

Prophylaxis in dermatologic surgery

Profilaxia em cirurgia dermatológica

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.

RESUMO

Profilaxia cirúrgica é assunto amplamente discutido pelos dermatologistas, inexistindo, entretanto, consenso, tanto nas opiniões quanto nos estudos publicados. Com o objetivo de organizar os dados existentes na literatura e embasar o dermatologista para melhor escolha, foi realizada revisão de trabalhos nas bases de dados do Medline e da Biblioteca Cochrane, levantando artigos sobre profilaxia com antibióticos e antivirais. Com base nesses estudos foram elaboradas recomendações de profilaxia em diversas situações cotidianas do dermatologista, bem como sugestões de medicações profiláticas. O uso crítico da medicina embasada em evidência auxilia o dermatologista a tomar decisões, mas não se deve desconsiderar a experiência do médico nem tampouco subestimar a capacidade individual de análise clínica do paciente.

Palavras-chave: *antibioticoprofilaxia; cirurgia; dermatologia.*

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

Continuing Medical Education



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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 cases¹, relating to patients with no sign of infection who had undergone several modalities of dermatologic surgery, such as excision with scalpel, electrodissection, curettage, micrographic 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%)². 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 infection³⁻⁹, there are no studies proving that the use of prophylaxis reduces this risk¹⁰.

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 nephrotoxicity¹¹. 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 agents¹². Finally, it is important to mention the possibility of drug-related interactions with frequently used substances. For instance, cephalexin, which is commonly used in dermatologic surgery, inhibits the renal tubular secretion of the metformin, resulting in significantly high concentrations in patients with diabetes mellitus¹³. In the same way, penicillin competes with methotrexate¹⁴ in patient's renal excretion, increasing the risk of neutropenia¹⁵.

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 orientations¹⁰, 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 illness¹⁶, 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 bacteremia¹⁷.

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 prophylaxes¹. 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 ADA¹⁹ and AAOS²⁰ 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 reviewed²¹.

Chart 1 - High risk factors for bacteremia

- Valvar prosthesis
- Endocarditis history
- Valvulopathy in cardiac transplant
- Congenital cyanotic cardiopathy

Adapted from Moorhead C and others (18)

Chart 2 - High risk factors of arthritis secondary to dermatologic procedures

- Joint prosthesis for less than two years
- Previous infection in a joint prosthesis
- Immunosuppression
- Decompensated diabetes
- Hemophilia
- Malnutrition

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 region 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-

Table 1 - Types of operative wounds according to CDCP

Wound type	Class	Infection rate (%)
Clean	I Surgical wounds in skin with no sign of inflammation, with antisepsis and sterile surgical technique	1-4
Potentially contaminated	II Surgical wounds in polluted areas such as the armpit, perineum or mucous membrane	5-10
contaminated	III Surgical wounds in inflamed areas, disruption of sterile technique, or traumatic wounds	6-25
Infected	IV Coarse contamination with strange bodies or festering wounds, with necrotic or devitalized tissue	>25

Adapted from Messingham and others (23)

Chart 3 - Locations and surgical techniques with increased risk of infection of the surgical wound

- Inferior extremities, especially leg
- Inguinal region
- Wedge shaped exeresis in the lip or ear
- Skin grafts
- Nasal flaps
- Extensive inflammatory cutaneous illness

matologists and, given the low incidence of subsequent infection, there is no absolute indication for antibiotic prophylaxis²³. 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 population³². Patients subjected to facial or perioral exfoliation, with peels, ablative laser or dermabrasion, pose an increased risk of viral infection activation³³. About 9% of patients without prophylaxis experience the reactivation of viral illnesses after undergoing those procedures^{32,34}. That percentage may reach 50% among patients with a history of herpes labialis³². Thus, the need for viral prophylaxis in exfoliations involving the perioral region is evident.

Several antiviral prophylaxis treatment plans have been proposed. Alster and others³⁵ 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 and received 250mg or 500mg of famciclovir twice a day for 10 days, starting one day before the procedure. No herpes lesions were observed in 90% of the cases, regardless of the dosage group. Approximately 35% of patients with a previous history of herpes labialis presented recurrence, compared to 5% in the group with no known history of the illness.

Gilbert and others³⁶ 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 and were randomized to begin treatment on the day of the procedure or one day before. No reactivation cases were observed in that study, suggesting there was no significance in treatment starting day.

The reactivation of the herpes labialis infection usually happens between three and 12 days after a procedure or until the reconstitution of the epidermis. The start is usually marked by intense facial pain, followed by the emergence of typical HSV vesicles 24 hours later. Trying to define the ideal duration of the prophylaxis up to the point of reepithelialization, Beenson and others³³ evaluated 120 patients subjected to facial or perioral exfoliation with ablative laser. They received 500mg

valacyclovir twice a day, starting one day before the procedure, and were randomized to continue for either 10 or 14 days. The authors concluded that there was no difference between the groups, given the absence of cases of reactivation of viral infection.

Another interesting fact from a practical point of view was observed in that study. The serology test for HSV was made before and after treatment, as the method of evaluation of possible viral infection. Surprisingly, a positive serology was found in 70% of the patients with no personal history. That significant value is important to persuade patients with no herpes history of the necessity to undergo the prophylaxis.

START OF THE PROPHYLAXIS

Systemic antibiotics can be administered in the pre, intra or post-operative periods. Ideally, the antibiotic should be in the bloodstream and in the surgical site at the moment of the incision to prevent infection. It is believed that antibiotics administered before the beginning of the surgery is incorporated into the coagulum of the wound at the moments of the incision and repair, working to protect against infection. According to this rationale, antibiotics administered in the postoperative period would be less effective²³.

According to the AHA, the ideal duration of prophylactic antibiotics is from 30-60 minutes before surgery¹ until up to two hours after the procedure¹⁸. The ADA and AAOS suggest starting prophylaxis one hour before the procedure¹.

RECOMMENDATIONS

Based on the most recent reviews and protocols^{1,18,23,33,35,36}, a series of suggestions regarding the use of prophylaxes, in addition to therapeutic options for each case, has been created (Table 5). It is important to note that those recommendations are intended as a starting point and are not exhaustive.

According to these guidelines, the only indication for prophylaxis with antibiotics in cutaneous surgeries would be the presence of high-risk criteria for infection of the surgical wound, as shown in Table 6.

In surgeries in infected areas or with contamination during the procedure, the antibiotic should not be administered preventively, but aggressively, with the intent of treating the infection in order to minimize the effects in the process of cicatrization of the wound.

As discussed earlier, the oral cavity presents higher risks for post-surgical bacteremia; however, only cases of high risk of endocarditis or joint prosthesis infection (Tables 1 and 2, respectively) should receive prophylaxis.

Antiviral prophylaxis is suitable in any exfoliation in the perioral region, with or without a history of infection. The recommended regimen is 500mg valacyclovir twice a day for 10 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 acyclovir³⁷.

Chart 4 - Prophylaxis indications			
Local	Condition	Indication	Prophylaxis
Skin	Not infected	High risk	No
Skin	Infected	Low/high risk	treat aggressively
Oral cavity	Any	High risk	Yes
Skin	Exfoliation	Antiviral	Yes

Adaptada de Wright et al.¹ e Moorhead C et al.¹⁸

Charts 5 - Locations and surgical techniques with increased risk of infection of the surgical wound
<ul style="list-style-type: none"> ● Extensive inflammatory cutaneous illness ● Extremities ● Groin ● Wedge-shaped exeresis in the lip or ear areas ● Nasal flaps ● Skin grafts ● High-tension sutures

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 cephalexin 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.

Chart 6 - Indications of prophylaxis			
Local	Restrictions	Medication	Dose (adult)
Skin	absence of allergy	Cephalexin	2g VO
		Cefazolin/ceftriaxone	1g IV
		Clindamycin	600mg VO/IM/IV
Oral mucous membrane	Allergy to beta-Lactamics	Azithromycin	500mg VO
		Amoxicillin	2g VO
		Cefazolin/Ceftriaxone	1g IM/IV
Oral mucous membrane	Allergy beta-Lactamics	Clindamycin	600mg VO/IM/IV
		Azithromycin	500mg VO

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. ●

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QUESTIONS FOR CONTINUING MEDICAL EDUCATION (CME)

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 pilar cyst in the scalp of a patient with interatrial 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.
- e) Photodynamic therapy for the treatment of facial actinic keratoses in a patient with a knee joint prosthesis.

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.

As respostas devem ser encaminhadas diretamente pelo site www.surgicalcosmetic.org.br.

A data limite para responder ao questionário constará por e-mail que será encaminhado com o link direto para acessar a revista.