



Staged tympanostomy tube placement facilitates pediatric cholesteatoma management

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Summary

Objectives: Evaluate results of middle ear ventilation with or without adenoidectomy prior to definitive cholesteatoma surgery in children with concomitant middle ear effusion.

Methods: Charts of 40 children seen in follow-up for acquired or congenital cholesteatoma were reviewed. Nine children underwent staged tympanostomy tube placement for concomitant middle ear effusion. Computed tomography was obtained after placement of tubes in all patients. Extent of disease by tomography was compared to disease extent at definitive surgery. Details of cholesteatoma surgeries, most recent disease status, and length of follow-up were recorded.

Results: Three children had extensive congenital cholesteatoma, while six had acquired disease. All nine children underwent tube placement (four with adenoidectomy) prior to definitive surgery. Computed tomography obtained after middle ear ventilation accurately predicted extent of cholesteatoma involvement. Seven atticotomies, two tympanomastoidectomies, and one revision mastoidectomy were performed. Follow-up ranged from 9 to 99 months with a median of 54 months. All were free of cholesteatoma at latest assessment.

Conclusions: Staged tympanostomy tube placement with or without adenoidectomy prior to tympanomastoidectomy allows superior delineation of cholesteatoma extent pre-operatively and facilitates surgery in children with concomitant middle ear effusion. Adenoidectomy may improve eustachian tube function and decrease the risk of recurrent disease.

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1. Introduction

The management of pediatric cholesteatomas remains a challenge [1]. Some authors have argued

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that cholesteatomas in children are innately more aggressive than those in adults [1,2]. It is likely that the high incidence of persistent eustachian tube dysfunction in the pediatric age group can lead to reconstructive failure, residual conductive hearing loss from middle ear effusion, and recurrence of cholesteatoma after otherwise adequate surgery [3]. Furthermore, middle ear surgery in children with obstructed eustachian tubes and chronically inflamed, hyperplastic mucosa is technically difficult and may lead to incomplete resection and residual disease.

Much has been written about the favorable effects of middle ear ventilation in reestablishing mucosal health and normal mucociliary function [4]. Pressure equalization can abruptly abort early cholesteatoma formation [5]. The addition of adenoidectomy to tube placement sometimes can restore eustachian tube function and middle ear ventilation long term [6–8].

Despite the well-established relationship between eustachian tube dysfunction in the development of acquired cholesteatoma, little has been written about the appropriate timing of tympanostomy tube placement or the role of adenoidectomy in the long-term management of this disease. Over the last several years, the senior author (GI) has employed pre-operative tympanostomy tube placement with or without adenoidectomy in the management of acquired cholesteatomas and large congenital cholesteatomas causing eustachian tube obstruction. This paper reviews the results of this approach and describes the advantages of pre-operative middle ear ventilation in the surgical treatment of extensive pediatric cholesteatomas.

2. Methods

The charts of 40 children seen in follow-up at an academic tertiary care setting for acquired or congenital cholesteatoma during the period April 2001 to August 2004 were reviewed in accordance with the protocol approved by the Temple University Committee for the Protection of Human Subjects. Children were identified who had concomitant middle ear effusion and who underwent staged tympanostomy tube placement with or without adenoidectomy prior to cholesteatoma removal. Computed tomograms obtained after placement of tubes in these children were assessed to define the extent of disease. The extent of cholesteatoma based upon CT was compared with the description of the cholesteatoma systematically recorded by the senior author at surgery. In addition, basic demographic data, length of follow-up, addition

of adenoidectomy to the tympanostomy procedure, type of cholesteatoma surgery, number and type of revision procedures, and most recent overall status of disease were recorded.

3. Results

Nine of the 40 children had concomitant middle ear effusion and underwent staged tympanostomy tube placement. Four children had an adenoidectomy in addition to tympanostomy tubes. The description of cholesteatoma location and extent based upon computed tomography matched the intra-operative description in all cases. The surgical procedures performed included seven atticotomies, one canal-wall-up tympanomastoidectomy, one canal-wall-down tympanomastoidectomy, and one revision mastoidectomy. The revision case was required for control of recurrent disease. Median follow-up was 54 months with a range of 9–99 months. All are free of active disease at most recent assessment. Table 1 presents demographic data and surgical details of each case. Table 2 summarizes audiogram results.

4. Discussion

Middle ear fluid following acute otitis media will resolve spontaneously in the vast majority of children within 6–12 weeks [9]. This resolution does not tend to occur in children with chronic middle ear effusions that have produced acquired cholesteatomas or when a congenital cholesteatoma mechanically obstructs the eustachian tube orifice. In such cases, there are several advantages to the placement of a tympanostomy tube under general anesthesia prior to definitive surgery.

- (1) *Careful examination of the drum under anesthesia*—In young uncooperative children, accurate visual assessment of a draining ear sometimes is not possible in the office setting. The brief general anesthetic given during tympanostomy tube placement offers an opportunity to thoroughly clean the ear, determine the absence or presence of a cholesteatoma, and to make some estimation of its extent.
- (2) *Stabilization of middle ear disease*—After a tympanostomy tube has been placed, the effect of negative middle ear pressure on the drum and associated retraction pocket is temporarily relieved. This sometimes permits the mechanical reduction of a small acquired cholesteatoma [5]. If definitive surgery is to be delayed by weeks or months because of medical or social

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