Prophylaxis in dermatologic surgery

ABSTRACT

The theme of surgical prophylaxis is widely discussed by dermatologists; however, there is a lack of consensus regarding both opinions and published studies. A review of papers relating to the use of antibiotics and antivirals in prophylaxis was conducted in order to organize the existing data and provide dermatologists with a better foundation for making decisions. The literature review was performed using Medline and Cochrane Library databases. Recommendations of prophylaxis in several common situations in the dermatologist’s daily experience, in addition to suggestions of prophylactic medications, were made based on these studies. The critical and evidence based approach in medicine provides support to the decision making process. Nevertheless, dermatologists should neither dismiss their own clinical experience nor underestimate the physician’s individual ability to conduct the clinical analysis of patients.

Keywords: antibiotic prophylaxis; surgery; dermatology.

INTRODUCTION

Although preventive treatment is routinely indicated for most patients, the use of antimicrobials remains a controversial and widely discussed subject in dermatologic surgery. However, there are few published reviews. For instance, there are no randomized studies, with appropriate methods and delineation of the risks including infection of the surgical wound, endocarditis, or infection of the joint prosthesis after dermatologic surgery.

The indiscriminate and popular use of antibiotics and antivirals is not supported in the literature and may jeopardize patients’ health. Aiming to ensure a successful outcome and maximize protection from possible faults in the conduct of the
case, dermatologists usually choose to use antimicrobials in surgical procedures. There are, however, objective data that should be considered before such decisions are taken.

The fact that the risk of bacteremia after dermatologic surgery, as described in the literature, is very limited is reassuring. There are only four studies on the subject, with a total of 265 reported cases, relating to patients with no sign of infection who had undergone several modalities of dermatologic surgery, such as excision with scalpel, electrodissection, curettage, microscopic Mohs surgery, hair transplant, and cutaneous flaps and grafts. Five patients (1.9%) presented bacteremia after dermatologic procedures, a lower incidence than that found in healthy controls (2.1%). In addition, of the five bacteremia cases found, three were caused by Propionibacterium acnes or Staphylococcus hominis, known atypical agents of endocarditis that belong to the normal flora of the skin and are, therefore, culture contaminants.

Although there are reports of endocarditis and joint prosthesis infection developing after dermatologic surgery with no signs of cutaneous infection, there are no studies proving that the use of prophylaxis reduces this risk.

Additional points should be considered before prescribing antibiotic prophylaxis. Although most antibiotics are well tolerated, they can cause a series of adverse effects, from gastrointestinal intolerance to serious cutaneous reactions such as toxic epidermal necrosis as well as acute hepatitis and nephrotoxicity. The indiscriminate use of antibiotics has also been leading to an increase in bacterial resistance. There is a greater incidence of resistance to multiple drugs not only from Staphylococcus aureus but also from Streptococcus viridans, which are important endocarditis and articular prosthesis infection agents. Finally, it is important to mention the possibility of drug-related interactions with frequently used substances. For instance, cephalixin, which is commonly used in dermatologic surgery, inhibits the renal tubular secretion of the metformin, resulting in significantly high concentrations in patients with diabetes mellitus. In the same way, penicillin competes with methotrexate in patient’s renal excretion, increasing the risk of neutropenia.

The knowledge of possible risks and disadvantages associated with the use of prophylaxes helps make decisions regarding their use. Next, indications for the use of antimicrobials after dermatologic procedures are presented. The orientation pillars in place are the guidelines of the American Heart Association (AHA), American Academy of Orthopaedic Surgeons (AAOS) and the American Dental Association (ADA), according to which there are three main groups of indications for the use of prophylaxis: in the prevention of endocarditis, infection in a joint prosthesis, and in the infection of the surgical wound.

ENDOCARDITIS
According to AHA 2007 orientations, there are four criteria for the indication of prophylaxis in the prevention of endocarditis: the location of the surgery, the condition of the skin, the type of procedure, and the presence of high cardiac risk factors.

In patients with high cardiac risk, the oral cavity is the only location indicated for prophylaxis, due to the high rate of bacteremia following intraoral procedures. Bacteremia has been found in 75% of patients with periodontal illness, compared to 10% of patients with no periodontal illness. Those figures are significantly larger than those found in other areas, whose rate is 1.9%, on average.

The condition of the skin is also a criterion for the use of antibiotics. Signs of infection or inflammation in the area of the procedure lead to the disruption of the cutaneous homeostatic mechanisms, increasing the risks of wound contamination and bacteremia.

Since treatments that do not involve incisions and bleeding do not involve a risk of contamination and the need for prophylaxis, procedures such as cryosurgery and non-ablative laser are not considered indications for the use of prophylaxes. The main high risk factors for bacteremia are displayed in Table 1.

INFECTION IN JOINT PROSTHESIS
The criteria employed to decide whether to administer prophylactic treatment to prevent infection in a joint prosthesis should be the same as for endocarditis, with the exception of the risk factors established by the ADA and AAOS in 2003, shown in Table 2. It is important to note that only a joint prosthesis is a high-risk criterion. In this manner, patients with plates, pins and screws are not classified as high risk and, accordingly, should not receive prophylaxis.

INFECTION OF THE SURGICAL WOUND
In spite of their viability in the dermatologist’s daily practice, the previous indications must be deemed as exceptional. The main reason to consider prophylactic treatment in dermatologic surgery is certainly the prevention of infection in the operative wound, a condition present in 1.3% of cases reviewed.

<table>
<thead>
<tr>
<th>Chart 1 - High risk factors for bacteremia</th>
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<tr>
<td>Valvar prosthesis</td>
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<td>Endocarditis history</td>
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<td>Valvulopathy in cardiac transplant</td>
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<td>Congenital cyanotic cardiopathy</td>
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Adapted from Moorhead C and others (18)

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<th>Chart 2 - High risk factors of arthritis secondary to dermatologic procedures</th>
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<td>Joint prosthesis for less than two years</td>
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<td>Previous infection in a joint prosthesis</td>
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<td>Immunosuppression</td>
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<td>Decompensated diabetes</td>
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<td>Hemophilia</td>
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<td>Malnutrition</td>
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Adapted from Moorhead and others (18)
In 1985, the Centers for Disease Control and Prevention (CDCP) 22 classified surgical wounds into four categories, according to their contamination degree (Table 3).

According to these guidelines 22, the use of antibiotics would only be indicated in polluted and infected wounds. In spite of continuing consensus in the need for prophylactic treatment in class III and IV wounds, more recent studies have reconsidered the management of class I and II wounds 24-27.

Based on those studies, Wright and others 1 established a set of criteria for the use of antibiotics in operative wounds, independently of the contamination degree (Table 4).

Dixon and others 24 published a study that has contributed to the definition of populations with a high risk of infection at the surgical site after dermatologic procedures, including Mohs surgery. They evaluated 2,424 patients subjected to the removal of 5,091 lesions without the use of prophylaxis. The rate of infection was 5%, notably in the following places and procedures: inguinal region and below the knee, wedge shaped excision in the lip and ear, and skin grafts. Another study, conducted by Syladis and others 25, evaluated 464 facial surgeries without the use of prophylaxis, which resulted in a rate of general infection of 6.5% (5% when only the nose and ear areas were considered). Another interesting finding was the higher infection rate of tumorous lesions when compared to benign lesions.

In turn, Maragh and others 28 evaluated 1,000 patients who had Mohs surgery, also in the absence of prophylaxis. In spite of an overall infection rate of 0.7%, the nasal area was responsible for 62.5% of the cases of infection. In this manner, the infection rate in surgeries in the nose area was 0.5%. Analyzing patients who had nasal flap surgery, the infection rate increases to 3.1%. Maragh and others also proposed other possible indications such as surgeries with high tension, surgeries in delicate areas such as the nose and hand, and multiple simultaneous procedures 29.

Futoryan and others 26 reported a rate of infection of 2.29% after Mohs surgeries and general procedures, being notably higher in cases of Mohs surgery carried out in the ears. Although most studies favor prophylactic treatment for surgeries in the ear area, there are controversies regarding the need for prophylaxes during ear procedures. The recent study conducted by Mailler-Savage and others 27 did not show advantages in the administering of prophylaxis nor a significant difference among patients who received quinolones after Mohs surgery in the ear and those who received only local care.

Wahie and others 17 prioritize the use of prophylaxis in patients with extensive inflammatory cutaneous illness after analyzing 100 biopsies carried out without the use of prophylaxis. They found higher infection rates in patients with extensive cutaneous illness as well as a larger proportion of *Staphylococcus aureus* in the affected skin.

### TOPICAL ANTIBIOTIC

Topical antibiotics are routinely used after dermatologic procedures. It seems as though the benefits to the cicatrization of the wound (i.e., promoting an appropriate environment) is related more to the topical antibiotic’s vehicle than to its active ingredients. Smack and others 30, for instance, randomized 922 patients to receive either bacitracin or petroleum jelly after diverse surgical procedures. They found infection rates less than 2% in both groups, without significant difference between them. Another argument against the indiscriminate use of topical antibiotics is the possibility of secondary contact dermatitis. The North American Contact Dermatitis Group reported overall sensitization rates of 9.2% with bacitracin and included it on its list of the 10 most common allergens 31.

### MICROGRAPHIC MOHS SURGERY

In the literature there is no specific discussion on the use of prophylaxis in Mohs surgery; prophylactic treatment is only indicated in cases that meet the criteria adopted for other procedures. Regarding, however, heterogeneous procedures that involve mucous membrane areas and last many hours, cases should be evaluated on an individual basis, and the decision on whether to use prophylaxis should take into account a series of factors including the patient’s conditions and the comorbidities associated with possible local infections.

### LIPOSUCTION

This procedure is executed by a growing number of der-
matologists and, given the low incidence of subsequent infection, there is no absolute indication for antibiotic prophylaxis. Nevertheless, in cases where there is suspicion of disruption of aseptic techniques or any factor that could contribute to infection, the use of antibiotics must be the choice.

**ANTIVIRAL PROPHYLAXIS**

The incidence of infection by simple herpes viruses (HSV) and varicella-zoster (VZV) is high all over the world. As shown in some serological studies, HSV and VZV can affect more than 90% of the population. Patients subjected to facial or perioral exfoliation, with peels, ablative laser or dermabrasion, pose an increased risk of viral infection activation. About 9% of patients without prophylaxis experience the reactivation of viral illnesses after undergoing those procedures. That percentage may reach 50% among patients with a history of herpes labialis. Thus, the need for viral prophylaxis in exfoliations involving the perioral region is evident.

Several antiviral prophylaxis treatment plans have been proposed. Alster and others reported the use of famciclovir for preventing HSV-I reactivation after exfoliation with ablative laser. The study was conducted with 99 patients who had facial or perioral exfoliation, with peels, ablative laser or dermabrasion, pose an increased risk of viral infection activation. About 9% of patients without prophylaxis experience the reactivation of viral illnesses after undergoing those procedures. That percentage may reach 50% among patients with a history of herpes labialis. Thus, the need for viral prophylaxis in exfoliations involving the perioral region is evident.

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Gilbert and others studied the use of valacyclovir in 84 patients who underwent facial exfoliation with dermabrasion, laser or chemical peel. All patients were given valacyclovir 500mg twice a day for 14 days. Oral valacyclovir is absorbed quickly and completely converted into acyclovir, with a higher bioavailability than that of oral acyclovir. The serial levels of acyclovir obtained after the administration of valacyclovir are similar to those achieved after the administration of intravenous acyclovir.
The choice of antibiotic for prophylactic treatment is summarized in Table 7. In cutaneous surgeries that require prophylaxis, the first choice is a single 2g dose of cephalaxin 2g orally (VO). If oral administration is impractical, a good alternative would be intravenous (IV) or intramuscular (IM) cefazolin or ceftriaxone 1g, also in a single dose. In patients with an allergy to beta-lactamics, azithromycin 500mg or clindamycin 600mg can be used orally, also in a single dose. IM or IV clindamycin is a good option for patients that cannot receive the medication orally. In surgeries in the oral cavity, the first choice for prophylaxis is a single 2g dose of amoxicillin VO. For patients with an allergy to beta-lactamics or who cannot receive the medication orally, the above recommendations apply.

**FINAL COMMENTS**

The use of prophylactic medicines is not innocuous and, when prescribed incorrectly, may entail more complications than benefits. The analysis of well-designed studies can provide important input into the decision about whether to use prophylaxes.

Before the administration of prophylaxis in dermatologic surgery, it is necessary to observe the presence of one of the following conditions:

1. Sufficiently high risk of infection for the prophylaxis to result in the use of a smaller dose of antibiotic than that necessary later on should an infection develop.

2. Lower incidence of infection, but possible severe comorbidities resulting from an infection. Surgeries in delicate areas such as the nose or ear, where local infection could cause great cosmetic damage to the cicatrization, would be typical examples.

Evidence-based medicine is no longer a mere tendency, but a reality and necessity in medical practice. Well-delineated studies are key for the formation of concepts. In that context, systematic revisions are the best instrument for analysis because they offer a greater degree of scientific evidence; nevertheless, they are also subject to failures or biases. They are based on a subjective method, given that the author chooses the studies and the data that he or she wants to include in the analysis. In addition, there is a tendency on the part of the authors to only publish studies with positive results, which makes the analysis partial. Also, in a systematic review, only the author has access to the complete data set of each study, implying that the reader will not be able to conduct an exhaustive analysis. Finally, literature reviews’ analysis of groups, rather than individuals, limiting the application of the results to individual patients.

Despite its limitations, evidence-based medicine is important for basing and guiding clinical reasoning. Nevertheless, it should not replace individual critical analysis and the physician/patient relationship in any way, for this relationship remains the cornerstone of medicine.
REFERENCES


35. Alster TS, Nanni CA. Famciclovir prophylaxis of herpes simplex virus infection or infection recurrence following laser skin exfoliation. Plast Reconstr Surg. 1999;104(4); discussion 434-5.


1. On the use of prophylaxis in dermatologic surgery, it is possible to ascertain:
   a) The more frequently used antibiotics (penicillin and cephalosporins) are safe and do not present important medicamentous interactions.
   b) The use of prophylaxis after dermatologic surgery in patients without signs of infection decreases the risk of endocarditis after the procedure.
   c) The risk of bacteremia after dermatologic surgery is similar to that in healthy individuals who have not undergone procedures.
   d) There is a consensus regarding the use of prophylaxis after oncologic surgeries, regarding both traditional techniques or Mohs micrographic surgeries.
   e) None of the above.

2. To avoid bacterial endocarditis, the use of prophylaxis is indicated in the:
   a) Removal of a nevus from the back of a patient with a metallic aortic prosthesis.
   b) Cryotherapy for the treatment of angiokeratoma in the leg of a patient who has undergone a kidney transplant.
   c) Exeresis of an oral papilloma in an elderly patient with a history of mitral prolapse.
   d) Exeresis of a pilary cyst in the scalp of a patient with interatral communication.
   e) Surgical biopsy (fuse) of a lesion suggestive of panniculitis in the inferior limb of a young patient with a history of Fallot’s tetralogy.

3. The use of prophylaxis for arthritis is indicated in the following case:
   a) Removal of the mucocele in a young patient with fixation plates and screws in the femur.
   b) BCC exeresis in fuse in an elderly female patient with a history of osteoporosis and a total hip joint prosthesis.
   c) Blepharoplasty in a patient with a history of total joint shoulder prosthesis and breast cancer.
   d) Exeresis of infected cyst in a patient who has recently had total knee joint prosthesis surgery.

4. There is a high risk of infection of a surgical wound, which impedes the healing process, in the following cases except for:
   a) BCC exeresis in the scalp.
   b) Transposition flap in the nose.
   c) Enlargement of the margins of melanoma in the leg.
   d) Punch biopsy in erythrodermic patient.
   e) SCC wedge-shaped exeresis in the inferior lip.

5. The use of topical antibiotics after dermatologic procedures:
   a) Decreases the rate of infection of the surgical wound.
   b) Is indicated in potentially contaminated wounds.
   c) Is not more effective than petroleum jelly.
   d) Seldom causes sensitization.
   e) All of the above.

6. The use of antiviral prophylaxis is indicated in the following situation:
   a) Periocular Baker’s Peeling in a patient with a history of labial herpes.
   b) Dermabrasion in the malar areas of a patient with a history of genital herpes.
   c) Facial exfoliation with CO2 laser in a patient without previous herpes lesions.
   d) Jessner’s Peeling and TCA for the treatment of melanoses in the limb of a patient with no history of herpes.
   e) 2 of the above are correct.

7. The percentage of patients with no history of herpes simplex who present positive serologies is:
   a) 5%
   b) 35%
   c) 50%
   d) 70%
   e) 90%

8. The ideal moment for administering prophylactic antibiotics is:
   a) 2 hours before the procedure.
   b) 1 hour before the procedure.
   c) During the surgery.
   d) Up to 2 hours after the procedure.
   e) It depends on the method of drug administration.

9. Prophylaxis is indicated in the following case:
   a) Wedge-shaped exeresis of SCC in the inferior lip of a patient with no history of endocarditis or joint prosthesis.
   b) Molluscum curettage in a child with a history of endocarditis.
   c) Exeresis in fuse, with the primary closing of the subcutaneous nodule in the axillary area.
   d) Liposuction of the abdomen.
   e) All of the above.

10. Prophylaxis is not indicated in:
    a) Nose surgeries.
    b) Intraoral procedures.
    c) Perioral exfoliation.
    d) Nail surgeries.
    e) All of the above.