

Comparison of Adenoidectomy and Myringotomy with and without Tube Placement in the Short Term Hearing Status of Children with Otitis Media with Effusion: A Preliminary Report

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Abstract

Background: Otitis media with effusion (OME) is the most frequent indication for surgery in children. Some surgeons prefer to use adenoidectomy and myringotomy with tympanostomy tubes insertion to prevent the sequelae of the disease and also more improvement of hearing. The aim of this study is to compare adenoidectomy-myringotomy with adenoidectomy-myringotomy plus tympanostomy tube in the management of OME.

Methods: Thirty children with OME (age range 4-8 year) were randomly assigned to receive adenoidectomy with myringotomy in one ear or adenoidectomy, myringotomy plus tympanostomy tube insertion in the other. The patients were subjected to auditory examinations 1 and 6 months post operation to evaluate hearing levels.

Results: The results showed no significant difference in hearing level improvement between these two methods of surgery.

Conclusion: It is concluded that adenoidectomy with myringotomy is sufficient for management of otitis media with effusion in children in short term.

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Keywords • Otitis Media effusion • myringotomy • adenoidectomy • tympanostomy tube • hearing loss

Introduction

Otitis media with effusion (OME) is the most common cause of hearing loss and the most frequent indication for an operative procedure in children.¹ It is fair to say that this disorder is one of the most important unsolved pediatric problems in otolaryngology.² OME is a manifestation of recurrent or chronic upper respiratory tract infections whose epicenter usually lies in the nasopharynx.

The diagnosis of OME is established by the presence of persisting middle ear effusion behind an intact tympanic membrane without other signs of inflammation such as redness and bulging.¹ In clinical practice the actual duration is not known certainly and one may rely upon the presence of effusion and the absence of other inflammatory signs or symptoms as indicators of the diagnosis.³ The effusion is produced by the middle ear

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mucosa in response to a variety of bacteria and other plausible agents. This effusion usually results in a moderate conductive hearing loss, with average air conduction thresholds reaching around 27.5db.¹ Although, the prevalence of otitis media decreases with age, otolaryngologists often consider surgical therapy for improvement of the hearing and avoidance of long term sequelae.²

Neither the indications for surgical therapy nor the types and numbers of procedures are uniform; however, myringotomy, adenoidectomy, tympanostomy tube insertion, and even tonsillectomy have been used, alone or with several combinations.¹ Adenoid is shown to be an important factor in the pathogenesis of OME and it is recommended that adenoidectomy should be considered as the initial surgical procedure for better treatment of OME.^{3,4} In fact, adenoidectomy accompanying myringotomy with evacuation of middle ear effusion is preferred to tympanostomy tube insertion to avoid several complications. Previous studies have demonstrated conflicting results in this regard. The aim of the present study was to compare adenoidectomy-myringotomy with adenoidectomy-myringotomy plus tympanostomy tube insertion in treatment of OME.

Materials and Methods

A number of children with bilateral chronic middle ears effusion unresponsive to medical therapy, were assigned randomly to adenoidectomy plus myringotomy in one ear and adenoidectomy, myringotomy plus insertion of a tympanostomy tube in the other ear in a period of 18 months. After careful physical examinations, otoscopy, audiometry and tympanometry, the patients were referred to Khalili Hospital affiliated to Shiraz University of Medical Sciences for either treatments. Children with a history of prior adenotonsillectomy, tympanostomy tube placement, dry middle ear, cleft palate, and perforated tympanic membrane were excluded from the study. Before operation, conductive hearing thresholds with 500, 1,000, and 2000 Hz and the speech reception threshold (SRT) were measured (the adenoid size was evaluated under general anesthesia by palpation and direct vision).

All the patients were examined by speech reception audiometry one and six months postoperatively. The air bone conduction threshold was also measured in all except in three patients who were not cooperate in this examination.

The main purpose of this study was to compare hearing improvement results between adenoidectomy plus myringotomy (ADMX

groups) and adenoidectomy and myringotomy plus tympanostomy tube placement (ADTT group) regarding pure tone averages (air-bone gap) and speech reception threshold averages (SRT mean) separately.

Surgical Methods

A myringotomy incision was made at the inferior aspect of the tympanic membrane radially and the middle ear fluid was aspirated until dry. The aspirated fluid was categorized as serous, mucoid or purulent. One tympanostomy tube with 1.1 mm internal diameter of Sheppard type was inserted through the myringotomy incision in the previously randomly selected ear. Ten day courses of amoxicillin therapy (75 mg/day in three doses) was prescribed for all patients postoperatively. During the six months follow-up, Otoscopic and audiometric examinations was done one and 6 months postoperatively.

Statistical Analysis

The parameters described as mean ± SD. The data were analyzed using Chi Square. Statistical significance was considered as P<0.05.

Results

This study was done on 30 children (age range 4-8 yr, 19 boys and 11 girls). The demographic and clinical characteristics of the patients are depicted in tables 1, 2. Intraoperative finding are depicted in table 3. Preoperative audiogram in 27 patients showed bilateral conductive hearing loss. Mean pure tone averages were 25.1 and 26.3 in decibels hearing level (db HL) for ADMX and ADTT groups, respectively before operation. Mean ears difference was 1.15 db±3.25 SD. There were no significant differences in clinical and demographic variables among treatment groups preoperatively.

Table 1: Preoperative clinical data of the patients

Decreased hearing level	n (%)
Nasal obstruction and snoring	26 (87)
Recurrent otitis media	24 (80)
Serous otitis media	19 (63)
History of allergy	4 (13)
Smoking in parents	10 (33)
Total	5 (17)
Decreased hearing level	30

Table 2: Preoperative and intraoperative physical examination of the patients

	Number of patients (%)
Septal deviation	5 (17)
Turbinate hypertrophy	13 (43)
Adenoid enlargement	23 (77)
Allergic signs	10 (33)

Table 3: Middle ear content of the patients' ears and number (%) of the patients in each group.

	Content	ADTT	ADMX
Fluid	Serous	8 (33%)	8 (33%)
	Mucoid	14 (58%)	14 (58%)
	Purulent	2 (9%)	2 (9%)
	Total	24 (80%)	24 (80%)
No fluid		6 (20%)	6 (20%)

ADMX= Adenoideotomy plus myringotomy alone; ADTT= Adenoideotomy plus tympanostomy tube placement

Improvement in air-bone gap for ADMX group was 16.04db during the first month and 16.25db after six months. For ADTT group this improvement was 17.47db and 17.62db during the first and sixth months, respectively. There were no significant differences between the two groups regarding pure tone average after one and six months postoperatively.

Preoperative speech reception threshold (SRT) for the patients of both groups demonstrated bilateral conductive hearing loss consistent with pure tone averages preoperatively. Mean SRT in decibels hearing level (dB HL) were 24.8 and 25.6 for ADMX and ADTT groups, respectively before operation. Mean paired ears difference was also 0.83db+5.105 SD. There were no SRT differences among the treatment groups preoperatively. In contrast, SRT level for the first and sixth months after operative showed a significant improvement in speech reception thresholds in both assigned groups. The mean SRT for ADMX group was 17db and 17.16 db one and six months after operation, respectively. For the ADTT group, the mean SRT was 18.3db and 19.33db after the first and sixth months of operation respectively. However, there were no significant differences in the SRT averages between the two groups postoperatively.

Discussion

All surgical procedures used for treatment of otitis media with effusion are in fact a way of bypassing the middle ear ventilation pathway (eustachian tube) to prevent further complications of the disease. Some authors believe that the use of adenoideotomy with or without concomitant tympanostomy tube insertion provides long-lasting relief.² Others demonstrated that tympanostomy tubes inhibited the reappearance of chronic effusion as long as they were in place and functioning, but they did not appear to reverse the secretory condition of the middle ear.¹

Myringotomy with tube insertion provides longer middle ear ventilation and longer time of effusion free middle ear but this is not without risks, including otorrhea, tympanosclerosis, residual perforation, tympanic membrane atrophy.⁵⁻¹⁰ Myringotomy with tube insertion would cause social limitations for children for example their

going swimming and requires special care during the shower to avoid wetting of the ears.^{6,8,11} It is concluded that after adenoideotomy and myringotomy without tympanostomy tubes insertion, patients were largely free from the main sequelae of tympanostomy tubes, purulent otorrhea, and from the need for water precautions because of prompt sealing of tympanic membrane.¹ Therefore myringotomy without ventilation tube is preferred for management of OME.

Nowadays, in order to have longer opening of the incision some surgeons use CO₂ laser,¹²⁻¹⁴ or diode laser,¹⁵ myringotomy and others use topical application of mitomycin-c,⁶ on incision site. In one study, vitamin E coated ventilation tube was used to prevent tympanosclerosis formation.¹⁶ It is clear that surgical therapy does not cure patients with chronic otitis media with effusion but just provides ventilation for middle ear.¹

So far, there are many ears that are intubated by "tympanostomy tubes" unnecessarily. In one study adenoideotomy plus tympanostomy tubes showed results similar to those of adenoideotomy with myringotomy, and tympanostomy tubes gave little additional benefit with the highest incidence of otorrhea (22% of these patients had one or more episodes of otorrhea and the rate of otorrhea increased by repeated tube insertion).¹ So some investigators recommended that adenoideotomy should be considered as the initial surgical management for otitis media with effusion and concomitant bilateral myringotomy with suction aspiration of the middle ear contents should also be done, with or without placement of tympanostomy tubes at the discretion of the surgeon.¹

Although the purpose of our study is comparing hearing status in the two groups, our results showed that otorrhea was significantly related to the intubated ears (27% v 7%) and during the six month observation period, 17% of tympanostomy tubes were occluded resulting in non-functional state. These complications have been proved by several previous studies as well.¹

By comparing conductive hearing thresholds, there was no statistically significant difference between the two assigned groups, postoperatively. The difference between adenoideotomy plus myringotomy group (ADMX) and adenoideotomy plus tympanostomy tube group (ADTT) considering speech reception threshold (SRT), was 1.83db and 2.16db 1 and 6 months after operation, respectively. By considering air-bone gaps (pure tone average) the differences between two described groups were 1.43 and 1.37, 1 and 6 months postoperation, respectively. These differences were not significant. Our results address the priority of adenoideotomy plus myringotomy procedure due to the avoidance of

typanostomy tubes complications.

The limitation of our study is the short period of follow-ups, since longer periods of post-operative observations may demonstrate conflicting results in favor or against tympanostomy tubes. We chose six months of observation period mainly due to low cooperation of children's parents as a result of socio-cultural states. In our study, no significant difference was found in speech reception thresholds or air-bone gap averages between the first and sixth month's evaluations.

Conclusion

It is clear that surgical therapy does not cure the patients with chronic otitis media with effusion, but adenoidectomy-myringotomy reduces its morbidity significantly. Considering several complications of tympanostomy tubes placement, it is less recommended than myringotomy alone however, tympanostomy tubes placement can be reserved just for recurrent effusions. It should be emphasized that larger studies with longer periods of observation are needed to confirm our results.

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