Perioperative Antibiotic Usage by Facial Plastic Surgeons

National Survey Results and Comparison With Evidence-Based Guidelines

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Objectives: To determine current practice for use of perioperative antibiotics among facial plastic surgeons, to determine the extent of use of literature support for preferences of facial plastic surgeons, and to compare patterns of use with nationally supported evidence-based guidelines.

Methods: A link to a Web site containing a questionnaire on perioperative antibiotic use was e-mailed to more than 1000 facial plastic surgeons in the United States. Responses were archived in a dedicated database and analyzed to determine patterns of use and methods of documenting that use. Current literature was used to develop evidence-based recommendations for perioperative antibiotic use, emphasizing current nationally supported guidelines.

Results: Preferences varied significantly for medication used, dosage and regimen, time of first dose relative to incision time, setting in which medication was administered, and procedures for which perioperative antibiotic was deemed necessary.

Conclusions: Surgical site infection in facial plastic surgery can be reduced by better conformance to currently available evidence-based guidelines. We offer specific recommendations that are supported by the current literature.

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Despite the growing focus of payers and regulatory agencies on evidence-based use of perioperative antibiotics to reduce surgical site infections, the administration of antibiotic prophylaxis in facial plastic and reconstructive surgery remains erratic and highly controversial. There are virtually no published outcomes studies on the effectiveness of antibiotic prophylaxis in nontraumatic facial plastic and reconstructive surgery and even fewer published reports based on controlled clinical trials. Published surveys of plastic and facial plastic surgeons suggest frequent use of perioperative antibiotics without consistency or adherence to evidence-based guidelines.

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RESULTS

The majority of facial plastic surgeons responding to our survey use antibiotic prophylaxis. Antibiotic choice and details regarding administration of the antibiotic vary widely.

Ninety-one percent (n=104) of those surveyed use antibiotic prophylaxis routinely. However, only 34% (39) use prophylaxis for all cases. Thirty-seven percent (n=42) decide to use prophylaxis on a case-by-case basis, with 16% using antibiotics for long or contaminated cases, 10% (11) using antibiotics only for contaminated cases, and 4% (4) using
antibiotics only for long cases. Forty-nine percent (n=43) replied that they used antibiotics postoperatively for more than 24 hours. Forty-three percent (n=39) give 1 dose, and 11% (n=12) continue the regimen for 24 hours after surgery (Figure 2).

A first-generation cephalosporin is the overwhelming antibiotic of choice, picked by 91% of respondents (n=104). A smaller number used a second- or third-generation cephalosporin or amoxicillin–clavulanate potassium (Augmentin; GlaxoSmithKline, Uxbridge, England) (Figure 3). Interestingly, no surgeon chose penicillin, vancomycin, gentamycin, or azithromycin, which were also possible choices.

Most surgeons (81 [71%] of 114) administer antibiotics using a written order at admission, whereas 18% (n=20) administer antibiotics at admission with a verbal order. A small number of surgeons (9%) provide a formal order written prior to admission (Figure 3). A nurse or a member of the anesthesiology staff usually gives and documents the physical administration of the antibiotic (Figure 4). One respondent indicated that no one documents the administration.

### Table: Facial Plastic Surgery Perioperative Antibiotic Usage Survey

<table>
<thead>
<tr>
<th>Question</th>
<th>Option 1</th>
<th>Option 2</th>
<th>Option 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are there cases for which you routinely use preop IV antibiotics?</td>
<td>yes</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>For which cases do you use preop antibiotics?</td>
<td>all</td>
<td>contaminated cases only</td>
<td>long cases only</td>
</tr>
<tr>
<td>When used, how do you usually order them?</td>
<td>written preadmission order set</td>
<td>written order once patient is at facility</td>
<td>verbal order once patient is at facility</td>
</tr>
<tr>
<td>When used, who usually administers the antibiotic?</td>
<td>nursing</td>
<td>anesthesiology</td>
<td>me or another physician on my team</td>
</tr>
<tr>
<td>When used, who usually documents it in the record?</td>
<td>nursing</td>
<td>anesthesiology</td>
<td>me or another physician on my team</td>
</tr>
<tr>
<td>If used, when do you prefer to have it administered?</td>
<td>no consistent time</td>
<td>within 1/2 hour of incision time</td>
<td>within 1 hour of incision time</td>
</tr>
<tr>
<td>If used, how long do you usually continue it?</td>
<td>no consistent time</td>
<td>1 only give one dose preoperatively</td>
<td>24 hours postoperatively</td>
</tr>
<tr>
<td>What antibiotic do you most commonly use?</td>
<td>1st generation cephalosporin (e.g., cephazolin)</td>
<td>2nd generation cephalosporin (e.g., cefuroxime)</td>
<td>3rd generation cephalosporin (e.g., cephraxone)</td>
</tr>
</tbody>
</table>

Figure 1. Facial plastic surgery perioperative antibiotic usage survey.

Figure 2. Duration of antibiotic treatment.

Figure 3. Perioperative antibiotic choice.
An extensive literature review was performed; to our knowledge, no such study has been conducted before in facial plastic surgery or otolaryngology. A few surveys were performed by general plastic surgeons, and our findings are similar to those.

The plastic surgery literature suggests that most general plastic surgeons use perioperative antibiotics for facial plastic surgical procedures, although there are few supporting studies with outcome data. Most recently, Perrotti et al sent a survey to members of the American Society of Plastic and Reconstructive Surgeons. Over 90% of the more than 1000 responding surgeons indicated that they routinely use antibiotics for face-lift, rhinoplasty, or blepharoplasty. An additional study by Krizek et al included responses from more than 1000 plastic surgeons in the United States and Canada. This survey revealed that 50% of surgeons performing rhinoplasty with implants used perioperative antibiotics. Krizek et al went on to perform a second survey, where they found again that most plastic surgeons use perioperative antibiotics.

Similar to our study, Perrotti et al found that cephalosporins were the most commonly used antibiotic. There is no controversy over this choice. The efficacy of high-dose, first-generation cephalosporins, primarily cefazolin, as prophylaxis in clean, contaminated head and neck surgery is well documented. An early landmark study performed in 1979 comparing cefazolin to placebo in patients undergoing head and neck cancer surgery was terminated prior to complete accrual because of the extensive improvement in surgical site infection rates in patients receiving antibiotic.

We found no published study of methods for ordering, administering, and documenting perioperative antibiotic use. However, Krizek et al commented that 63% of plastic surgeons administer antibacterial agents prior to surgery—14.1% during surgery and 22.9% after surgery.

The American Academy of Otolaryngology–Head & Neck Surgery has proposed specific basic principles for prophylaxis against surgical site infection. First, antimicrobials must be present at therapeutic levels at the time of incision. Antibiotics should be administered 1 hour preoperatively if given orally and shortly before anesthetic induction if given intravenously. In addition, antibiotic administered after 24 hours is not considered protective.

Facial plastic surgery encompasses a wide variety of procedures, most of which are classified as clean or clean, contaminated surgery by the classification system of the National Academy of Sciences, National Research Council. Examples of clean surgery include blepharoplasty and face-lift. The infection rate for clean wounds is generally reported to be less than 2% in nonsmokers. Although some controversy exists in the literature regarding the use of antibiotics for clean surgery (placing incisions in surgically prepared skin), the 2003 guidelines set forth by the American Academy of Otolaryngology–Head & Neck Surgery state that antimicrobial prophylaxis is generally unnecessary for clean-only incisions in healthy patients.

Krizek et al point out that a very large series would be needed to show any benefit from the use of prophylactic antibiotics in such procedures, as the surgical site infection rate is so low and the expected difference in outcomes between the control and study samples so small. One relatively large study performed by Baran et al in 1999 classified 1400 patients into 4 groups, including 1 group of 300 patients who underwent a cosmetic surgical procedure (rhinoplasty, blepharoplasty, rhytidectomy, abdominoplasty, liposuction, or reduction mammoplasty). These patients were randomized to receive a therapeutic intravenous single dose of ampicillin-sulbactam or placebo. There was no statistically significant difference in the infection rate between the group receiving antibiotic and the group receiving placebo. Furthermore, Johnson and Wagner retrospectively reviewed the records of 438 patients who had undergone uncontrolled head and neck surgery. Only 3 patients (1%) developed infection, one of whom had received antibiotic prophylaxis. They therefore concluded that perioperative antibiotic offered only “nonefficacy” for inpatients undergoing clean head and neck surgery.

There has been much attention and debate in the literature surrounding the use of antibiotics for clean nasal surgery, primarily rhinoplasty or septoplasty. No placebo-controlled studies were found for this type of surgery, and there is no statistical evidence in the otolaryngology or plastic surgery literature to support the use of perioperative antibiotic.
antibiotic use for clean nasal surgery. It should be noted, however, that local infection and severe complications such as toxic shock syndrome have been rarely reported.10 Yoder and Weimert11 evaluated 1040 patients undergoing septal surgery and found that infections developed in only 0.5% of patients. They conclude that perioperative antibiotics are not warranted in septal surgery. Furthermore, Slavin et al12 prospectively evaluated preoperative and intraoperative blood cultures of 52 healthy patients admitted for rhinoplasty. Only 1 culture grew a microorganism (which the authors attribute to contamination), and no local or systemic infections were noted in any patients throughout a 60-day postoperative period. Slavin et al12 concluded that “the value of perioperative antibiotic prophylaxis is questionable [in rhinoplasty].” Silk et al13 also concluded that staphylococcal bacteremia during nasal septrhinoplasty is a rare occurrence and that antimicrobial prophylaxis is unnecessary.

Regarding length of perioperative antibiotic use, the survey by Perrotti et al1 reveals that 25% of respondents prescribe antibiotics for longer than 4 days after facelift; 31%, after rhinoplasty; and 15%, after blepharoplasty.1 Almost half of our respondents prescribe antibiotics for longer than 24 hours. These findings are in contrast to the current recommendation to discontinue perioperative antibiotics at 24 hours postsurgery. Even in contaminated head and neck surgery, where perioperative antibiotics have proved to be advantageous, no benefit is seen by administration of antibiotics for longer than 24 hours postoperatively.4

Adherence to hospital guidelines and documentation of administration are topics of concern in many institutions in the United States and internationally. Inappropriate antibiotic prophylaxis contributes to the emergence of resistant organisms as well as increased cost and risk to patients. Our survey reveals that there is no agreement among those surveyed concerning orders for and documentation of antibiotic administration. A French study14 analyzed the use of antibiotic prophylaxis in the wake of 2 French consensus conferences attempting to evaluate and improve adherence to guidelines. The study involved the administration to anesthesiologists of 2 surveys regarding indications, choice of drugs, dosage, timing, and treatment duration. The first survey included all patients admitted for a surgical procedure during a 15-day period. Sixty-nine percent of antibiotic administration was found to be inappropriate. Local recommendations were subsequently distributed to all anesthesiologists, anesthetists, and surgeons in the hospital. In addition, the recommendations were displayed in the operating rooms. A second, similar survey (taken 3 months later) revealed that only 18% of antibiotic administration was inappropriate. The authors conclude that successful intervention depends on a hospital-wide education program.

In conclusion, despite the absence of distinct guidelines and evidence-based literature to support its use, perioperative antibiotic administration seems to be common in facial plastic surgery as well as general plastic surgery. In addition, despite increasing interest in regulation and standardization of perioperative antibiotic administration, the documentation and use of prophylaxis varies widely among surgeons. Certainly, large-scale studies are greatly needed in this area to determine correct and appropriate use of antibiotics to avoid unnecessary risk and cost to patients, payers, and hospitals. Hospital-wide education and awareness has proved useful outside the United States. We propose that such education and guidelines in the context of evidence-based decision making become standard for facial plastic surgeons.

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REFERENCES