

Management of retraction pockets of the pars tensa in children by excision and ventilation tube insertion

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Abstract

Retraction pockets of the pars tensa in children can result in erosion of the ossicles leading to hearing loss and eventually cholesteatoma formation. Several different types of treatment for the more severe grades of retraction pocket have been described. The aim of this pilot study was to assess the outcome following simple excision and ventilation tube insertion of grade II, III and IV retraction pockets of the pars tensa. The eardrums were graded according to Sadé's classification (1979).

There were seven grade II and four grade III retractions. Ten eardrums healed completely in a mean time of 3.6 months (mean follow-up 16 months) and there was one residual perforation. Two retractions recurred and both of these were only grade I. Clinically, an improvement in hearing was reported in seven children (eight ears) and the average air conduction threshold gain for these patients was 16 dB. A larger prospective study is currently underway.

Key words: Tympanic membrane; Otitis media with effusion

Introduction

Retraction pockets of the pars tensa are believed to result from eustachian tube dysfunction with resultant negative middle ear pressure and effusion formation (Sadé, 1979). The lamina propria undergoes a destructive process causing a thinning of the tympanic membrane and retraction formation (Wells and Michaels, 1983; Yoon *et al.*, 1990). Comparative histological studies of the human tympanic membrane and that of eight other mammalian species suggest that there is no inherent abnormality which predisposes the human eardrum to develop retraction pockets (Chole and Kodama, 1989). Three different classification systems have been used to describe these lesions (Sadé, 1979; Tos, 1982; Charachon *et al.*, 1992). We used Sadé's classification (1979) in which grade I represents simple retraction of the eardrum ('retracted'), grade II retraction onto the incudostapedial joint ('severe retraction'), grade III retraction but not adhesion to the promontory ('atelectasis'), and grade IV adhesion of the eardrum to the promontory ('adhesive otitis').

The effects of retraction in the postero-superior part of the pars tensa include conductive hearing loss either due to interference with the normal vibration of the tympanic membrane or erosion of the incudostapedial joint, recurrent otorrhoea, granulation tissue formation and in some cases it may

progress to cholesteatoma formation (Wells and Michaels, 1991).

The primary aims of surgical management are to prevent ossicular erosion and cholesteatoma formation and to close the air-bone gap. The wide variety of methods of treatment currently in use for adults and children attests to the fact that no single treatment has been reported to be superior to any other. These include ventilation tube insertion (Palva, 1963; Sirala, 1963), simple excision with insertion of a ventilation tube (Sharp and Robinson, 1992), excision and grafting (Glasscock *et al.*, 1987; Levinson, 1987; Sadé, 1987; Roulleau, 1988; Mills, 1991) and cortical mastoidectomy (Arving, 1963; Grahne, 1964). This study describes the results of simple excision of the retraction pocket and ventilation tube insertion in children only.

Materials and methods

All children with grades II to IV retraction pockets of the pars tensa in whom treatment was deemed necessary in the last three years were included in the study. This involved nine children and 11 ears. A detailed pre-operative history was taken including symptomatology, predisposing factors and previous medical or surgical treatment.

The tympanic membrane was examined otoscopically and the following noted: (1) the site of

retraction by quadrant; (2) the grade of retraction according to Sadé's classification (1979); (3) the state of the incudostapedial joint; (4) other tympanic membrane and middle ear pathology.

Pure tone audiometry (air and bone conduction) and where possible tympanometry was performed on all children. The retraction pockets were excised with a sickle knife via the transmeatal approach and a Shepard ventilation tube inserted. This was carried out under general anaesthesia by the same surgeon. Where no other surgical procedure was undertaken, the operation was carried out as a day case. The results were assessed by means of completion of a parent questionnaire, otoscopic examination by the same observer and audiometric evaluation.

Results

Retraction pockets were excised in nine children (five male and four female) with a total of 11 ears. The average age at time of operation was 6.6 years (range: 4–11 years). Bilateral retractions, present in two children, were operated on simultaneously. The presenting symptoms were hearing loss in nine children and recurrent acute otitis media in six children. There were seven grade II and four grade III retraction pockets (Table I). The postero-superior quadrant was the commonest site affected with 10 retractions presenting there and one retraction in the antero-superior quadrant. The incudostapedial joint was intact in nine ears and eroded but still in contact in two cases. The average pre-operative air conduction threshold at the following frequencies, 500 Hz, 1 and 2 kHz was 25 dB for grade II ears and 34 dB for grade III ears. The bone conduction thresholds were normal in all cases.

All nine patients were managed conservatively by their GP before referral; six underwent simple observation, two had decongestants and one had long-term, low dose, antibiotic treatment. Previous surgical procedures had been carried out in four cases; three underwent adenoidectomy and ventilation tube insertion and one underwent adenotonsillectomy and ventilation tube insertion.

In all 11 ears, the retraction pocket was excised via the transmeatal approach. No ossicular reconstruc-

TABLE I
RESULTS OF EXCISION/VENTILATION TUBE INSERTION (MEAN FOLLOW-UP: 16 MONTHS; RANGE 10–24 MONTHS)

Test ear	Pre-operative retraction Grade	Post-operative retraction Grade
1	III	0
2	II	0
3	II	0
4	II	Perforation
5	II	0
6	III	0
Bilateral		
7	III	I (2 months)
8	III	0
9	II	I (10 months)
Bilateral		
10	II	0
11	II	0

TABLE II
COMPARISON OF PRE- AND POST-OPERATIVE SYMPTOMS (PARENT QUESTIONNAIRE)

No. of patients = 9 (11 ears)	Improved	Same	Worse
Pain	5	3	1
Discharge	5	3	1
Smell	5	4	0
Hearing	7	1	1

tion was required. The mean follow-up period after surgery was 16 months (range: 10–24 months). Ten ear-drums healed completely in a mean time of 3.4 months (range 1–7 months). A perforation persisted in one case which presented with a grade II retraction. Two retractions recurred (at two and 10 months) and both were only grade I (Table I).

A comparison of pre- and post-operative symptoms showed an improvement in otorrhoea and diminution in otalgia in five out of nine patients (Table II). Clinically, hearing improved in seven children, was the same in one and worse in another. The case of diminished hearing was associated with recurrent retraction formation. Audiometrically, eight ears improved by an average of 16 dB, two were unchanged and one was worse across the frequency range by 7 dB (Table III). The ear with the persistent perforation showed an overall improvement in hearing.

Discussion

Retraction pockets of the pars tensa are occasionally progressive and if they and the underlying cause are not treated, then they may result in ossicular erosion and cholesteatoma formation. Treatment is either medical or surgical. Medical treatment is aimed primarily at the underlying cause and includes antibiotic treatment, decongestants, forced middle ear insufflation and simple observation. Frequent otoscopic assessment is needed during this period as Charachon *et al.* (1992) reported a deterioration in the grade of the retraction pocket in 16 per cent of cases after medical management of grade I and II retraction pockets over a five-year period. Surgical procedures which contribute towards removing the underlying cause, such as adenoidectomy and tonsillectomy are also advocated.

The commonest surgical treatment performed is ventilation tube insertion, which aims to correct the effects of eustachian tube dysfunction. However, in the presence of persistent eustachian tube dysfunction, recurrence is common once the ventilation tube falls out. In addition it does not have any effect on the eardrum that is already adherent to underlying middle ear structures (Levinson, 1987). In grade I retraction pockets, we advocate the use of a ventilation tube in the presence of a middle ear effusion but in the absence of an effusion careful observation suffices.

For more severe degrees of retraction, more extensive surgical procedures may be required. The aim of simple excision of the pocket with insertion of

TABLE III
COMPARISON OF THE OUTCOME OF SURGERY AND THE CHANGE IN AVERAGE AIR CONDUCTION THRESHOLD

Test ear	Grade of retraction		Average air conduction threshold (dB)		
	Pre-operation	Post-operation	Pre-operation	Post-operation	Change
1	III	0	38	18	+20
2	II	0	35	10	+25
3	II	0	37	22	+15
4	II	Perforation	18	12	+6
5	II		0	30	30
6	III	0	30	13	+17
Bilateral					
7	III	1	40	47	-7
8	III	0	30	8	+22
9	II	1	5	5	0
Bilateral					
10	II	0	27	12	+15
11	II	0	21	13	+8

Air conduction threshold measured at 500 Hz, 1 and 2 kHz.
Bone conduction threshold was normal in all cases.

a ventilation tube is to allow spontaneous healing of the eardrum in the presence of a normally ventilated middle ear cleft and thus prevent recurrence of the retraction. The advantages of simple excision of the retraction pocket over grafting techniques are that the surgery is quicker, easier to perform, relatively non-invasive, can be performed as a day case and any epithelial pearl formation is readily visible (Sharp and Robinson, 1992). Sharp and Robinson (1992) achieved a successful result in 65 per cent of patients (43 ears) treated by simple excision of the pocket and ventilation tube insertion with a mean follow-up of 14.1 months. This was for a mixed group of children and adults however. In our series, we treated children only and obtained a non-retracted intact eardrum in the presence of a well aerated middle ear cleft in 73 per cent. A further 18 per cent had a mild recurrent retraction which was of a less severe grade than pre-operatively. The mean follow-up period was 16 months. It is possible that shallower retractions can be considered as stable in that they are self-cleansing. No further surgery has been required in either of these recurrent retractions to date but follow-up is limited. It is interesting to note that both recurrent retractions occurred in cases of bilateral retraction pockets (Table I) and this may indicate a greater underlying disease severity, unlike that already reported (Sharp and Robinson, 1992). They also reported that the number of previous ventilation tube insertions did not appear to be predictive of a poor outcome, with which we concur. The hearing loss associated with retraction pockets increases as the retraction becomes more severe (Table III) and our findings are in agreement with Bennet (1970) and Mills (1991) in that the postero-superior quadrant is the commonest site of retraction formation.

The use of a composite graft of cartilage and perichondrium to reinforce the excised segment has been advocated by some as it provides good physical support for the healing eardrums, is autologous and is easily harvested (Levinson, 1987). Levinson (1987) reported a recurrence rate of 13 per cent (11 ears) after using this method with a mean follow-up of 22 months. Mills (1991) reported some degree of

retraction in 66 per cent (four ears) of cases at one year using this same method. In both series, the procedure was carried out in children and adults and the mean ages were 26 and 39 years respectively. Its main and significant disadvantage is that it may hide any evidence of recurrent disease or cholesteatoma. In addition, whilst this form of treatment may be appropriate in adults with established non-resolving eustachian tube dysfunction, it does appear to be unduly aggressive in most children as their eustachian tube dysfunction tends to resolve spontaneously with time.

Conclusion

Although the number of patients included in this pilot study is small and the follow-up relatively short, the preliminary findings suggest that where appropriate simple excision and ventilation tube insertion is a beneficial procedure for progressive grade II-IV retraction pockets of the pars tensa in children. A larger prospective study is currently underway.

References

- Arving, J. (1963) Some problems concerning the prognosis and treatment of chronic adhesive otitis media and of serous otitis media. *Acta Otolaryngologica* **188** (suppl.): 75-76.
- Bennet, R. G. (1970) The significance and management of the drumhead retraction pocket. *Journal of Laryngology and Otology* **84**: 167-189.
- Charachon, R., Barthez, M., Lejeune, J. M. (1992) Spontaneous retraction pockets in chronic otitis media: medical and surgical therapy. *Ear, Nose and Throat Journal* **71**(11): 578-583.
- Chole, R., Kodama, K. (1989) Comparative histology of the tympanic membrane and its relationship to cholesteatoma. *Annals of Otology, Rhinology and Laryngology* **98**: 761-766.
- Glasscock, M., Jackson, C. G., Schwaber, M. K. (1987) Chronic ear disease: surgical decisions and techniques. *American Academy of Otolaryngology-Head and Neck Surgery Instructional Course* 1338.
- Grahne, B. (1964) Simple mastoidectomy with air chamber creation in progressive adhesive otitis. *Acta Otolaryngologica* **58**: 258-270.
- Levinson, R. M. (1987) Cartilage-perichondrial composite graft tympanoplasty in the treatment of posterior marginal and attic retraction pockets. *Laryngoscope* **97**: 1069-1074.

- Mills, R. P. (1991) Management of retraction pockets of the pars tensa. *Journal of Laryngology and Otology* **105**: 525–528.
- Palva, T. (1963) Surgical management of chronic adhesive otitis media. *Acta Otolaryngologica* **188**: 70–74.
- Rouilleau, P. (1988) Fixed retraction pockets and their treatment. *Revue de Laryngologie, Otologie et Rhinologie (Bordeaux)* **109**: 209–211.
- Sadé, J. (1987) Treatment of cholesteatoma. *American Journal of Otolaryngology* **8**: 524–533.
- Sadé, J. (1979) The atelectatic ear. In *Monographs in Clinical Otolaryngology*. Vol. 1: *Secretory otitis media and its sequelae*. Churchill-Livingstone, New York, Edinburgh and London, pp 64–88.
- Sharp, J. F., Robinson, J. M. (1992) Treatment of tympanic membrane retraction pockets by excision: a prospective study. *Journal of Laryngology and Otology* **106**: 882–886.
- Sirala, U. (1963) Pathogenesis and treatment of adhesive otitis. *Acta Otolaryngologica* **188 (suppl.)**: 9–18.
- Tos, M. (1992) Can cholesteatoma be prevented? In *Proceedings of the Second International Conference on Cholesteatoma and Mastoid Surgery*. Tel Aviv Kugler Publications. Amsterdam, pp 591–597.
- Wells, M. D., Michaels, L. (1983) Role of retraction pockets in cholesteatoma formation. *Clinical Otolaryngology* **8**: 39–45.
- Wells, M. D., Michaels, L. (1991) Mode of growth of acquired cholesteatoma. *Journal of Laryngology and Otology* **105**: 261–267.
- Yoon, T. H., Schachen, P. A., Paparella, M. M., Aeppli, D. M. (1990) Pathology and pathogenesis of tympanic membrane retraction. *American Journal of Otolaryngology* **11**: 10–17.

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