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Management of Cholesteatoma: Experience at the Hearing and Speech Institute

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Abstract

Cholesteatoma in children presents characteristics that differentiate it from the adult condition. The surgical management of cholesteatoma in children remains a controversial subject. The purpose of this paper is to study a group of children and adults who underwent the surgical removal of their cholesteatoma at the Otolgy Department at Hearing and Speech Institute between 1987-1990. Open techniques were performed in 62% of adult cases and 69% of children, whereas the closed technique was done in 38% of adults and in 31% of children. A comparison of the results and complications in the two groups is presented in detail.

Introduction

CHOLESTEATOMA is a pathological entity, characterized by a bone eroding skin lined cavity filled with concentric layers of desquamated squamous epithelium. The diagnosis of cholesteatoma in adults is not difficult. There is usually a history of recurrent otorrhea (foul smelling) with hearing loss. children with cholesteatoma, on the other hand, may go undetected for several years. There are several reasons for this. Many times there is no pain or drainage associated with cholesteatoma and the hearing loss may not be detected particularly when only one ear is involved. Some children have small, tortuous ear canals and it is difficult to examine them even with the aid of a microscope. A foul smelling discharge of any type in a child with perforation is almost certain to be associated with cholesteatoma, also when an aural polyp is present in a child, it is almost always a sign that cholesteatoma is present. Mastoid X-rays and polytomes are helpful in determining the extent of disease and the presence of complications but are usually not needed to establish the diagnosis [1].

A number of surgical approaches have been advocated for the removal of cholesteatoma. Prior to tympanoplasty the radical mastoidectomy was the procedure of choice for all but a few patients with cholesteatoma for whom the modified radical mastoidectomy could be used. During the 1950's and early 1960's reliable techniques for reconstruction of the tympanic membrane were developed that allowed the otologic surgeon the opportunity to restore middle ear function after removal of the

disease [2]. Tympanoplasty was combined with open mastoidectomy, restoring the middle ear space as in a modified radical mastoidectomy.

Tympanoplasty also allowed the presentation of the posterior canal wall, as in the posterior tympanotomy or facial recess approach, as well as the transcanal approaches.

For the last 30 years the pendulum of popularity has swung from open procedures to intact canal wall procedures and back again. Each technique is strongly advocated by outstanding and experienced surgeons who utilize their favoured approach in most of their cases [3,4].

Rather than learning a single approach for cholesteatoma, today's otologic surgeon should select the best surgical approach for each individual patient based on the patients history, the anatomy of the temporal bone and the extent of the disease process [5].

The treatment of pediatric cholesteatoma presents many problems for the otologist. First, the physician must make a correct and early diagnosis. Second, the otologist must provide a disease free ear that will remain stable through adulthood and be easily followed. Third, a serviceable hearing level, which is important for the development of normal language and communication skill should be achieved. Fourth, the otologist should educate the family as to the nature of the disease, the need for long-term follow up and the possibility for further radiodiagnostic studies, reconstructive surgery and aural rehabilitation [6]. Most authors agree that cholesteatoma in children is more aggressive and undergoes faster growth than in adults [7]. Many authors also stated that the growth of cholesteatoma in the middle ear tended to involve the ossicles more frequently in children [8,9]. In comparison the adult cholesteatomas, fistulas of the semicircular canals, facial nerve paralysis and intracranial complications occurred less frequently in the pediatric group.

The subject of greatest disagreement among otologist relates to the choice of surgical approach. However, various studies demonstrated that successful treatment of cholesteatoma in the pediatric age group can be achieved by using the same basic principles of therapy used for cholesteatoma in adults.

Material and Methods

In the present study we report our experience on a group of patients with cholesteatoma. This series includes 99 patients who were operated upon in the department of ear surgery at the Hearing and Speech Institute between 1987 and 1990.

There were 38 bilateral cases, 18 patients were lost to follow up. The remainder patients (8 patients) were 52 adults and 29 children (younger than 16) there were 18 males in the children group and 36 in the adult group.

For each patient, history, examination of ears, nose and throat, including routine microscopic examination in the office and audiological evaluation. The hearing tests consisted of pure tone thresholds with proper masking and speech discrimination. Each patient mastoid X-ray, special attention was paid to the nose and sinuses. Sinoscopy was done for patients with suggestive history of nasal obstruction or sinusitis.

Canal-wall down mastoidectomy was performed in children with extensive disease, sclerotic mastoids and poor eusta-

chian tube function (20 cases) whereas canal wall up procedures were done in patients with localized disease (9 cases). In adults, the type of operative procedures to eradicate the disease were similar, where Canal wall down procedures were done in 32 adult cases and Canal wall up procedures were done in 20 cases.

Results

The pre-operative symptoms are summarized in table 1. The presenting symptoms were, hearing loss, otorrhea, otalgia, tinnitus and vertigo. Hearing loss and otorrhea were the commonest presenting symptoms.

Examination of the ear revealed a variety of abnormalities (table 1).

The most common finding was retraction pockets either in the tympanic membrane (T.M) or extending to mastoid was observed in 68% of the acquired patients, granulation tissue occurred in 41% and 39% of the patients had a tympanic membrane perforation. Marginal perforations (secondary acquired cholesteatoma) were more common than attic perforation (Primary acquired cholesteatoma).

Radiographic studies were available in 40% of patients examined. The mastoid in children were reported as pneumatized in 40%, one half of these having clouding of the air cells, and in 60% the mastoid was sclerotic. Primary operations employed were either intact canal wall up procedures (tympanoplasty or tympanoplasty with mastoidectomy) in canal wall down procedures (modified radical mastoidectomy or radical mastoidectomy). A planned second stage procedure was performed in 10 children (34%) and 17 adults (32%).

The destructive properties of cholesteatoma were evident during surgery. The ossicles were most vulnerable in the pediatric acquired series, where erosion of the incus occurred (79%) where involement of the malleus was in 44.8% of the cases, also the stapes arch was absent in 75% of cases when compared with adults, almost 71% of the cases had involvement of the incus and 40.3% malleus affection whereas in 63% of the cases the stapes arch was absent. The ossicular chain was intact in 5% of cases pediatric cases, where in adults it was intact in (9%) of cases.

There were no deaths, meningitis, brain abscesses or lateral sinus thrombosis in this series.

The major complications were the involvement of the labyrinth and facial nerve, while in the open cases infected cavities were of great concern. Graft breakdown, recurrence of cholesteatoma and hearing loss also occurred.

Infected cavities occurred in 14 cases (43%) of the adult series and in 8 cases (40%) of the children who underwent open surgery. The facial nerve bony covering was eroded in 2 adults (3.8%) whereas this complication did not occur in any case of the pediatric age group. Neither the cholesteatoma nor surgery to eradicate it produced any facial nerve weakness or paralysis.

Discussion

The diagnosis of cholesteatoma in children can be a difficult task. Being uncooperative and their small, tortuous ear canals make examination difficult. The successful treatment of pediatric cholesteatoma can be achieved by using the same basic principles of therapy used for cholesteatoma in adults. Yet, still the subject of greatest disagreement among otologists relates to the

Table (1): Clinical Profile.

	Pediatric %	Adult %
Symptoms		
Hearing loss	8.62	94
Otorrhea	79.3	90.3
Otalgia	37.9	26.9
Tinnitus	10.3	23
Vertigo	6.8	19.2
Signs		
Site of cholesteatoma		
Post. epitympanuma	68.9	84.6
Ant. epitympanum	62	63.4
Antrum	65.5	69.2
Sinus tympani	31	57.6
Eust. tube	6.8	11.5
Petrous apex		
Retraction pockets		
Post. superior	37.9	32.6
Attic	27.5	21.1
Entire membrane	3.4	1.9
Perforations		
Attic	16.5	30.7
Marginal	13.7	9.6
Central	10.3	3.8
Others		
Granulations	41	48
Polypi	13.4	15

Table (2): Condition of the Ossicular Chain.

Condition of ossicular chain	Pediatric		Adult	
	No.	%	No.	%
Incus erosion	23	79.3	37	71
Malleus erosion	18	44.8	28	40.8
Stapes arch absent	22	75.8	33	63.4
Stapes arch present	5	17.2	14	26.9
Ossicular chain intact	2	2.1	5	9.6

Table (3): Operations Done.

Operation	No. of cases	%	No. of Recc.	%
Adult				
CWD	32	62	2	6
Modified radical mast.	6		1	17
Radical mastsidoctomy	26		1	4
CWU				
Intact wall technique	20	38	5	25
Pediatric				
CWD	20	69	2	10
Modified radical mast.	4		1	25
Radical mastoidectomy.	16		1	6
CWU				
Intact Wall Techniquc	9	31	2	22

Table (4): Recividism Rates: Recurrent and Residual Disease in Children.

Study	No.	Recurrent (%)	Residual (%)
Glasscoch [10]	43	23	23
Palva [9]	65	--	5
Sheehy [4]	181	--	51
Edelstein [6]	127	3	8
Edelstein [12]	69	2	10
Tos [8]	122	12	--
Our study	29	18	22

Table (5): Recividism Rates: Recurrent and Residual Disease.

	No. of cases	None	ME.	Mastoid	Both	Total	%
Pediatric	29	22	3	2	4	9	40.9
Adult	52	37	6	5	4	15	28.8
Total (Ped.+Adult)	81	59	9	7	8	24	29.6

choice of surgical approach.

It has been stated by several authors that cholesteatoma in children is more aggressive and undergoes faster growth than in adults [10,11]. Our results in this study confirmed the aggressive nature of pediatric acquired cholesteatoma. As the growth of cholesteatoma frequently tended to involve the ossicles, where the stapes arch was absent in 75% of cases when compared to adults (63%).

This was previously confirmed in other studies [6], where cholesteatoma in middle ear tended to involve the incus (78%), the malleus (54%) and the stapes (40%). Most authors [8,9], agree with this point in contrast to few others [12], who stated that cholesteatoma involved the ossicles less frequently in children.

There has been a shift to more conservative surgery (Intact canal wall) in the last few years, yet recent reports indicate that there is an increased incidence of residual and recurrent disease when this procedure is used.

Sheehy [13] studied 1024 patients operated on over 10 years period. All were primary operations and 181 (18%) were individuals under 16 years of age. The intact canal wall procedure was employed 97.5% of the time for all cases (90% in the children). In the under 16 age group the operation is most likely to be performed in 2 stages as a planned procedure. Sheehy, demonstrated quite clearly the difference in residual cholesteatoma found in children and adults. The overall incidence of residual was 51% in children and 30% in adults. The residual disease was almost twice as common in the under 16 age group. It must be remembered, however, that many of these cases were planned for second stage procedures in which cholesteatoma has been left previously (attached to stapes, over fistula, etc.).

Palva [9], investigated 245 children 65 of whom had cholesteatoma, to compare with adults, he picked 65 individuals over age of 16. All patients were operated upon employing a modified radical technique in which the posterior canal wall was taken down and the mastoid cavity was obliterated with S.C tissue flap. Palva's results were better than those of any other series. He did have 3 residual cholesteatoma in the 65 children as opposed to none in adults.

Glasscock et al. [1] performed a retrospective analysis of the treatment results in patients with cholesteatoma. Three primary operations were employed in his series, tympanoplasty, tympanoplasty with mastoidectomy (intact canal wall procedure) and radical mastoidectomy, the majority underwent an intact canal wall tympanoplasty.

A planned second stage procedure was performed in 84% of the children and in 79% of the adult patients. They found that residual disease was 23% in the under 16 age group and 15% in adults. Recurrent cholesteatoma again was 23% in children as opposed to 12% in adults. Hearing and graft take were the same for both.

In our series canal-wall down mastoidectomy was performed in children with extensive disease, sclerotic mastoids and poor eustachian tube function as evidenced by absence of middle ear aeration and a sclerotic mastoid, whereas canal wall up procedures were done in patients with localized disease. In adults the type of operative procedure to eradicate the disease was similar.

If we compare the adults with the pediatric group, the types of operative procedures to eradicate the disease were nearly similar (Pediatric CWD 68%, adult CWU 38%) table.

In our own series the rate of recidivism was similar to the results of other studies of cholesteatoma (Table 1). As we found that the residual disease rate was 28.7% in children and recurrence rate 18% with a total of 40% in children and a total recidivism rate of 28% in adults. Hearing and graft takes were the same for both. The

rate of recurrence with intact canal wall technique was much higher than the canal wall down procedures specially in pediatric age group (table 4).

Our results are comparable to those of Sheehy [14] and Glasscock et al. [1], although Tos, [8] and Edelstien et al. [6] had much more lower results, however, they explained that these low results rates may be due to the philosophy of treating each cholesteatoma individually and selecting the procedure that will assume the complete eradication of the disease. So as presented here, the results question the widespread use of intact canal wall procedures particularly in children. Even in the hands of its proponents the incidence of residual and recurrent disease is higher in children when the intact canal procedures are employed.

Although it is the surgeon's choice based upon his training and technical skill, their proper pre-operative selection of the patient and the availability of adequate follow up, we feel that the alternatives we will continue to use specially in the pediatric age groups is to either stage all combined approach tympanoplasty (CAT) operations or to take down the posterior canal wall in those cases in which the cholesteatoma is not limited to the middle ear.

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