



Review Article

To remove or not to remove: Review of cases of medial migration of tympanostomy tubes[☆]

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ARTICLE INFO

Article history:

Received 21 June 2015

Received in revised form 4 August 2015

Accepted 5 August 2015

Available online 14 August 2015

Keywords:

Medialized tubes

Medialization

Medial migration

Ventilation tubes

Tympanostomy tubes

ABSTRACT

Objective: Few cases of medial migration of tympanostomy tubes have been reported and its optimal management has not been well delineated especially in asymptomatic patients. The aim of this review is to present all cases of medialized tympanostomy tubes reported in the literature in order to provide the most beneficial management option.

Methods: Eligible articles were identified through a comprehensive search in Cochrane, Embase and Medline electronic databases. Two reviewers independently screened the data sources, using pre-defined inclusion criteria to generate a list of eligible articles. Data extracted included patient demographics, diagnosis, type of tube, timing of migration, presenting symptoms, examination outcomes, treatment and follow up.

Results: 10 articles were chosen for data extraction from which 29 patients presenting with medial migration of tympanostomy tube were identified.

Conclusion: The low complications associated with removing a medialized tube and the risk of leaving foreign objects in the middle ear cleft make myringotomy for removal of the tube a practical and safe management option for medialized tubes even in asymptomatic patients.

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Contents

1. Introduction	1794
2. Methods	1794
2.1. Sources of data and search strategy	1794
2.2. Criteria for inclusion	1794
2.3. Study selection	1794
3. Results	1794
3.1. Demographics	1794
3.2. Characteristics and incidence of medial migration of tympanostomy tubes	1794
4. Discussion	1794
4.1. Mechanism behind medial migration of tubes	1794
5. Should medialized tubes be surgically removed in asymptomatic patients?	1795
6. Conclusion	1797
Acknowledgements	1797
References	1797

[☆] This study was presented at the American Society for Pediatric Otolaryngology meeting, Boston, MA, April 2015.

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1. Introduction

Tympanostomy tube placement is the most common ambulatory surgical procedure performed in children according to Rosenfeld et al. [1]. It is estimated that up to 17% of patients who have tympanostomy tubes placed will develop some sort of complications [2,3]. These include otorrhea, peritubal drum atrophy, scarring, granulation tissue, tympanosclerosis, persistent perforation, blockage of the tube lumen, premature extrusion, cholesteatoma formation and tympanostomy tube displacement into the middle ear [4–6].

Medial migration of a tympanostomy tube is a rare occurrence where the tube migrates into the middle ear space as opposed to normal extrusion laterally into the external auditory canal. A meta-analysis conducted by Kay et al. indicated a 0.5% rate of medial displacement of tympanostomy tubes, concordant with Groblewski et al.'s occurrence rate of 0–1.1% [2,4]. However, medialized tubes are underreported because they are not always visible on otoscopic evaluation especially when the TM is opaque, the tube has migrated into the hypotympanum or the tube is white. The underlying mechanisms behind this complication are not well delineated but are believed to be eustachian tube dysfunction, technical errors in insertion, and biofilm formation on the medial surface of the tubes [2,7].

Given the infrequency of medialized tympanostomy tube in otolaryngology practice, it is understandable why there is a lack of consensus in the literature dedicated to the specific management of this condition. Only a few cases of medial migration of tympanostomy tubes have been reported. In asymptomatic patients with normal otoscopy and hearing many otolaryngologists decide to leave the tube in place in the middle ear, while others advocate removal to avoid the potential risk of middle ear inflammation, foreign body granuloma, ossicular erosion and its sequel.

The aim of this review is to present all cases of medial migration of tympanostomy tubes for which treatment was discussed in order to delineate the most beneficial management option.

2. Methods

2.1. Sources of data and search strategy

A literature review was completed in order to elucidate the occurrence of middle ear migration of tympanostomy tubes and present its outcomes. Eligible articles were identified through a comprehensive search in Cochrane, Embase and Medline electronic databases. Articles written in English and French, published between January 1978 and February 2014 were considered. The search strategy included medical subject headings, sub-headings, and text words such as “migration”, “tympanostomy tubes”, “PE tubes”, “middle ear”, “medialized”, “grommet” and “foreign body”.

2.2. Criteria for inclusion

The inclusion criteria for this review were articles describing a single or many cases of medial migration of tympanostomy tubes. Articles mentioning middle ear migration as a complication of tubes but did not report cases were excluded. All included articles had to discuss whether intervention or observation was conducted post medial migration of tubes.

2.3. Study selection

Two authors independently reviewed the titles and abstracts retrieved by the electronic search and removed studies non-concordant with the criteria for study eligibility. The lists of articles

from each author were jointly reviewed and a common list was created. All relevant articles underwent second stage review and were examined in full texts to revalidate inclusion.

3. Results

3.1. Demographics

A total of forty-nine (49) articles were identified by the electronic databases search. Following review of titles and abstracts, nineteen (19) articles were selected for full review. A search of the reference lists from relevant studies was also performed and 1 study was added. A total of ten (10) articles were chosen for data extraction from which twenty-nine (29) patients presenting with middle migration of tympanostomy tube were identified. The flow diagram of the search strategy is demonstrated in Fig. 1.

3.2. Characteristics and incidence of medial migration of tympanostomy tubes

Demographic data for included patients from each study are summarized in Table 1. Out of 22 patients with documented gender and age, a 1.75:1 ratio for male predominance was observed (14 male; 8 female). 14 patients were pediatric and 8 were adults. Table 1 summarizes the clinical findings and chosen treatment modality. All patients included in this review received tubes due to recurrent acute otitis media, chronic otitis media or otitis media with effusion. All but 1 patient had unilateral migration of tubes. The laterality of migrated tubes was reported in 18 cases; 12 in right ear and 6 in the left. When mentioned, the specific type of tubes inserted by the otolaryngologist varied among patients (3 Shah, 2 Shepard, 2 Richards, 2 Armstrong, 1 Donaldson, 1 Pope, 1 Reuter Bobbin, 1 Paparella type I). The time of medial migration greatly varied among patients. The earliest detection of medial migration of tube was at 3 weeks post insertion, while the latest was 22 years post insertion. Symptoms reported occurred when medial migration was not detected or surgical removal was not opted. Hearing deficit was the most frequent symptom observed in 13 patients (8 conductive hearing loss, 2 sensorineural hearing loss, 2 plugged ears, 1 muffled hearing). Audiology, otoscopic and general evaluation revealed that 8 ears had presence of effusion, 5 patients were asymptomatic and 2 complained of dizziness. Perforated, retracted and thickened tympanic membranes (TM) were also observed. In 7 cases where the tube was removed from the middle ear, a new tube was reinserted. In one of these cases, a remigration of a newly inserted tube occurred [5].

4. Discussion

4.1. Mechanism behind medial migration of tubes

The mechanism behind medial displacement of tympanostomy tubes is not thoroughly understood. As seen by the present review, medial migration seems to be independent of tube type and occurs at various intervals after placement. One hypothesis is that the tube might migrate medially as a result of persistent negative middle ear pressure, as often the tube is initially seen in the correct position but later found medial to a healed intact tympanic membrane [2]. Some authors assume that an atypically long myringotomy incision would result in the outer rim of the tube lying partially inside the TM when inserted preventing keratin from being collected in its groove; the mechanism of the extrusion of tubes [10]. The tube could then be pushed medially and the TM can heal completely over it. Another theorized mechanism behind

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