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Long-term follow-up of otitis media with effusion in children: Comparisons between a ventilation tube group and a non-ventilation tube group

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ABSTRACT

Objective: The objective of this study was to investigate the long-term outcomes in children with otitis media with effusion who received either medical treatment or ventilation tubes.
Methods: We retrospectively analyzed the medical records of 89 bilateral cases of otitis media with effusion in children who were recommended to receive ventilation tube insertion and were followed up for more than 5 years. Tympanic membrane was inspected by otoscopic examination. Hearing was evaluated with pure tone audiometry. The mean duration of follow-up was 8.4 years (range, 5.2–15.7 years). Twenty-three children were treated without surgery, while 22 were treated once by ventilation tube insertion and 44 were treated more than once by ventilation tube insertion.
Results: At the fifth year of follow-up, both groups of children who underwent ventilation tube insertion had more frequent tympanic membrane abnormalities than the medication group (8.7% in those treated without surgery, 72.7% in those treated once by ventilation tube insertion, and 88.6% in those treated more than once by ventilation tube insertion). Common tympanic membrane abnormalities were retraction (27.0%) and tympanosclerotic plaque (23.6%), regardless of the treatment modality. At the fifth year follow-up, the average air-conduction threshold was 10.0 dB (± 6.5 dB) in patients treated without surgery, 15.9 dB (± 11.2 dB) in patients treated once by ventilation tube insertion, and 17.8 dB (± 7.6 dB) in those treated more than once by ventilation tube insertion. The audiological difference was significant when we compared the hearing level of children treated by medication without surgery to the two ventilation tube groups.
Conclusion: Though ventilation tube insertion can resolve hearing loss quickly, there were more tympanic membrane abnormalities and a decline in hearing levels in our ventilation tube insertion group vs. the observation group measured 5 years later. Physicians should therefore be cautious when applying a ventilation tube in patients with otitis media with effusion and should explain the risks to patients who are a candidate for repeated ventilation tube insertion.

1. Introduction

The incidence of otitis media with effusion (OME) is relatively high in children, and hearing loss associated with OME may be significant if episodes of OME persist or recur at a critical age for linguistic development. Eventually, it may have a detrimental impact on speech and cognitive development [1–4]. The treatment modalities are comprised of watchful waiting, antibiotic treatment, or surgical intervention (myringotomy and/or ventilation tube).

Considering the immediate adverse effects of antibiotics and the emergence of bacterial resistance, the Cochrane review recommends that antibiotics should not be routinely used as a treatment for OME even though the relevant benefits of these drugs have been demonstrated [3,5]. A ventilation tube (VT) is generally used for the management of OME when conservative treatments have failed. The beneficial effects of VT include prevention of frequently recurring flare-ups of otitis media, and hearing improvement as a result of the restoration of ambient air pressure in the middle ear cavity [6,7]. On the other hand, there is an increased risk of eardrum pathology, including persistent tympanic membrane perforation, tympanosclerosis, atrophy,

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Table 1
Demographic data of the patient subjects with otitis media with effusion.

	OBS	VT1	VT2
Number of patients (total $N=89$)	23	22	44
Sex (M:F)	10:13	18:4	30:14
Mean age ± SD (years)	3.7 ± 2.4	6.2 ± 3.3	5.0 ± 3.7
Mean duration of follow up ± SD (years)	9.8 ± 3.5	7.9 ± 2.6	7.5 ± 2.4
Pretreatment audiologic test (no of patients)	6	11	20

SD, standard deviation; OBS, treated with medication but no surgery; VT1, treated by VT insertion once; VT2, treated by VT insertion more than once.

atelectasis, or retraction in children treated with a VT when compared with watchful waiting or medical management [8]. Therefore, selection of the appropriate treatment strategy in young children with otitis media with effusion is still controversial due to the high rate of spontaneous resolution, the low rate of complications, and the questionable effectiveness of medication [9–11] and surgery [12,13].

There have been a few reports on long-term results of OME managed by VT insertion and observation. Despite an abundance of new research, the lack of a proper control group under similar conditions with non-invasive treatment (for instance, medical treatment or observation) is a major problem in the effort to evaluate the efficacy of ventilation tube treatment [14]. Employing a 25-year follow-up period, Caye-Thomasen et al. reported that eardrum pathology was observed in 70% of ears treated by VT [15,16]. Therefore, comparison study between VT insertion and observation treatment is needed in OME patients.

The purpose of this retrospective cohort study was to investigate the long-term otological and audiological outcomes after treatments of OME between VT insertion and observation group. Otoscopic examination and pure tone audiometry were conducted 5 years after treatment in children with OME who have a similar pretreatment status and treated by either observation with intermittent medical treatment or VT insertion.

2. Materials and methods

2.1. Study design

We retrospectively analyzed the data of 162 children from April 1995 to November 2007 at the Department of Otolaryngology of the Asan Medical Center. The children were 10 years of age and younger and diagnosed with bilateral OME. Five-year end point examinations were performed with an otoscope and pure tone audiometry. Among the potential study participants, 73 were excluded because of a middle ear anomaly, an inner ear anomaly presentation with mixed hearing loss (HL), diagnosis of cholesteatoma, or a previous history of VT insertion. The patients who had confounding factors such as cleft palate or craniofacial anomalies were also excluded in this study. Ultimately, a total of 89 children were enrolled in this study and were treated by either observation with intermittent medication or VT insertion.

Data obtained from medical records included patient age, gender, date, treatment strategy, the number of surgical interventions, and the patient's medical history. This retrospective study protocol was reviewed and approved by the Institutional Review Board of the Asan Medical Center.

2.2. Patient groups

OME is defined as otitis media with middle ear effusion of any color and without the signs and symptoms of an acute infection such as fever, otalgia, orotorrhea. The decision to conduct a VT insertion was based on the following criteria: chronic bilateral OME for more than 3 months without response to antibiotic treatment, which also

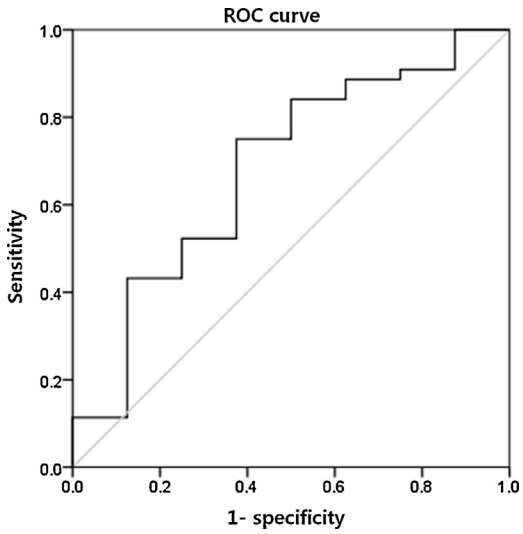

Fig. 1. ROC curve for tympanic membrane abnormality. ROC (receiver operating characteristic) curve was used in this study to determine a cutoff value (sensitivity 0.75, 1-specificity 0.375) for identifying relation between duration of placing tube and tympanic membrane abnormality.

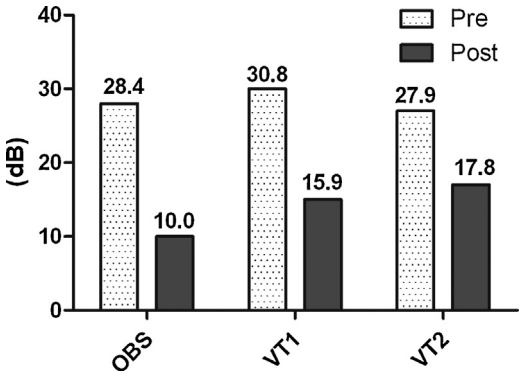

Fig. 2. Air-conduction (AC) threshold at pre- and post-treatment. The post-treatment hearing level was measured after the fifth year of follow-up. Hearing was improved after treatment in all groups. Pre, pre-treatment state; post, post-treatment state; OBS, treated with intermittent medication but no surgery; VT1, treated by VT insertion once; VT2, treated by VT insertion more than once.

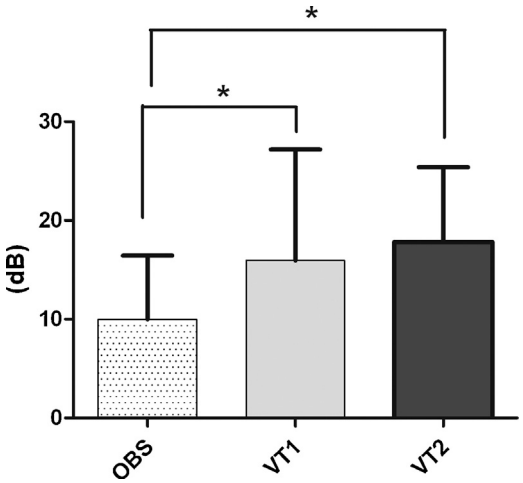

Fig. 3. Air-conduction (AC) threshold at the 5-year follow-up. Hearing level was better in the OBS group than in the VT1 and VT2 groups. Between VT1 and VT2, there was no statistical difference in hearing level. OBS, treated with intermittent medication but no surgery; VT1, treated by VT insertion once; VT2, treated by VT insertion more than once.