

ORIGINAL ARTICLE

Bacterial Colonization in the External Ear Canal and Ear Tampon with Special Interest to Tympanoplasty

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Objective: To assess bacterial colonization in the external auditory canal and ear tampons in the patients who had tympanoplasty operation.

Methods: In 18 patients with chronic otitis media, a swabbing was performed from the external auditory canal preoperatively for bacterial cultivation. Postoperatively the ear tampons were also sent for bacterial cultivation. Pre and postoperative cultivation results of the patients were compared.

Results: Preoperatively, there was 1 (5.6%) patient with a pathogenic bacterial growth (Klebsiella). In the remaining 17 patients (94.4%) normal skin flora growth (coagulase negative staphylococcus) was encountered. Postoperatively, a pathogenic bacterial growth was encountered in 3 (16.8%) patients (Klebsiella in 1, E. coli in 1, and Stenotrophomonas in 1). No graft failure was encountered in the patients. There was no correlation between the graft take rate and culture results ($p>0.05$). There was no correlation between mastoidectomy and bacterial growth ($p>0.05$).

Conclusion: Ear tampons placed after tympanoplasty operations can be a media for the growth of pathogenic bacteria such as Stenotrophomonas maltophilia. Isolation of a pathogenic bacterium in the ear tampons is not an indicator for an ongoing infectious process, as the result of tympanoplasty in the patients with bacterial growth is still successful. The use of perioperative antibiotics may be the cause of absence of an active infection in the external auditory canal.

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Introduction

External auditory canal can harbor certain microorganisms [1, 2]. Coagulase negative Staphylococcus, Staphylococcus aureus and Streptococcus pneumoniae are the most common bacteria isolated from the external ear canals of healthy people [3].

In surgical treatment of ears with chronic discharge, pathogenic microorganisms may remain in the middle ear even after meticulous tympanomastoidectomy, and cause recurrent infection unless an appropriate antimicrobial agent is administered [4]. In addition, in chronic suppurative otitis media with MRSA (methicillin resistant staphylococcus aureus), performing a mastoidectomy may lead a better graft success whereas the graft success rate is not affected

by mastoidectomy in the presence of MSSA (methicillin sensitive staphylococcus aureus) [5].

Although surgery for chronic otitis media has been widely performed, the impact of microorganisms on tympanoplasty success has not been understood clearly. In addition, an ear tampon is placed in the external auditory canal after Tympanoplasty, and left in place at least 5-10 days. This tampon can also harbor some microorganisms, may impact on outcome of the surgery. It is also unclear whether tympanoplasty can affect perpetuation of the microorganisms after the surgery. In this study, we aimed to assess bacterial colonization in the external auditory canal and ear tampons in the patients who had tympanoplasty operation

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Methods

Totally, 18 patients with chronic otitis media were included in the study. None of the patients had cholesteatoma or chronic suppurative otitis media. A swabbing was performed from the external auditory canal bacterial cultivation preoperatively. None of the patients used oral or topical antibiotics for the chronic otitis media prior to operation.

All patients underwent tympanoplasty and/or mastoidectomy. At the end of the operation, an ear wick (merocell) was placed in the external auditory canal for stabilization of the tympanomeatal flap. The ear wicks were left in place for one to two weeks depending on type of the surgery. Until the removal of the ear wick, the dressing of the ear of the patients was changed every day or every other day under sterile conditions, and the patients were also treated with oral antibiotics (sulbactam-ampicillin). At the time of removal the ear wicks were taken out under sterile conditions, and placed in sterile tubes to be sent for bacterial cultivation. The patients were given topical ciprofloxacin ear drops for two weeks after removal of the ear tampons.

Pre and postoperative cultivation results of the patients were collected and the results were compared statistically using McNemar test. The patients were examined at least one month after the surgery to evaluate the graft take. The correlation between the graft take rate of the patients and culture results were compared using chi-square test.

Results

There were 8 female and 10 male patients. The ages ranged from 14 to 59 (mean 34.9 ± 15.8) years. The operations were mastoidectomy plus tympanoplasty in 9 and tympanoplasty in 9 patients.

Preoperatively, there was 1 (5.6%) patient with a pathogenic bacterial growth, which was *Klebsiella*. In the remaining 17 patients (94.4%) normal skin flora growth (coagulase negative staphylococcus) was encountered. Postoperatively, a pathogenic bacterial growth was encountered in 3 (16.8%) patients. These were *Klebsiella* in 1, *E. coli* in 1, and *Stenotrophomonas* in 1 patient (Table 1).

Table 1. Bacterial culture results obtained preoperatively from the external ear canal and postoperatively from the ear tampon.

Cultivation result	Preoperative n (%)	Postoperative n (%)
Normal flora	17 (94.4)	15 (83.2)
<i>Klebsiella</i>	1 (5.6)	1 (5.6)
<i>Stenotrophomonas</i>	-	1 (5.6)
<i>Enterobacteriaceae</i>	-	1 (5.6)
Total	18 (100)	18 (100)
<i>P</i> >0.05		

The patient who had *Klebsiella* growth preoperatively had also growth of this bacterium postoperatively. In 2 patients, who had postoperative pathogenic bacterial growth, the preoperative culture result was normal skin flora. There was a no statistically significant difference between the pre and postoperative cultivation results ($p > 0.05$). No graft failure was encountered in the patients. There was no correlation between the graft take rate and culture results ($p > 0.05$). There was no correlation between mastoidectomy and bacterial growth ($p > 0.05$).

Discussion

In this study, 5.6% of the tympanoplasty candidates had pathogenic bacterial colonization in the external auditory canal. A pathogenic bacterial growth in the ear tampons was encountered in 16.8% of the patients after the operation. Although there was no statistically significant difference between the pre and post operative culture results of the patients, there was almost a three fold increase in the rate of pathogenic bacterial growth in the ear tampons of the patients. This indicates the problem of contamination in the ear tampons.

The pre and postoperative culture results may change as far as *Klebsiella* and *E. coli* are concerned. Tympanoplasty does not seem to help eliminate these bacteria. Hence, the otologic surgery may result in contamination of the ear tampon with the pathogenic bacteria, even if the ear dressing is performed under sterile conditions. Contamination with gram negative

bacteria is possible in the perioperative period, or these microorganisms already exist in the ears of the patients. This contention can be supported by the finding that *Klebsiella* and gram-negative bacteria can exist in the middle and inner ears, and can be associated with chronic otitis media [6]. It is also possible that *Klebsiella* or other gram negative bacteria grown in the ear tampons without colonizing in the ear canal. Hence, removal of the ear tampon with bacterial growth and starting a topical antibiotic drop might have prevented the ear from being infected with the bacteria.

Graft take rate in tympanoplasty operation can be affected by a variety of factors. Infection can be one of these factors. Although a positive bacterial culture was obtained in almost 5-15% of the patients before and after tympanoplasty, there was no correlation between the graft take rate and positive bacterial cultures. This can be explained by several mechanisms. First, the presence of bacteria in the external ear canal is due to contamination rather than being an etiologic factor related to the middle ear disease. Secondly, perioperative antibiotic use might have prevented the pathogenic microorganisms from causing an infectious process. Absence of an infectious discharge or pus in the external auditory canal of the patients supports these contentions.

Stenotrophomonas maltophilia is a pathogen that causes infections mainly in immunocompromised patients, whereas community-acquired *S. maltophilia* infections have been occasionally reported [7]. A prominent feature of this organism is its resistance to multiple antibiotics including beta-lactam agents, carbapenems and aminoglycosides [8]. The patient who had this bacterium in the ear tampon was not immunocompromised, and there was no bacterial growth in his preoperative culture. This microorganism is hardly encountered in the ear, and possibly this is the first case report of *Stenotrophomonas maltophilia* in the ear tampon.

Almost 50% of the subjects with chronic suppurative otitis media may have a positive culture result [9]. It was suggested that the cultures obtained in chronic

suppurative otitis media demonstrates *P. aeruginosa* in almost 70%, *S. aureus* in 10%, *Corynebacterium diphtheriae* in 10%, *S. pneumoniae* in 9%, *H. Influenzae* in 8%, and other species in 33% [10]. Four species of organisms, methicillin-sensitive *Staphylococcus aureus* (MSSA), MRSA, *Pseudomonas*, and coagulase-negative *Staphylococcus* show higher prevalence than others on both the preoperative and postoperative cultures in patients with chronic suppurative otitis media [11]. These studies address the chronic suppurative otitis media in which the cultures are obtained from the ear discharges. However, in our study, none of the patients had chronic suppurative otitis media, and the cultures were obtained from the external auditory canal and ear tampons rather than the middle ear or ear discharges. For this reason, no *pseudomonas* growth was encountered in our study.

In conclusion, ear tampons placed after tympanoplasty operations can be a media for the growth of pathogenic bacteria such as *Stenotrophomonas maltophilia*. Isolation of a pathogenic bacterium in the ear tampons is not an indicator for an ongoing infectious process, as the result of tympanoplasty in the patients with bacterial growth is still successful. The use of perioperative antibiotics may be the cause of absence of an active infection in the external auditory canal.

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