Main Articles

Adult-onset otitis media with effusion: results following ventilation tube insertion


Abstract
The outcome of otitis media with effusion (OME) in children is generally good. However, it is less clear in adults. All adult patients who had a ventilation tube inserted for OME at the Ipswich Hospital between 1996 and 1997 were studied. Of 53 patients studied, 28 had had a previous history of ventilation tube insertion. Furthermore, at 15–27 months following ventilation tube insertion, the ventilation tube had already extruded in 31 patients and the OME had already recurred in 19 of these. Endoscopic examination revealed that many patients still had evidence of inflammation at the lateral nasal wall (26.4 per cent) and at the eustachian tube orifice (51 per cent). There is also a strong history of atopy in the studied group and the skin prick test was positive in 57 per cent of the patients. This study shows that many patients with adult-onset OME have underlying pathology that could lead to recurrence of OME following ventilation tube extrusion.

Key words: Otitis Media with Effusion; Middle Ear Ventilation

Introduction
Otitis media with effusion (OME) is one of the commonest causes of paediatric referral to an otolaryngologist. While it is accepted that most OME in children resolves with time, a significant number of cases still result in ventilation tube insertion. It has been reported that 70 per cent of children had complete resolution of OME following one ventilation tube insertion and a further 20 per cent resolution following a second ventilation tube insertion. On the whole, most clinicians agree that most children with OME have a good outcome, mainly as a result of the natural resolution of the disease.

The outcome of adult-onset OME is less well-established. It is known that OME secondary to nasopharyngeal carcinoma will not respond well to ventilation tube insertion and will very often result in persistent discharge through the tube.

The aim of the present study is to examine the outcome of ventilation tube insertion in patients with non-tumour related adult-onset OME. Any underlying nasal, nasopharyngeal and atopic factors will also be examined.

Patients and methods
The protocol of the study was reviewed and approved by the East Suffolk Local Research Ethics Committee. Written consent from the patient was exempted by the Ethics Committee. All adult patients with OME who had ventilation tube insertion at the Ipswich Hospital NHS Trust between June 1996 and June 1997 were studied. Those with known head and neck tumours were excluded. For the purpose of the present study, all patients were recalled to the out-patient clinic 15 to 27 months following ventilation tube insertion for assessment. Information regarding previous history of ventilation tube insertion, the onset of the OME (adult-onset or a continuation of childhood problems) as well as any history of atopy was obtained. A systematic enquiry was made concerning symptoms of rhino-sinusitis including sneezing fits, nasal blockage, rhinorrhoea and facial pain. A symptom was regarded as chronic if it had been present for longer than three months. The indication for, the side of ventilation tube insertion, the operative findings and the nature of the middle-ear fluid were obtained by reviewing the patient’s case record.

A full ENT examination including otoscopy, rigid nasal endoscopy using the Hopkins’ rod and fibre-optic examination of the nasopharynx was also performed on all patients. The status of the ventilation tube, the appearance of the eardrum and any recurrence of the OME were documented. Recur-
erence of the OME was further confirmed by tympanometry. In an attempt to blind the endoscopist to the status of the OME and the ventilation tube, rigid nasal endoscopy and fibre-optic examination of the nasopharynx were carried out by the senior author (MWY) prior to the review of the patient’s record and examination of the ears.

The nasal endoscopic findings were categorized into ‘normal’, ‘gross septal deviation’, ‘presence of mucopus at the lateral nasal wall’ and ‘polypoidal mucosa at the lateral nasal wall’. Severe septal deviation was reported only if it resulted in complete blockage of the corresponding nostril.

The findings of fibre-optic examination of the nasopharynx were categorized into ‘normal’, ‘presence of mucopus at the eustachian tube orifice’ and ‘oedema/hyperaemia of the tori tubarii’. Any growth including enlarged adenoids in the nasopharynx was noted.

All patients then had a skin-prick allergy test performed by the junior author (RA) who was blinded to the otoscopic and endoscopic findings of the patients. Up to 28 different allergens were used in the skin-prick test including inhalant and food allergens. In addition, all patients had a blood test for serum IgE level.

**Results**

A total of 53 patients had ventilation tube insertion performed between June 1996 and June 1997. They were between 27 and 88 years old. Twenty-one were male and 32 were female. Only four patients had OME which had started during childhood; the rest had adult-onset OME. The OME was bilateral in 31 patients and unilateral in 22 patients. As a result, 31 patients had bilateral ventilation tube insertion and 22 patients had ventilation tube insertion only in the affected ear. Eleven out of 53 patients had T-tubes inserted whereas the rest (42 patients) had either Shepherd or Shah grommets inserted.

Of the 53 patients studied, 28 already had a previous history of ventilation tube insertion and the most recent ventilation tube was inserted for recurrence of the OME. Fourteen patients had had one set, four had had two sets and 10 had had three or more sets of ventilation tube inserted previously. There was no dry tap on any of the myringotomies. Forty-one of the 53 patients had thin fluid and 12 had thick ‘glue’ aspirated from the middle ear on myringotomy.

At the time of the follow-up assessment 15 to 27 months following ventilation tube insertion, 22 out of 53 patients still had at least one ventilation tube *in situ*. Eleven patients had in-dwelling T-tubes and 11 patients had in-dwelling grommets. For the other 31 patients, the ventilation tubes were already extruded from the ears. Table I summarizes the outcome of the patients. Nineteen patients (61 per cent) had recurrence of OME following extrusion of the ventilation tube. For those with the ventilation tube still *in situ*, four (18 per cent) had either a recurrent or persistent discharge from the ventilation tube.

Table II illustrates the endoscopic findings of the nose on all the patients who had ventilation tube insertion and also the sub-group whose ventilation tube had already extruded. Inflammation at the lateral nasal wall was defined as the presence of either mucopus or polypoidal mucosa at the lateral nasal wall. Many patients in the present study (26.4 per cent) had endoscopic evidence of pathology in the nasal cavity, including signs of inflammation at the lateral nasal wall (20.8 per cent). However, there is no statistical difference in the nasal endoscopic findings between the groups of patients with and without, recurrence of OME following extrusion of the ventilation tube (using Yates-corrected Chi-squared, *p* > 0.5).

**TABLE I**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Number of patients (n = 53)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VT still <em>in situ</em></td>
<td>22</td>
</tr>
<tr>
<td>VT already extruded</td>
<td>31</td>
</tr>
<tr>
<td>Recurrence of OME following VT extrusion</td>
<td>19</td>
</tr>
<tr>
<td>Persistent/recurrent discharge from VT</td>
<td>4</td>
</tr>
</tbody>
</table>

**TABLE II**

<table>
<thead>
<tr>
<th>Nasal endoscopic findings</th>
<th>All patients with VT insertion (n = 53)</th>
<th>Recurrence of OME (n = 19)</th>
<th>No recurrence of OME (n = 12)</th>
<th>Patients with VT still in situ (n = 22)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>39</td>
<td>12*</td>
<td>9*</td>
<td>18</td>
</tr>
<tr>
<td>Severe septal deviation</td>
<td>5</td>
<td>1*</td>
<td>2*</td>
<td>2</td>
</tr>
<tr>
<td>Inflammation at lateral nasal wall</td>
<td>11</td>
<td>7*</td>
<td>1*</td>
<td>3</td>
</tr>
</tbody>
</table>

Note: *Comparing normal and abnormal endoscopic finding between the OME recurrence group and No recurrence group using Yates-corrected Chi-squared test, *p* > 0.5.
Nineteen out of 53 patients (35.8 per cent) in the present study also suffered from chronic symptoms of nasal blockage, rhinorrhoea or sinus pain. Table IV illustrates the correlation between the nasal endoscopic findings and the clinical symptoms of chronic rhino-sinusitis. Among patients with normal nasal endoscopic findings (n = 38), only about 20 per cent displayed concomitant symptoms of rhino-sinusitis. However, amongst patients having either severe septal deviation or inflammation at the lateral nasal wall (n = 16), nearly 70 per cent displayed concomitant nasal symptoms. This greater incidence is highly significant (Yates-corrected Chi-squared, p < 0.01).

Of the 53 patients in the present study, 23 (43 per cent) had a known history of atopy. Nine were asthmatic; nine had hay fever and six were eczema sufferers. Table V illustrates the number of patients with positive skin prick allergy tests and raised serum IgE level, again comparing the total patient group and the sub-group with ventilation tube already extruded. There is no statistical difference in the results of skin-prick testing or the serum IgE level between the groups of patients with, and without, recurrence of OME following extrusion of the ventilation tube (Yates-corrected Chi-squared, p > 0.5). The commonest allergens identified by skin-prick testing in the present study were house-dust mite (19 patients), grass or tree (11 patients), wheat (five patients), cat or dog (four patients), Alternaria (four patients) and Aspergillus (two patients). However, only seven out of 53 patients had an increase in the serum IgE level.

Discussion

The Ipswich Hospital NHS Trust serves a population of 350,000. Between 1996 and 1997, 53 adult patients had ventilation tube insertion for OME at the Department of Otolaryngology, which suggests that adult-onset OME is not uncommon. The main task for a clinician is to identify the underlying cause of the OME as well as alleviating the symptoms for the patient. Hence, endoscopic examination of the nose and nasopharynx is regarded as an essential part of the management, especially as our study reveals that 35.8 per cent of patients also had concomitant symptoms of chronic rhinosinusitis. Biopsy of the nasopharynx or computed tomography (CT) scanning is often necessary in unilateral OME to exclude a nasopharyngeal tumour. The examination of the nasopharynx was performed 15–27 months following ventilation tube insertion and biopsy of the nasopharynx. It was assumed that after such a long interval, any abnormality noted at the eustachian tube area was unlikely to be the residuum of the previous biopsy scarring. The present study concentrates on non-tumour related OME in adults. Over 20 per cent of patients in this study had endoscopic evidence of inflammation at the lateral nasal wall. This finding is in agreement with other reports that there is a strong connection between OME and chronic sinusitis. Finkelstein et al. reported that OME was the presenting symptom in 23 per cent of patients suffering from chronic sinusitis. In another prospective study on 167 consecutive patients with adult-onset OME, they reported that 19.8 per cent of the patients had a history of persistent nasal symptoms of more than three months duration prior to the onset of the OME. Nasal endoscopy of that particular group of patients revealed purulent discharge coming from the lateral nasal wall in over 70 per cent of the subjects and ethmoidal polypoidal disease in 45 per cent of the subjects.

It is commonly agreed that many cases of otitis media originate from ascending infection through the eustachian tube. Using restriction fragment

### TABLE III

<table>
<thead>
<tr>
<th>Appearance of eustachian tube orifice</th>
<th>All patients with VT insertion (n = 53)</th>
<th>Patients with VT extruded (n = 31)</th>
<th>Patients with VT still in situ (n = 22)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>26</td>
<td>8*</td>
<td>10</td>
</tr>
<tr>
<td>Mucopus at ET orifice</td>
<td>12</td>
<td>8*</td>
<td>4</td>
</tr>
<tr>
<td>Oedema/Hyperaemia at ET orifice</td>
<td>20</td>
<td>7*</td>
<td>9</td>
</tr>
</tbody>
</table>

Note: *Comparing the normal and abnormal appearance at the ET orifice between the OME recurrence group and No recurrence group using Pearson Chi-squared statistic, p > 0.05.

### TABLE IV

<table>
<thead>
<tr>
<th>Nasal endoscopic findings</th>
<th>Number of patients</th>
<th>Number of patients with concomitant symptoms of rhino-sinusitis (blocked nose, rhinorrhoea or sinus pain)</th>
<th>Number of patients with no symptoms of rhino-sinusitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>38</td>
<td>8</td>
<td>30</td>
</tr>
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mapping of non-typable *Haemophilus influenzae* recovered from paired nasopharyngeal and middle-ear fluid cultures in children with OME. Bernstein *et al.* reported that the strains of bacteria in the nasopharynx and the middle ear of a particular subject were indistinguishable, but that they were different between different subjects. They concluded that OME caused by *Haemophilus influenzae* involves spread of the bacteria from the nasopharynx to the middle ear. Takahashi *et al.* studied 78 adult ears with OME and observed oedema of the eustachian tube orifice in 26.9 per cent of the ears and mucopurulent discharge blocking the tube in 23.1 per cent of the ears. In our study, 51 per cent of patients still had evidence of inflammation at the eustachian tube orifice 15 to 27 months following ventilation tube insertion. It is, therefore, not surprising that 19 out of 31 patients (61 per cent) had recurrence of OME following extrusion of the ventilation tube and four out of the remaining 22 patients (18 per cent) had troublesome discharge from the ventilation tube. However, we could not demonstrate any difference in the endoscopic findings at the lateral nasal wall or at the eustachian tube orifice between the groups of patients with, and without, OME recurrence. The observation that over 50 per cent of all patients in this study had previous ventilation tube insertion was further evidence that the long-term benefit of ventilation tube alone in adult-onset OME is limited. It is interesting that Finkelstein reported that in 31 out of 33 adult patients who had OME associated with chronic sinusitis, the middle-ear effusion and negative middle-ear pressure were normalized after successful conservative or surgical treatment of the sinusitis. Marked regression of the hypertrophied adenoids and disappearance of the oedema and hyperaemia of the eustachian tube orifice were observed in all patients exhibiting resolution of sinusitis and OME. El-Guindy also reported that normalization of tubal function was achieved in 17 out of 32 patients after correction of the nasal and peri-tubal abnormality.

The present study also demonstrates a strong association between adult-onset OME and atopy. Twenty-three out of 53 patients (43 per cent) had a known history of atopy. More importantly, 30 out of 53 patients (57 per cent) had a positive skin-prick test. This is higher than among the general population, which has a reported positive skin-prick test of up to 30 per cent. This further supports the connection between atopy and OME in adults. Based on critical analysis of history together with allergy tests, Bernstein estimated that OME in children is also associated with allergy in 35 to 40 per cent of cases. In a double-blind study, Friedman *et al.* showed that provocative nasal challenge to an allergic individual produced eustachian tube obstruction, preceded by allergic rhinitis. More dramatic findings on the correlation between OME and allergy were reported by McMahan *et al.* They studied children with OME and found that 93 per cent of 111 children had a positive radio-allergosorbent test (RAST). They further reported a success rate of 91 per cent in treating refractory chronic otitis media with allergy therapy for inhalants and food. The role of IgE-mediated hypersensitivity in the development of OME is still unclear. It has been suggested by Bernstein *et al.* that in patients with OME, the middle-ear mucosa itself is rarely a target organ of allergy. They studied 100 children with recurrent OME and found that the IgE level in the middle-ear effusion was higher than that in the serum in only eight per cent. It was postulated by Bernstein *et al.* that the release of biological mediators of inflammation from basophils and mast cells at the nasal and nasopharyngeal mucosa produces eustachian tube oedema and inflammation. However, Hurst and Fredens studied the eosinophil cationic protein in the middle-ear mucosa in patients with both allergy and OME concluded that there is an intrinsic immune-mediated process involving eosinophils activated within the middle ear itself. Recognizing the importance of allergy in OME, Hurst investigated the use of immunotherapy and a food elimination diet in 20 patients with refractory OME. All 20 patients were found to have allergic sensitivity and for the 11 patients who complied with the allergy management, all had resolution of the OME and remained free of recurrence for more than three years. The other nine patients who either refused or could not comply with the allergy treatment had persistence of the OME. In the present study, none of our adult patients received either immunotherapy or a food elimination diet although those patients with hay fever and asthma had received a steroidal nasal spray or an inhaler prescribed by their general practitioner.
In contrast to the strong evidence in the literature concerning the relationship between OME, chronic rhino-sinusitis and allergy, we could not demonstrate a correlation between OME recurrence and the atopic status of the patients or the endoscopic findings in the nose and nasopharynx. However, we recognized that the number of subjects in the present study was relatively small. A prospective study involving a bigger number of patients may provide a more definitive answer in the future.

In conclusion, adult-onset OME is frequently associated with chronic rhino-sinusitis (21 per cent) or atopy (57 per cent). The resulting inflammation at the eustachian tube orifice often persists following insertion of the ventilation tube (51 per cent). Hence, treatment with ventilation tube alone frequently leads to failure, with either recurrence of the OME following ventilation tube extrusion (61 per cent) or troublesome discharge from the ventilation tube (18 per cent). Therefore, it seems logical to treat underlying pathology such as chronic sinusitis or atopy as there are encouraging reports in the literature of a more favourable outcome of OME following such treatment.

Acknowledgement
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References
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Address for correspondence:
Mr M. W. Yung, Department of Ear, Nose and Throat, The Ipswich Hospital NHS Trust, Heath Road, Ipswich, Suffolk IP5 4PD, UK.
Fax: 01473 287 135
E-mail: yung@doctors.org.uk

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