MINI-REVIEW

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The role of antibiotics in rhinoplasty and septoplasty: a literature review*

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SUMMARY

Background: *Prophylactic antimicrobial therapy during nasal surgery is common among surgeons worldwide, although the effectiveness of this practice is controversial. The authors reviewed the literature to evaluate the value of antibiotic prophylaxis.*

Methods: *A MEDLINE search was preformed using the key terms septoplasty, rhinoplasty, infections and antibiotics. The authors identified eleven studies written in English or German that addressed the effectiveness of prophylactic antibiotics, infection rate and bacteremia during nasal surgery. Due to the small number of studies statistical re-analysis was discarded.*

Results: *The articles demonstrated an overall very low incidence of bacteremia or infection. The studies failed to demonstrate a difference between patients who received antibiotic prophylaxis during nasal surgery and patients who did not; with the only exception being cases of complicated revision rhinoplasties.*

Conclusion: *Our review suggests that the infection rate after elective nasal surgery is very low, making routine antibiotic prophylaxis redundant. Preventive systemic antibiotics are indicated in complicated revision rhinoplasties, prolonged placement of nasal packs and for patients who are susceptible to infections.*

Key words: septoplasty, rhinoplasty, infections, prophylactic antibiotics

INTRODUCTION

Prophylactic antimicrobial therapy for elective rhinosurgery against perioperative infections is a preventive measure common among surgeons worldwide [(1)]. Nevertheless, infection rates seem to be very low, thus making the effectiveness of such treatment questionable. Redundant antibiotic treatment may be associated with several complications, allergic reactions, toxicity and emerging species of resistant pathogens to name a few, and can compromise the patient's safety. This study presents a review of the pertinent medical literature on the subject.

MATERIAL AND METHODS

We performed a computerized MEDLINE search through the Pub Med service of the U.S. National Library of Medicine using the key terms *septoplasty, rhinoplasty, infection* and *antibiotics.* A time limit filter was applied in order to retrieve the most current publications. Articles published before 1980 were excluded. An additional search was performed in the reference lists of the qualifying articles to identify relevant studies overlooked by the computerized search. All English and German written articles considering the effectiveness of prophylactic antibiotics, incidence of infection and bacteremia during the procedures were reviewed. It is interesting that only few studies had been conducted to explore the effectiveness of prophylactic antibiotics during nasal surgery. Since most of them were based on a small number of participants we did not proceed to evaluate the statistical significance of each manuscript.

RESULTS

Eleven studies matched the search criteria and were included in our review. Four studies examined the incidence of intra or postoperative bacteremia. Two studies dealt with the incidence of infection without prophylactic antibiotics and the remaining five examined the effectiveness of systemic or local antibiotics during nasal surgery.

Bacteremia during rhinosurgery

Slavin et al. studied the incidence of intraoperative bacteremia in 52 rhinoplasty (RP) patients who were free of antibiotic treatment 2 weeks or more prior to surgery [(2)]. Preoperative cultures were obtained by nasal swabs. Blood culture samples were drawn immediately before the operation and 5 and 15 minutes after completion of the osteotomies. The most common organism isolated preoperatively was *Staphylococcus epidermidis* (82.7%), followed by *Streptococcus viridans* (17.3%). Of the 312 blood cultures, only one postoperative culture, from

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the 15-minute blood aliquot, grew S. epidermidis. None of the patients had local or systemic infections during a 60-day follow-up period.

Silk et al. studied 50 healthy patients who had undergone septoplasty (SP) and who did not receive antibiotic treatment during the 2-week period beforehand [3]. Pre-operative nasal cultures were obtained. Blood cultures were collected immediately before the first incision was made and at 5 and 15 minutes into surgery. *Staphylococcus aureus* was the most common organism isolated preoperatively in 23 patients, followed by coagulase-negative *staphylococci* (CNS) in six patients. None of the intraoperative blood cultures were found positive for bacterial growth.

Kaygusuz et al. examined the incidence of postoperative bacteremia in 53 SP or septorhinoplasty (SRP) patients [4]. All patients were treated with anterior nasal packing. Nasal smear cultures were obtained preoperatively followed by additional smears from the pack material. Blood cultures were collected immediately pre-operatively, post-operatively and immediately following retrieval of the nasal packing. All preoperative blood cultures were negative. Eight patients (15.0%) had bacteremia immediately after surgery and 9 patients (16.9%) after the nasal packing had been removed. None of the patients developed serious clinical problems.

Recently, Okul et al. [5] examined 30 SP and 30 open SRP patients who were free of antibiotic treatment at least 20 days before surgery. Preoperative nasal cultures were collected and 3 blood cultures were drawn: pre-operatively, intra-operatively and 30 minutes postoperatively. The most frequently isolated organisms from the nasal cavities were CNS (39 patients) and S. *aureus* (22 patients). All preoperative and post-operative blood cultures were negative. Intraoperative cultures were positive in 4 patients (13.3%) in the SRP group and in one patient (3.3%) in the SP group. None of the patients expressed clinical evidence of focal or systemic infection.

Incidence of infection without prophylactic antibiotics

Yoder and Weimert (6) conducted a study that included 1040 patients who underwent SP or SPR. All procedures were performed through an internal nasal approach. None of the patients received prophylactic antibiotics, nor was a topical surgical preparation solution used. Five patients (0.48%) developed minor nasal infections which resolved after a short course of oral antibiotics.

Cabouli et al. [7] found a 0.6% infectious complication rate after reviewing 2,000 aesthetic primary or secondary rhinoplasty patients who did not receive antimicrobial prophylaxis.

Effectiveness of antibiotics

Schafer and Pirsig conducted a double-blind randomized study to evaluate the effectiveness of antibiotic prophylaxis in preventing postsurgical infections in cases of complicated RP [8]. One hundred patients who were scheduled to undergo revision RP were randomized into two groups. 48 patients received three mega units of oral propicillin for 12 days and 52 patients received placebo. Bacterial cultures were collected with nasal swabs pre and postoperatively. Sixty-nine percent and 42% of the preoperative cultures demonstrated growth of *S. epidermidis* and *S. aureus*, respectively. Serious infections developed in 6 patients (five of them in the placebo group), and a more localized infection in 12 patients (nine of them in the placebo group).

Weimert and Yoder [9] studied in a prospective manner 174 patients, 106 patients who underwent SP and 68 patients who underwent RP. Nasal cavities were packed bilaterally with bacitracin-impregnated gauze. Seventy-five patients (45 from the SP series and 30 from the RP series) were randomly assigned to a regimen of prophylactic antibiotics which began 12 hours preoperatively and continued for five postoperative days, and the remaining 99 patients did not receive antibiotic coverage. Only four patients (2.3%) (two in each group) developed minor postoperative infections, which quickly resolved without sequelae when antibiotics were given.

Mäkitie et al. conducted a retrospective study to evaluate the incidence of postoperative infections in 100 consecutive adult patients who underwent SP [10]. In this study, symptoms such as hematoma with fever and submucosal swelling with erythema were considered indicative of infection. Altogether, 21 patients (21%) received prophylactic antibiotics. A total of 12 patients (12%) suffered mild postoperative infections; three of them had received prophylactic antibiotics. None of the patients experienced life-threatening complications.

Thirty-five SP patients were prospectively examined by Caniello [11]. The patients were randomized into 3 groups: patients who were not given any antibiotic treatment; patients who were administered a single dose of 1g intravenous cephazolin upon anesthetic induction; and patients who received a single dose of 1g intravenous cephazolin upon anesthetic induction followed by oral cephalexin for 7 days post-operatively. All patients returned for follow-up evaluation at the outpatient clinic 7 and 30 days after surgery. None of the patients developed signs of infection.

Effectiveness of local antibiotics

Bandhauer et al. (12) investigated the effect of antibiotic nasal packing on the potentially infectious nasal flora (PINF) during SP and/or turbinate surgery. All of the 95 patients were free of antibiotics for at least one week before surgery. Preoperative nasal smears were performed. Thirty-seven patients received nasal packing with untreated polyvinyl acetate (Group A); 28 received cotton gauze strips with an antibiotic-free ointment

(Group B) and 30 received nasal cotton gauze strips with an antibiotic ointment (Group C). Nasal packs were removed on the 3rd postoperative day, and their middle sections were submitted for microbiological analysis along with bilateral nasal smears. Preoperative nasal smears were positive for PINF in 10.8% of Group A, 21.6% of Group B and 40% of Group C. After removal of the packing PINF were found in 78.4% of Group A, 75% of Group B and 23.3% of Group C (S. *aureus* as the sole organism).

DISCUSSION

Many surgeons routinely administer antibiotics during elective rhinosurgery. The main rationale for prophylaxis is to prevent postoperative infection and to avoid toxic shock syndrome (TSS) [13]. Nevertheless, the wide spread use of antibiotics during and after surgery has a number of disadvantages. Allergic and toxic reactions pose a true hazard to susceptible patients; hospitals all over the world are in a continuous battle against the rising numbers of resistant organisms; superinfection is becoming more frequent and the economical burden of routine antibiotic administration is overwhelming.

The intranasal area is a contaminated field, which cannot be effectively prepared as a sterile field. The most frequently isolated organisms of the nasal flora are *S. epidermidis*, *S. viridans*, CNS and *S. aureus*. Mucosal incisions allow transient bacteremia, which can occur intraoperatively or postoperatively, and in some cases, may follow removal of the nasal packing. The reported rates vary between 0% and 15%.

The incidence of local or systemic infections without antibiotics seems to be very low. Most of the studies we reviewed found that the infection rate without prophylactic antibiotics did not exceed 2.3 %. Although one might consider the findings of Mäkitie et al. who demonstrated an infection rate of 9% as an exception to this statement, we believe that symptoms such hematoma with fever and submucosal swelling with erythema are not always indicative of infection. An infection rate of 14% was documented by Schafer and Pirsig, however it should be pointed out that their study was based on complicated revision rhinoplasties often involving free transplants. Highly interesting are the findings of Yoder and Weimert, where although topical surgical preparation was not used, the infection rate was only 0.48%.

Proof of the effectiveness of prophylactic antimicrobial therapy during nasal surgery seems to be lacking. Of the reviewed studies, all but one failed to demonstrate a difference between patients who received antibiotic prophylaxis and patients who did not. Significant differences were found by Schafer and Pirsig in cases of complicated revision rhinoplasties.

Severe complications such as TSS were not reported in any of the studies, and the majority of such cases in the literature were associated with the use of nasal packing (14-16), even when prophylactic antibiotics had been used (17,18). Although local antibiotic ointments cannot eradicate the potentially infectious nasal flora they may contribute to the reduction of such pathogens, thus reducing the risk of infection.

CONCLUSION

We conclude that infections after elective nasal surgery in healthy patients rarely occur, making routine antibiotic prophylaxis redundant. Possible limitations of our review may be due to the obvious restrictions of a MEDLINE-based search, the lack of a statistical analysis and the small scale of the studies reviewed. However, under the given circumstances, and the fact that the majority of the studies demonstrated similar findings, it is the author's opinion that statistical analysis would have no influence on the result. Although nasal packing is beneficial in many aspects it may contribute to the rate of infection and should therefore be used judiciously. When indicated, it should be used in conjunction with an antibiotic ointment and removed as early as possible. In complicated revision rhinoplasties, especially when free transplants are being used and with prolonged placement of nasal packs, systemic antibiotics are indicated. Patients who are immunocompromised, those with valvular heart disease, or patients otherwise susceptible to infections should receive antimicrobial prophylaxis even for simple procedures, as bacteremia may occur during nasal procedures.

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