

The Effects of Myringotomy and Ventilation Tube Insertion on the Hearing Level of the Patients with Serous Otitis Media Referring to 5th Azar Hospital in Gorgan, Iran (1999-2011)

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Article Type:

Original Article

Article History:

Received: 24 Jul 2020

Revised: 21 Oct 2020

Accepted: 31 Oct 2020

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DOI: [10.29252/jorjanibiomedj.8.4.4](https://doi.org/10.29252/jorjanibiomedj.8.4.4)

Abstract

Background and Objective: The eustachian tube (pharyngotympanic tube) connects the middle ear cavity to the nasopharynx, and its dysfunction leads to the accumulation of fluids in the middle ear and hearing loss. In such cases, irresponsiveness to pharmaceutical treatments urges myringotomy combined with ventilation tube insertion. Given the importance of the operation outcomes, the present study aimed to evaluate the effects of myringotomy and grafting on the patients with chronic serous otitis media (SOM) referring to 5th Azar Hospital in Gorgan, Iran during 1999-2011.

Material and Methods: This descriptive-analytical research was performed by reviewing the medical records of patients with SOM who underwent myringotomy and grafting and met the inclusion criteria. After the surgery, the patients were followed-up by the researcher, and those with available medical records who were followed-up for 1.5 years were enrolled in the study. The incomplete files were completed using the available documents in the medical statistics unit. The data of 94 patients were collected and analyzed in SPSS version 18.

Results: In total, 94 patients were assessed, including 50 males (53.2%) and 44 females (46.8%). Among 174 patients, 80 and 14 cases had bilateral and unilateral involvement, respectively. The highest frequency of the disease was observed in the age range of 5-10 years (n=51; 54.2%), and adenotonsillectomy was the most common concurrent surgery (n=83; 88.3%). After 18 months, 31 patients (32%) experienced hearing loss recurrence, four of whom had tympanic membrane perforation, four had otorrhea, and one had recurring SOM. In addition, seven out of 31 patients with hearing loss had severe allergies, while three, one, and one cases had a cleft palate, nasopharyngeal cancer, and cystic fibrosis, respectively.

Conclusion: According to the results, the follow-up of the patients with SOM is essential, especially in the cases with a known underlying cause, where further care is required due to the possibility of recurrence.

Keywords: Myringotomy, Ventilation Tube Insertion, Hearing, Otitis Media

Introduction

The middle ear is a cavity bounded by the tympanic membrane on one side and connected to the nasopharynx through the eustachian tube, which is normally closed and opens while yawning or swallowing. Air enters the middle ear with the opening of the eustachian tube, thereby leading to the establishment of equal air pressure on both sides of the tympanic membrane. Eustachian tube dysfunction leads to the absorption of the trapped air by the lining of the middle ear and formation of negative pressure, thereby causing the accumulation of serous fluid and a disease known as serous otitis media (SOM) or chronic otitis media with effusion (COME). Studies have estimated that 80% of children are affected by otitis media with effusion (OME) at some point (1). The disease most commonly occurs between the ages of six months and four years, affecting more than 50% of children within the first year of life. While most OME episodes resolve spontaneously within three months, approximately 30-40% of children experience repeated OME episodes, and 5-10% of these episodes last for one year or more (2).

Some of the main causes of eustachian tube dysfunction include the hypertrophy of the tonsils and adenoids, allergies, cleft palate, recurrent sinusitis, autoimmune diseases, and deviation of the nasal septum. Despite the lack of a direct association between the size of the adenoids and hearing loss, recurrent nasopharyngitis has been reported to cause OME (3). In addition, a submucous cleft palate may be associated with OME due to the impairment of the tensor veli palatini muscle (4). On the other hand, nasopharynx tumors may cause SOM due to the blockage of the eustachian tube path. Even the radiotherapy of the patients with head and

neck cancer has been proposed to increase the possibility of SOM (5). In most of the cases, patients with SOM are young, and a study in this regard has reported the higher prevalence of the disease within the age range of 6-8 years (6). With aging, the possibility of the disease may be diminished by the immune system and inflammatory responses (7). While SOM occurs bilaterally, nasopharyngeal carcinoma should be considered, and the biopsy of the nasopharynx is required when the disease occurs unilaterally in adults. SOM often has no acute symptoms due to the slow and chronic course of the disease. Adults with SOM tend to complain of fullness in the ear and know about tinnitus, while in children, parents often learn about the condition based on the fact that their children turn up the volume of the TV or do not notice the surrounding sounds (1).

In such cases, the examination of the eardrum shows no perforation or the possible inward stretch. Following a physical examination, diagnosis is made by the detection of transient hearing loss and type B tympanograms via audiometry and tympanometry, respectively. A thorough ear, nose, and throat examination should be performed to determine the underlying cause of eustachian tube dysfunction. These patients primarily received medication therapy with antibiotics and antihistamines. While the consumption of intranasal corticosteroids and antihistamines cannot control the disease in the long run, it could decrease the disease recurrence (7). Surgical treatment is also recommended in case of failure of pharmaceutical treatment and continuous discharge with hearing loss within 4-6 months. In general, surgical treatment is aimed at treating the underlying factors and myringotomy combined with the placement of middle ear ventilation tubes (1,

8). During the surgery, an incision is made in the tympanic membrane to drain the pus from the middle ear, and the ventilation tube is placed inside the tympanic membrane (9). In a research, the optimal site for an incision was reported to be the anteroinferior quadrant of the tympanic membrane (10). If not treated, SOM may lead to complications such as tympanosclerosis, retraction pockets, adhesive otitis media, and speech disorders, which is considered to be a form of public health disorder (6).

Although normal hearing ability often returns following surgery, SOM recurrence may be observed after the removal of the ventilation tube and repair of the tympanic membrane. In addition, the surgery may be associated with complications such as otorrhea, lack of repair of the tympanic membrane, and cholesteatoma. Given the importance of the surgery outcomes, the final hearing status of the patients, and the possible complications, the present study aimed to evaluate the effects of myringotomy and ventilation tube insertion on the patients with chronic SOM referring to 5th Azar Hospital in Gorgan, Iran during 1999-2011.

Materials and Methods

This cross-sectional, descriptive-analytical study was performed on the patients undergoing myringotomy and ventilation tube insertion in Gorgan during 1999-2011. We reviewed the medical records of the patients with complaints of hearing loss, fullness of the ear or respiratory problems due to tonsillar hypertrophy and deviation of the nasal septum, as well as COME diagnosis after the physical examination and auditory tests and surgical indication. In addition, the diagnostic criteria of transient hearing loss above 30db and type B tympanometry were observed in the participants. The medical records of the

patients, who had been followed-up for 18 months after the surgery, were assessed in terms of age, gender, underlying predisposing factors, eustachian tube dysfunction, allergies, the involved side, and hospital documents, and the cases with recurrent hearing loss, otorrhea or cholesteatoma were determined. Moreover, the cases without improvement despite the pharmaceutical treatment and reoperation were identified.

In order to complete the data of the patients, the data of those not referring for the follow-up or those with incomplete records were obtained from the medical statistics unit, and the missing data were completed via phone call. The exclusion criteria of the study were SOM diagnosis and medication therapy, unwillingness to participate in the study, and incomplete data. Data analysis was performed in SPSS version 18 using Chi-square, and the relative risk was estimated at 95% confidence interval.

Result

In total, the medical records of 113 patients were assessed, 19 of which were eliminated from the research due to incomplete data, inaccessibility or lack of referral for the follow-up. Finally, the medical records of 94 patients were evaluated, among which 80 patients underwent bilateral surgery, seven cases underwent left-sided surgery, and seven patients underwent right-sided surgery. As such, 174 ears undergoing surgery were evaluated, and the patients were divided into five age groups. Table 1 shows the number of the patients in each group. As is observed, the majority of the patients were within the age range of 5-10 years (Table 1).

Table 1. Frequency Distribution of Patients in Terms of Age

Age (year)	n (%)
0-5	11 (11.7)
5-10	51 (54.2)
10-15	24 (25.5)
15-20	4 (4.3)
20 <	4 (4.3)
Total	94 (100)

The type of the surgery combined with myringotomy and placement of the middle ear ventilation tubes were assessed, and the obtained results indicated that the majority of the patients underwent adenotonsillectomy ([Table 2](#)).

Table 2. Frequency Distribution of Simultaneous Surgeries with Ear Surgery

Type of Surgery	n (%)
Adenotonsillectomy	83 (88.3)
Adenoidectomy	5 (5.3)
Septoplasty	2 (2.1)
Nasal Endoscopy	1 (1.1)
Ear Surgery	3 (3.2)
Total	94 (100)

In the current research, 63 (67%) out of 94 patients who were followed-up for 18 months regained normal hearing, while 31 cases (33%) experienced hearing loss. Among these patients, 24 cases had hearing loss in both ears, while three and four cases had hearing loss only in the left and right ear, respectively. In other words, postoperative hearing loss was detected in 55 out of 174 ears. Therefore, the prevalence of hearing loss was calculated to be 31.6, showing that the incidence of hearing loss was 31.2% in the patients undergoing

surgery in both ears and 35.7% in the patients undergoing surgery in only one ear. In addition, four out of 94 patients (4.25%) experienced the recurrent tear of the tympanic membrane, while four cases (4.25%) had otorrhea.

Out of 31 patients with hearing loss, 23 cases (74.19%) had recurrent OM. In addition, seven patients (22.58%) had allergies, and three (9.67%), one (3.22%), and one cases (3.22%) had a cleft palate, nasopharyngeal cancer, and cystic fibrosis, respectively. The other patients had no known underlying factors. In terms of the correlation between hearing loss and gender, 63 out of 94 patients (67%) had favorable hearing, while 31 patients (33%) had hearing loss. In total, 50 patients were male, and 44 were female. Among the female patients, 30 cases (68.2%) had favorable hearing, while 14 cases (31.8%) had hearing loss. As for the male patients, 33 cases (66%) had favorable hearing, and 17 cases (34%) had hearing loss. Nevertheless, the analysis of the results showed no significant association between hearing loss and gender.

Discussion

In the present study, 50 out of 94 patients (53.2%) were male, and 44 (46.8%) were female. In the study by Sarfaraz and Rekabi, which was conducted on patients with SOM undergoing surgery, the majority of the patients were male ([11](#)). In addition, Safar et al. performed a research on patients with SOM, and the majority were female (23 males vs. 26 females) ([12](#)). Despite the difference in the gender of the patients, the difference has not been considered significant.

In the current research, 51% of the patients were within the age range of 5-10 years, which represented the highest frequency of

the disease, and the frequency decreased with age. In the research by Safar et al., the majority of the patients with SO were aged 5-6 years (12). Moreover, Sarafraz et al. reported the highest frequency of the disease in the age range of 4-6 years. The comparison of these findings indicated that the disease is most common in childhood. In terms of the underlying factors of SO and receiving simultaneous surgery, the results of the present study demonstrated that 83 patients (88.3%) underwent adenotonsillectomy, and 50 patients (5.3%) underwent adenoidectomy. Furthermore, only one patient had a nasopharyngeal tumor, which was simultaneously biopsied by endoscopy, and intubation was also carried out for this elder patient. In the research by Sarfaraz and Rekabi, the patients requiring surgery reported large adenoids more frequently than the other underlying factors, which is in line with our findings since in the present study, adenoids were removed simultaneous with the tonsils in most of the patients. In addition, nasopharyngeal carcinoma was observed in one case. Among the other underlying causes were male gender, living in nursing homes, smoking habits in the family, and systemic diseases (11). Moreover, Hurst D. S. and M. C. Coul reported the key role of allergies and gastroesophageal reflux into the esophagus in the development of SOM, respectively (13, 14).

In the present study, 63 patients (67%) had favorable hearing, while 31 cases (33%) had hearing loss after 18 months, four of whom also presented with otorrhea, four had tympanic membrane perforation, and 23 had recurrent SOM. In a research by Davies-Husband et al., 43% of the patients had normal hearing after tympanostomy (15). However, Song et al. reported better results in this regard compared to the present study as

they observed recurrence in only 17% of the patients, which was significantly lower than our findings (n=23; 24.46%). Similarly, Nurliza and Lim confirmed the positive effect of surgery on hearing (16). The discrepancy in this regard could be due to differences in the follow-up period or underlying factors of the patients. Among the female patients in the current research, 30 cases (68.2%) had favorable hearing, while 14 cases (31.8%) had hearing loss. Meanwhile, 33 male patients (66%) had favorable hearing, and 17 cases (34%) had hearing loss. Despite the difference between the gender and hearing results, it was not considered significant (P=0.499). In a study by Yaman et al., the recurrence rate was reported to be lower in male patients compared to females, while the difference was not considered significant (2); this is consistent with our findings.

In the current research, the main underlying factors in the patients who had recurrence or unfavorable outcomes included allergies, cleft palate, nasopharyngeal cancer, and cystic fibrosis, and allergies was the most common causative factor. Consistently, Sarfaraz and Rekabi (11) mentioned these underlying factors, and Hurst D. S. confirmed the role of allergies in this regard (13).

Conclusion

According to the results, myringotomy and ventilation tube insertion yielded proper outcomes in the patients with SOM. Therefore, it is recommended that patients be followed-up considering the recurrence of the disease in the presence of some underlying factors. In addition, it is suggested that proper training and education be provided to SOM patients regarding the possibility of disease recurrence and the required treatments.

Acknowledgments

This article was extracted from a PhD dissertation registered at the School of Medicine of Gorgan University of Medical Sciences (code: 610) and approved by the Ethics Committee of the university (letter No. P/35/355266) on March 10th, 2020. Hereby, we extend our gratitude to all the personnel of the ear, nose, and throat clinic and experts of the medical statistics unit, especially Ms. Sepideh Sadat Hosseini, for assisting us in this research project.

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How to cite:

Taziki M.H. The Effects of Myringotomy and Ventilation Tube Insertion on the Hearing Level of the Patients with Serous Otitis Media Referring to 5th Azar Hospital in Gorgan, Iran (1999-2011). *Jorjani Biomedicine Journal*. 2020; 8(4): 4-10.