.

Finally, he drew attention to the rôle of hyperplastic tonsils in the aetiology of chronic exudative otitis. Their enlargement was in all directions and it pushed the soft palate upwards and so compromised the orifice of the eustachian tube; this fact was not widely appreciated but it was fundamental to remove hyperplastic tonsils which were likely to offend in this fashion. Moreover, lymphatic congestion of the eustachian tube occurred when the tonsils and adenoids were themselves congested.

Meeting November 1 1968

President's Address

James Hinton

by Philip Reading MS FRCS
(*Guy's Hospital,*
London)

I have decided to speak on the life of James Hinton, the first aural surgeon appointed to the staff of Guy's Hospital. This is not just an exercise in honour of an illustrious ancestor; there is a strong human interest in his character, and we all owe him a debt of gratitude for the advances he made in otology.

He was born in Reading in 1822, the third son in a family of eleven children. He feared and respected his father who was a stern Baptist minister, well known for his powers as a preacher. The family was large, and money not plentiful; plain living and high moral standards were the features of Hinton's early upbringing. Years later, he recalled in a letter: 'It was a rule in our family that no child should be helped twice to apple pie, lest the supply should fall short. To the end of my life I have never been able to ask for a second helping without a feeling of discomfort, and almost of guilt.' His mother held first place in his heart, and she was chiefly responsible for forming his character. From her teaching, he carried always a deep sympathy for the unfortunate, the

poor, the widow and the orphan, and a hatred of wrong principles, which, in later life, was liable to provoke outbreaks of uncontrollable anger.

He made little or no mark at school, and when the family moved to London, in 1838, was placed at the age of 16 with a woollen draper. Later he found another dead-end job in an insurance office. Perhaps as a revulsion against this undemanding and monotonous occupation, he began in the ensuing years to show the beginnings of that restless intellectual activity which stayed with him for the rest of his life. He sat up night after night, sometimes all night, studying a wide range of subjects - history, metaphysics, Russian, German, Italian and mathematics. But his main interest was in reading the philosophers. In this period of earnest self-improvement he showed all the awkwardness of the adolescent. He was tall and thin, his clothes never seemed to fit, and he paid little attention to his appearance. He was normally very argumentative on many subjects, particularly philosophy, and was always seeking to get to the root of things. His biographer describes him at this period of his life as 'an abstract idea, untidily expressed'. At this time he first met Margaret Haddon, the girl who after a long courtship became his wife. He could not have been a very prepossessing suitor, as he had no social graces, no small talk, and was very solemn.