

THE CURRENT STANDARD TREATMENT OF CHRONIC OTITIC MEDIA WITH CHOLECTEATOMA

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ABSTRACT

BACKGROUND: Currently there are two main techniques for cholesteatoma surgery: the closed technique (wall up) and the open technique (wall down). The canal wall down mastoidectomy in cholesteatoma can secure a good operation field and easy removal of the lesion. However, there are some problems: the lifelong care of the cavity, dizziness due to the exposed semicircular canal, difficulty with the fitting of a hearing aid as well as poor cosmetics. The canal wall up technique has a better hygienic status and better functional outcome. This technique is associated with a higher rate of residual disease and a higher rate of recurrent disease. To prevent both residual and recurrent cholesteatoma, we performed canal wall down technique with the obliteration of paratympanic spaces for patients with acquired cholesteatoma.

MATERIAL AND METHODS: This paper studies the long-term outcomes of surgical treatment of chronic suppurative otitis media with cholesteatoma to prevent residual disease and its relapses. The results of the postoperative observation of 189 patients during the period from 2009 till 2014 are presented. All patients underwent sanation surgery with the obliteration of paratympanic spaces followed by the restoration of the posterior wall of the external auditory meatus and simultaneous tympanoplasty (closed-type surgery). The patients were examined one year after the treatment with the use of the MRI technology using the non-EPI DWI regime to monitor the residual and recurrence cholesteatoma.

RESULTS: We analyzed the postoperative results from 189 patients. The follow-up observation revealed 11 cases of residual cholesteatoma. Recurrent cholesteatoma was not observed during the follow-up periods.

CONCLUSION: Long-term follow up indicated that the canal wall down technique with bony obliteration is a safe method with which to treat primary cases and to reconstruct unstable cavities. The MRI technology in the non-EPI DWI regime was successful in differentiating soft tissues and enabling the detection of residual or recurrent cholesteatoma after a canal wall down bony obliteration technique procedure.

Keywords: *cholesteatoma, chronic otitic media, bony obliteration technique*

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Received: November 3, 2015

Accepted: December 1, 2015

INTRODUCTION

Chronic otitis media is a serious disease, which remains an important social and economic problem worldwide. Cholesteatoma is accompanied by progressive growth and bone resorption structures of the middle ear (1,2). The latest research in molecular biology shows how the cholesteatoma perimatrix influences the bone leading it to resorption. Osteo-

clasts and deterioration of extracellular matrix affect the bone matrix in this process (3,4).

Cholesteatoma is cured only by surgical treatment.

Residual cholesteatoma and recurrent cholesteatoma is a specific problem, which reduces the surgical treatment efficacy. Today there are two main methods of cholesteatoma surgery: the closed technique (wall-up) and the open technique (wall-down). It should be noted that one of the stages of surgery intervention is the obliteration of paratympanic spaces, reconstruction of tympanic cavity and ossicular reconstruction.

For a long period of time wall-up operations were used with caution because of the risk of residual cholesteatoma and recurrence of the disease. This method helps to improve the hygienic status and functional result but there are some disadvantages, which includes the necessity of long-term follow up and a second assessment.

According to different authors, the probability of residual cholesteatoma is about 20%, and recurrent disease – 13% from the total number of operated patients (5,6,7). In clinics where the wall-up surgical technique is used, the requirement of a second surgical intervention is 57%. Only in 7.2% was residual cholesteatoma found and in 92.8% surgical intervention was not necessary (5). Mercke U (8) published data which shows the absence of recurrence of disease and low residual cholesteatoma after the wall-up technique. However, such results were reached by a combination of the close technique with the obliteration of paratympanic spaces.

The advantages of the wall-down technique are a lower rate of residuals (about 7%), a lower rate of recurrence (about 5%) and a wide surgical field (6,9). However, postoperative cavities present a significant problem for the patient and for the doctor. Disadvantages include the need of regular cleaning, a higher infection risk, water intolerance, hearing aid fitting problems, vertigo and decreased functional outcome. This is why during the last several years a tendency to combine open and closed techniques has become widely spread (5,9,10,11,12). There are a lot of different techniques for mastoid and epitympanic obliteration: bone pate, bioglass, covering it with chondroperichondrial flap and temporal fascia (13,14).

MATERIALS AND METHODS

We have been following up our patients for some years and then analyzed the results about residual and recurrence of cholesteatoma. 189 ears were operated (183 patients: 71 females and 112 males). In 129 cases an operation was performed for the first time and 60 cases reoperation was required. The average age was 45 years.

All patients had preoperative examination, including a routine examination involving otomicroscopy, pure tone audiometry and computer tomography (CT) scans of temporal bones.

Operations were carried out under general combined anesthesia. Generally, with the endaural approach, mastoidectomy was used and the epithelium of cholesteatoma was completely removed. The level of external canal posterior wall was determined by extension of cholesteatoma and sclerotic mastoid cells degree. If the process allows we leave high remnants of the external canal posterior wall. The obligatory inspection of the blind zones was accomplished with an endoscope. During the operation the state of important anatomical structures was evaluated, such as lateral semicircular canal, facial-nerve canal, wall of sigmoid sinus and other structures of the middle ear. Also the state of ear bone was evaluated and in most cases the removal of individual elements was performed. The ossiculoplasty and timpanoplasty was done simultaneously with chondro-perichondrial flap from tragus or posterior surface of concha of auricle. More often the timpanoplastica II-III types were used. The reconstruction of ossicular chain was done with the use of incus, stored cartilage and titanium implants (PORT, TORP).

Paratympanic spaces discovered during the operation were obliterated with cartilage, cortical bone chips, bone pate and bioglass. Lateral parts of attic, aditus and external canal posterior wall were recovered using the chondro-perichondrial flap.

To control recurrent cholesteatoma and recurrence of the disease in certain conditions standard regimes T1, T2 and non echo planar diffusion weighted imaging (non-EPI DWI) magnetic resonance imaging (MRI) were used. The high intensive signal in standard regime T2 and non-EPI DWI and the low intensive signal in standard regime T1 show the presence of cholesteatoma. If in all regimes there

was an iso-intense appearance, residual cholesteatoma was excluded. Examination should be conducted after one year. If the results are still negative, the next examination may be conducted after five years.

RESULTS

We have been following up our patients for some years and then analyzed the results about residual and recurrence of cholesteatoma. From 2009 to 2014, we operated 189 ears (183 patients: 71 females and 112 males). 129 operations (68.4%) were primary surgery, and 60 (31.6%) were revision and re-operations after surgery by other surgeons. The materials used for obliteration was cartilage (23%), bone pate (37%), bioglass (15%), bone pate with bioglass (15%) and cartilage with bone pate (10%).

After surgery, all patients were hospitalized for about 5 days. Postoperative monitoring of patients was carried out intensively during the first two months, we then administered follow-up examinations after 6 and 12 months. Throughout this year patients underwent MRI for the diagnosis of residual cholesteatoma and relapse. The results were evaluated according to otomicroscopy, MRI sequences, such as the non-EPI DWI (Figure 1, 2) and recorded for survey.

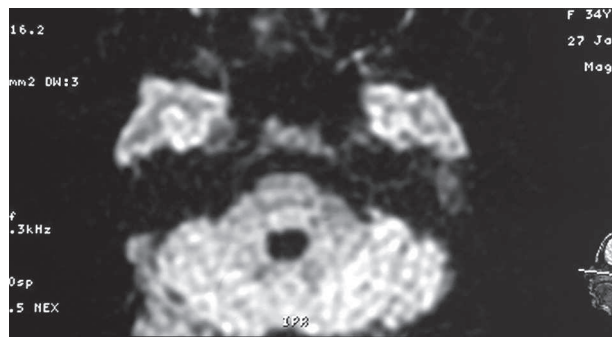


Figure 1. Postoperative MRI (non-EPI based diffusion weighted image) showing the absence of residual cholesteatoma

From 2009 to 2011 the residue of cholesteatoma was diagnosed in 3 cases (3.7%), from 2009 to 2012 – 7 cases (5.9%), from 2009 to 2013 – 9 cases (6%) and from 2009 to 2014 – 11 cases (5.8%). No residual cholesteatoma or cystic lesions were detected in the obliterated mastoid cavity (Table 1). Most patients had good epithelization on the external auditory canal and could cease water restriction after surgery.

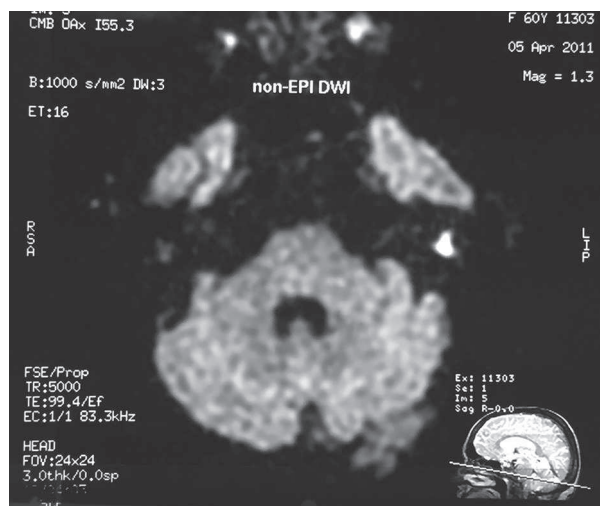


Figure 2. The patient with residual cholesteatoma 12 months after surgery. Postoperative MRI (non-EPI based diffusion weighted image) shows cholesteatoma is markedly hyperintense

DISCUSSION

The ideal goals of cholesteatoma surgery are the elimination of all possible causes of cholesteatoma recurrence and establishment of a well aerated middle ear with a proper sound conducting mechanism as well as a trouble-free external auditory canal with self-cleaning function.

Table 1. Postoperative results of mastoid obliteration technique

Years	Number of operations	Total number	Cases of residual cholesteatoma
2009	39	39	1 (2.5%)
2010	43	82	2 (3.7%)
2011	36	118	4 (5.9%)
2012	33	151	2 (6%)
2013	38	189	2 (5.8%)

Our findings show that despite the radical intervention with the use of the open technique about 30% of patients do not experience elimination of chronic otitis media. They are not satisfied with their life quality which depends on continuing exacerbation, the need of regular removal from the cavity of the epidermis, difficulties with selection of the right hearing aid and vertigo. When the number of patients increases - the risk of statistical error reduces.

It can be determined by a small number of patients. Our research shows that with increasing number of patients residual cholesteatoma also has a slight increase.

After the primary operation it usually takes 12-18 months for the residual disease to be revealed. During this period of time the operated patients must be monitored. The results of surgical treatment were estimated by otomicroscopy and MRI regime non-EPI DWI which allows for specific characterization of small cholesteatoma pearls. On MRI, cholesteatoma can be unambiguously distinguished from other soft tissues such as scar tissue, cholesterol granuloma, granulation tissue and fluid. Today MRI is the most reliable method to control the residual cholesteatoma and its recurrence (15,16). According to different authors the specificity of diagnosing cholesteatoma is 86%-100% (17,18). CT scans were not used to control the residual cholesteatoma and recurrence of the disease because of the low specificity, which does not permit differentiation of post-operation changes from residual cholesteatoma. This means that sanation surgery with the obliteration of paratympanic spaces, with reconstruction external canal posterior wall and simultaneous tympanoplasty is the most preferable method of treatment. The fact is that chronic otitis media leads to a reorganization of bone and leads to evident sclerotic process in mastoid cells, whereas the postaural approach requires opening large amounts of sclerotic bone. The endaural approach gives an opportunity to follow the process, revealing the formation of the middle ear only within the spread of cholesteatoma with subsequent improvement to these structures. This means the endaural approach is preferable. In the case of endaural approach, if the surgeon is planning to obliterate the paratympanic spaces it is possible to leave more bone intact with, of course, the obligatory inspection of the blind zones with an endoscope.

The operative technique and postoperative control combines the advantages of open and closed technique. The absence of post-operation cavity makes it possible to avoid a second operation, which is necessary after the closed technique.

This method helped us to reduce the rate of residual and recurrence of cholesteatoma and to have good functional results.

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