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The Comparison of Bacteremia and Amount of Bleeding During Tympanomastoidectomy

İsmail Önder Uysal[1]*, Kerem Polat[1], Elif Bilge Uysal[2] and Sema Koç[3]

[1]*Cumhuriyet University Medical School, Department of Otolaryngology, Sivas, Turkey*
[2]*Department of Microbiology, Cumhuriyet University, Sivas, Turkey*
[3]*Department of Otorhinolaryngology, Gaziosmanpasa, University School of Medicine, Tokat, Turkey*

Abstract

Objective: The aim of this study was to investigate the relationship between the amount of bleeding and bacteremia during tympanomastoidectomy surgery.

Material and methods: A total of fifty-seven patients undergoing tympanomastoidectomy were evaluated in the present study. The amount of bleeding was measured and recorded for each patient. Preoperative and intraoperative blood cultures were collected immediately after the induction of anesthesia and 45th min intraoperatively.

Results: Blood cultures taken preoperatively were negative, however the cultures obtained intraoperatively were positive in 7 (12.3%) of 57 patients who underwent tympanomastoidectomy, and bacteremia was more frequent among those with a greater amount of bleeding during the surgery.

Conclusion: The results of this study suggest that although bacteremia had no clinical consequences for patients, patients with more bleeding have an increased risk of developing bacteremia which may cause complications in higher risk individuals.

Keywords: Tympanomastoidectomy; Bleeding; Bacteremia

Introduction

There are different approaches to the treatment of chronic otitis media especially in developing countries. Chronic otitis media may occur as a limited disease in the tympanic cavity or a more extensive involvement of the temporal bone with various complications. In literature there are two major surgical procedures that address these problems: the canal wall down (open-cavity) and the canal wall up (closed-cavity) techniques, with or without second-look surgery [1]. The first aim in the surgical treatment of Chronic Otitis Media (COM) is to eradicate the infection and any accompanying cholesteatoma [2].

Spread of the bacteria to the circulation causes bacteremia with the symptoms of fever and chills [3]. Bacteremia has been reported to occur after tympanomastoidectomy in some studies [4].

The aim of this study was to investigate the relationship between the amount of bleeding and bacteremia during tympanomastoidectomy.

Patients and Methods

We evaluated the bacteremia and amount of bleeding during tympanomastoidectomy in 57 patients suffering from COM. 31 (54.4%) of them were male and 26 (45.6%) female. Patients with severe chronic underlying diseases (including cardiovascular disorders, renal or hepatic disease, or immunodeficiency) were excluded from the study, as were those who suffered an acute episode of respiratory infection or received antibiotics for any reason in the 4 weeks before the operation.

All the patients were questioned for the cause of their referral. A microscopic examination was performed to identify any discharge, perforation, polyps, cholesteatoma, granulation tissue, and changes in middle ear mucosa. There was not cholesteatoma in patients and in our physical examination we did not see discharge from ears.

We divided the cases into two groups. The cases with positive culture were in group 1 and with negative culture in group 2. The ages were between 14 and 46 with the mean of 34.1 in group 1 and between 10 and 77 with the mean of 29.9 in group 2.

All operations were performed under general anesthesia with retroauricular incision. After cleansing the area with iodine solution (Betadine, Kansuk, Istanbul, Turkey), we used 1:100,000 epinephrine solution infiltration before incision. Mean Arterial Blood Pressures were (MBP) between 55 and 65 mmHg during surgery. All of the patients underwent tympanomastoidectomy with the same surgical instruments and we used temporal fascia as the source of the graft. The underlay technique was used in all of the cases. The suction tank was emptied before the operation. Blood accumulating in the ear was frequently aspirated. The approximate amount of bleeding was measured by estimating the volume in the suction tank and weighing the swabs, and was recorded for each patient during the surgery. The mean duration between the beginning of the operation and the arrival to the antrum was about 45 minutes. The incision was closed with 3/0 vicryl subcutaneously and 4/0 prolen.

Blood cultures were taken immediately after the induction of anesthesia preoperatively and in 45th minutes when we reached antrum. Blood samples were collected into BD BACTECTM Plus Aerobic/F blood culture vials, in accordance with sterile blood collection techniques. Blood was drawn from a peripheral vein distinct from the one used for intravenous anesthetic induction. Blood culture samples were monitored for 5 days in the BACTEC 9050 (BD Diagnostic Systems, USA) blood culture system. Blood culture vials which tested

***Corresponding author:** Ismail Önder Uysal, Cumhuriyet University Medical School, Department of Otolaryngology, Sivas, Turkey, Tel: +90 346 258 00 00-0385; Fax: +90 346 258 13 00; E-mail: dr.iuysal@hotmail.com

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positive were Gram stained and passaged on Sabouraud-dextrose agar and EMB media with sheep blood and incubated at 35°C under aerobic conditions. At the end of 5 days, the blood culture vials considered to be negative were passaged on blood agar and evaluated for false negativity. Isolated microorganisms were identified with the BD Phoenix (BD Diagnostic Systems, USA) fully automated identification system.

All patients received oral amoxicillin clavulanate for 5 days postoperatively (1 g every 12 h). None of the patients in the bacteremia group or bacteria negative group experienced fever or local infection. None of our patients required additional medications.

Fischer's exact test was used to compare the gender between groups. Gender was presented as count and percentage. The Kolmogorov-Smirnov test was used to evaluate whether the distribution of variables was normal. The two independent sample t test was used to compare continuous variables. Continuous variables were presented as mean [Standard Deviation (SD)] or median (interquartile range [Q1-Q3]). SPSS 14.0 Windows software (Chicago, IL, USA) was used for all statistical analysis. Results with a calculated P value of <0.05 were considered statistically significant.

Results

We evaluated 57 cases in our study. No microorganisms were isolated from the preoperative blood cultures. Blood cultures obtained in 45th minutes were positive in 7 cases (group 1) and negative in 50 cases (group 2).

The bleeding amount in group 1 changed between 100 ml and 200 ml with a mean volume of 144.2 ml and in group 2 between 20 ml and 350 ml with a mean of 103.1 ml.

We detected Coagulase-negative staphylococci in 6 cases and Streptococcus spp in 1 case (Table 1).

Bacteremia was more frequently encountered among those with a greater amount of bleeding during the surgery. The result was statistically significant (p<0.05).

Discussion

Bacteremia is an important complication of the postoperative period. In the ENT literature, bacteremia has been reported to develop after tonsillectomy, septoplasty, septorhinoplasty and mastoidectomy procedures [3,4]. In the literature, there is only one study showing the relationship between bacteremia and the amount of bleeding; a significant correlation was observed during adenotonsillectomy [5]. Bacteremia can result in serious problems especially in patients with cardiovascular diseases [6].

To the best of our knowledge, this is the first study to show the relationship between the amount of bleeding and bacteremia in patients who underwent tympanomastoidectomy.

It is known that there is a risk of bacteremia for operations performed in regions with bacterial flora. During tympanomastoidectomy, the integrity of the skin is disrupted, and a fresh wound is formed in that area. The wound surfaces remain open during the operation allowing bacteria to migrate through the vascular system, potentially causing infections and bacteremia intraoperatively or postoperatively [3,7].

	Group 1	Group 2	p
Amount of cases	7 (12.3%)	50 (87.7%)	
Agea (years)	34.1	29.9	
Coagulase-negative staphylococci	6		
Streptococcus spp	1	-	
Bleeding Amount (ml)	144.2 [100-200]	103.1 [20-350]	0.02 (<0.05)

[a]Median [Q1-Q3]. Group 1, positive blood culture; Group 2, negative blood culture

Table 1: Baseline demographic and medical characteristics of all patients.

Otosclerosis surgery and tympanoplasties with dry perforations are considered as clean surgical procedures by The American National Research Council. Govaerts et al. found the risk of postoperative infections to be less than 5% in otosclerosis and in tympanoplasty operations with dry perforations [8].

Although most otologic operations are accepted as clean surgery, chronic otitis media surgery, with or without cholesteatoma, should be accepted clean-contaminated; if there is otorrhea during surgery, it is considered contaminated or dirty [9]. American National Research Council classified the ears with cholesteatomas and/or discharges as dirty ear because its postoperative infection incidence was reported as 10% [8].

Middle ear is a route for the free transport of bacteria and toxins to the inner ear. The use of both tympanoossicular allografts and temporal muscle fascia grafts are regarded as transplantation and the middle ear is open to contamination from the nasopharynx [8].

Keleş et al. [4]., performed a study about bacteremia during mastoidectomy and/or tympanoplasty and determined that 5 patients of 59 cases developed bacteremia after tympanoplasty procedures with mastoidectomy. When growing microorganisms were evaluated, 3 cases had Streptococcus spp; in the remaining 2, 1 had Coagulase (-) staphylococcus and the other had bacillus spp with spores. Anaerobic bacteria could not be isolated in any of the samples.

The most common infectious agents are species of S. aureus and other gram-positives in clean otologic surgery [9]. In chronic otitis media without cholesteatoma, the most common isolated microorganisms are Pseudomonas aeruginosa and staphylococci species, mainly S. aureus. Gram-negative organisms are also isolated, such as Klebsiella, Proteus or Haemophilus and gram-positive bacteria, with predominance of Streptococci. Anaerobes are uncommonly isolated [10]. In the periods of otorrhea the isolates are mostly polymicrobial. The isolated microorganisms are the same in otitis media with cholesteatoma and simple chronic otitis media, however anaerobes are more frequent in otitis media with cholesteatoma [10,11].

Antibiotics are used in surgery with prophylactic purposes. Prophylactic antibiotic use longer than 24 hours is not recommended by The American National Research Council. There is no consensus regarding the use of prophylactic antibiotics for ear surgery. Currently, many patients use antibiotics for 5-7 days after ear surgery [8,12].

Probably, there is a relation between the duration of such operations and the risk of postoperative infections. Most of the infections are observed in cases with operation duration of more than 2 hours [8].

Koç et al. [5,13], evaluated the relationship between bacteremia and amount of bleeding during septoplasty and tonsillectomy. They reported that bacteremia was more frequently encountered among those with a greater amount of bleeding during the both surgery.

Mild bleedings can generally be controlled by simple local procedures, and no serious intervention is required. Some risk factors may increase the amount of intraoperative bleeding. These are: age; gender; surgical technique; a history of bleeding disorders; use of drugs which affect coagulation, such as aspirin, warfarin, clopidogrel

and dipyridamole; and elevated intraoperative mean arterial pressures [14,15]. None of our patients had these risk factors, and no serious bleeding was observed. Preoperative hematologic evaluations about bleeding were in normal ranges.

In our study, blood cultures were positive for 7 (12.3%) out of 57 patients who underwent tympanomastoidectomy, and bacteremia was more frequently encountered among those with a greater amount of bleeding during the surgery. Our microbiological data are in line with those reported in the literature. Although bacteremia had no clinical consequences for patients in this study, patients with greater amounts of bleeding have an increased risk of developing bacteremia which could produce complications in higher risk individuals.

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