

Contribution to the study of antimicrobial prophylaxis in third molar extraction surgeries

Contribuição ao estudo da profilaxia antimicrobiana em cirurgias de extração dos terceiros molares

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ABSTRACT

The use of antibiotic prophylaxis in the extraction of third molars is extremely controversial, raising several discussions about the most appropriate clinical protocol to avoid postoperative complications. To review the literature on the subject, describing the evidence for and against antibiotic prophylaxis to prevent surgical site infections in third molar extractions, besides establishing a prophylactic protocol and dosage regimen. A literature review was carried out analyzing scientific evidence from articles on the PubMed and Scielo platforms by searching for the descriptors "antibiotic therapy and infection in third molar extraction surgery", "antimicrobial prophylaxis and infective endocarditis", "antibiotic prophylaxis and adverse effects", "antibiotic therapy in dentistry", "surgical time and incidence of infections in extractions", including original articles and double or triple blind randomized clinical trials, in Portuguese and English, published between 1980 and 2021, separated in chronological order. There is no consensus in the literature on the indication of antimicrobial prophylaxis, but factors as surgeon's skill, time elapsed during the procedure and the patient's general health status directly affect the incidence and severity of infections. Among all the literature analyzed for this study, it is possible to infer that the topic is still extremely questionable and, therefore, it is essential to conduct new experimental studies to obtain more conclusive data on the subject.

Indexing terms: Clinical protocols. Oral surgery. Profilaxis dental.

RESUMO

O emprego da profilaxia antibiótica na exodontia de terceiros molares é extremamente controverso, gerando diversas discussões sobre o protocolo clínico mais adequado para evitar as complicações pós-operatórias. Revisar a literatura referente ao tema, descrevendo as evidências a favor e contra a profilaxia antibiótica para prevenir infecções do sítio cirúrgico nas extrações de terceiros molares, além de firmar um protocolo profilático e regime posológico. Realizou-se uma revisão de literatura analisando evidências científicas através de artigos nas plataformas PubMed e Scielo pela pesquisa de descritores "antibioticoterapia e infecção em cirurgia de extração de terceiros molares", "profilaxia antimicrobiana e endocardite infecciosa", "profilaxia antibiótica e efeitos adversos", "antibioticoterapia em odontologia", "tempo cirúrgico e incidência de infecções em exodontias", sendo incluídos artigos originais e ensaios clínicos duplos ou triplos cegos randomizados, nos idiomas português e inglês, publicados entre 1980 e 2021, separados em ordem cronológica. Não há consenso na literatura sobre a indicação da profilaxia antimicrobiana, porém há fatores como a habilidade do cirurgião, tempo

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decorrido durante o procedimento e estado de saúde geral do paciente afetam diretamente na incidência e severidade das infecções. Dentre toda a literatura analisada para este estudo, é possível aferir que o tema é ainda extremamente questionável e, portanto, é fundamental que novos estudos de caráter experimental sejam feitos para que se obtenha dados mais contundentes sobre o assunto.

Termos de indexação: Cirurgia bucal. Profilaxia dentárias. Protocolos clínicos.

INTRODUCTION

During the extraction of dental elements, there are countless factors that may contribute to the development of infections, both at the surgical site (dental socket) and systemically, leading to transient bacteremia [1,2]. These factors range from the conditions in which the procedure was performed, such as the surgical environment, surgeon's experience, procedure time, maintenance of the aseptic aspects of the surgery and tissue manipulation, and even the defense system and surgical healing conditions of each individual, which can change depending on systemic diseases, oral hygiene, and postoperative care [3,4]. Some of these factors are considered risk factors with a greater propensity to trigger infections, leading to discussion of the prophylactic administration of antimicrobials before and after operative periods in third molar extraction surgeries [1].

The third molars are the last teeth to erupt in the oral cavity and therefore, are subject to lack of space and, consequently, to impaction [3]. Therefore, they are more difficult to operate, especially lower third molars, which also have a higher rate of infection due to lower blood supply to the mandible [1]. However, the infection rate in healthy patients (ASA I)³ does not exceed 6%, and the rate of adverse reactions to these drugs is 7%, generating controversies and discussions on the subject [1,5].

Antibiotics, when administered correctly, can inhibit the growth or even kill bacterial cells, which can reduce the chances of surgical failure [3,6]. However, when used indiscriminately, they result in superbugs causing immeasurable harm to the patient's health and to the environmental balance. The evolution of strains occurs through selective pressure and then multiplication of resistant bacteria through the use of drugs [6]. Ever beyond the possibility of superinfections, the use of antimicrobials may cause many adverse effects, such as allergic reactions, vomiting, nausea, change in the microbiota, intoxication and development of secondary infections, which may generate higher costs and comorbidities to the individual under treatment [1,2,7].

LITERATURE REVIEW

For the literature review, the following inclusion criteria were used: original articles and randomized double or triple blind clinical trials, in Portuguese and English, published between 1980 and 2019, organized in chronological order.

Faced with numerous conflicting information in the specialized literature, regarding the indication of antibiotic prophylaxis in oral and maxillofacial surgery, Peterson et al. [8] described five criteria for its indication [2,7,8]:

1. The procedure must have a significant risk of infection;
2. The correct antibiotic for the surgical procedure must be selected;
3. The antibiotic level must be high;
4. The timing of antibiotic administration must be correct;
5. The lowest possible exposure to the antibiotic should be used.

Peterson et al. [8] also states that antibiotic prophylaxis in the postoperative period, in addition to contributing to the development of bacterial resistance, does not reduce the incidence of cicatricial infections. However, patients

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³ ASA - American Society of Anesthesiology – classification of patients, according to surgical risk, according to their clinical condition.

with certain diseases that interfere with host defenses or who are under immunosuppressive treatment should receive prophylactic antibiotics before the procedure; These diseases being: decompensated diabetes, nephropathy, leukemia, Hodgkin's disease and patients undergoing radiotherapy treatment in the head and neck region [1,2,8].

In 1986, Krokmanov and Nordermram [9] already considered the association of antibiotic prophylaxis with chemical control of the biofilm to be indispensable.

Classen et al. [10] stated that the rates of cicatricial infections increase with each passing hour of the initial incision. Therefore, when it is not possible to carry out antibiotic prophylaxis in the preoperative period, the same dose can be indicated up to 3 hours after the procedure, knowing that with each passing hour the effectiveness is reduced [10].

In 2003, Saad Neto et al. [11] determined that it is essential when performing extensive ostectomy postoperative antibiotic treatment.

Gutierrez et al. [12], obtained positive results in the preoperative prophylactic administration in patients with partially erupted teeth, with a history of pericoronitis, in surgeries of teeth requiring odontosection and ostectomy (classified as Pell & Gregory B and C, 2 and 3⁴), which will be performed by a professional with little experience or in patients with systemic dysfunction.

Monaco et al. [13], analyzed the administration of antibiotics in adolescents aged 12 to 19 years, in the preoperative period of third molar surgeries and application of chlorhexidine before and after the procedure period, verifying a reduction in pain, but not in inflammation.

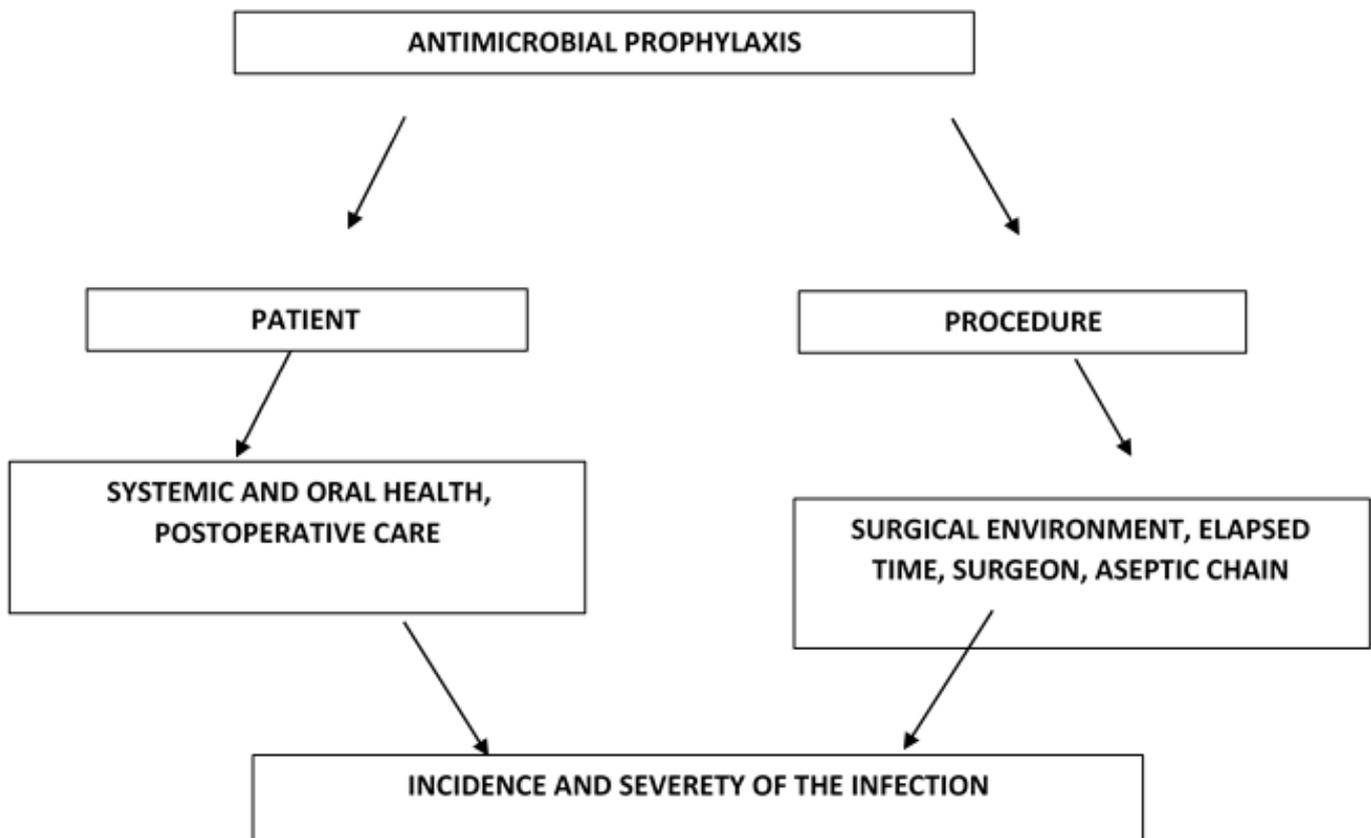


Figure 1. Factors for the use of antimicrobial prophylaxis.

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⁴ Pell and Gregory classification. Class I - enough space to accommodate the crown of the lower third molar in relation to the anterior edge of the mandibular ramus. Class II - space smaller than the mesiodistal diameter of the crown of the lower third molar in relation to the anterior edge of the ramus of the mandible. Class III - The mandibular third molar lies within and behind the anterior border of the ramus of the mandible.

RESULTS

Through the analyzes it was possible to infer that there are no additional benefits when administering antibiotic prophylaxis in patients classified as ASA I, unless there are risk factors such as: partially erupted or malpositioned teeth, with a history of pericoronitis, in surgeries that require odontosection and ostectomy (Pell & Gregory B and C, 2 and 3), and which will be performed by a professional with little experience or in patients with systemic compromise and poor oral hygiene [2,3,5].

Antibiotic prophylaxis applied in the postoperative period is invalid and increases the risk of adverse reactions [7,14].

Surgical time (time under procedure) is directly related to the surgeon's experience, tissue trauma and the risk of surgical infections [4,14].

Patients with heart disease, predisposed to infective endocarditis (valvular diseases, history of rheumatic fever, artificial valves, history of previous endocarditis, congenital heart defect, recent heart transplantation and those who have prosthetic devices), patients with orthopedic prostheses, immunosuppressed or have metabolic disorders such as diabetes and renal failure, antimicrobial prophylaxis is recommended by the American Heart Association (AHA) to prevent metastatic infections [1,15].

Unlike the so-called "prophylaxis of surgical site infections", these cases demand a specific regimen of prophylaxis for infective endocarditis. The AHA protocol recommends 2 g of Amoxicillin, orally, one hour before the procedure [1,2,15]. In the case of patients allergic to Amoxicillin, the recommended use of Clindamycin 600 mg, orally, also one hour before the procedure, or when possible, 30 minutes before, intravenously, this being the preferable route of administration because it depends less on the metabolic processes of the individual and agree with the principles of antibiotic prophylaxis of Peterson et al. [8] [1,2,8,15].

With every minute that passes from the initial incision, the risk of infection is increases. The duration of third molar extractions should be up to 50 minutes [4]. Lower third molars have a higher rate of infection compared to upper ones, especially when compromised by it's overall positioning.

Amoxicillin is the first-choice antibiotic because it is better absorbed in the gastrointestinal tract, providing high and lasting serum levels and because it is effective against the main microorganisms that cause oral infections (Gram + cocci) [1,3,6,7,16].

When the prophylactic dose of antibiotics is indicated, it should be 4x the therapeutic dose, up to 3 hours after the initial surgical incision, knowing that with each passing minute, the prophylactic efficacy is reduced [17].

The effective antimicrobial prophylaxis protocol must be composed of the association of preventive measures such as the previous administration of antibiotics, biofilm control, maintenance of the aseptic chain and well done postoperative care. One of the measures that stood out among the analyzed literature was 0.12% chlorhexidine digluconate, which, when used in a single mouthwash before the procedure, is able to avoid in addition to infections at a distance and at the surgical site, postoperative complications such as Alveolitis, without causing adverse reactions [1].

The use of antibiotics to prevent infections has also proved to be beneficial to prevent postoperative pain, swelling, fever and trismus, if used at the right time and in the correct dosage [6,13].

There is no consensus in the literature about the real need for antimicrobial prophylaxis. The preponderant item for the case depends on the professional's common sense associated with the rational use of antibiotics.

DISCUSSION

Although there is no consensus in the literature regarding the antimicrobial prophylaxis protocol in third molar extraction surgeries, it is clear that their use should not be radicalized, knowing that using them routinely can be as

incoherent as prohibiting their use. The recommendation for antimicrobial prophylaxis should depend on the patient's physical condition, their comorbidities, the complexity of the case and the conditions under which the procedure will be performed and overall professional's common sense.

Establishing protocols in the face of such dissent would "stiff" the professional's conduct, establishing rules for different patients, as opposed to the principle that each patient is a different case and, therefore, deserves to be treated differently. In addition, the professional must always bear in mind the Hippocratic principle *primum non nocere*, that is, first, do no harm.

On the other hand, the importance of this study is precisely to guide its conduct, based on the literature review. In addition, the present review aims to establish some criteria (or guidelines) for the prescription of antimicrobials in the prophylaxis of infections in third molar surgeries, based on the rational use of drugs. Since the II Consensus of the World Health Organization (WHO), held in Nairobi, in 1985, it already provides, in its conclusions, that the antimicrobial should follow the next [18]:

1. be appropriate to the clinical condition of the patient;
2. be prescribed in doses appropriate to the needs of each patient;
3. be prescribed in the appropriate period for the treatment;
4. have the lowest possible cost to the patient and their community.

CONCLUSION

Among all the literature analyzed for this study, it is possible to infer that the topic "antimicrobial prophylaxis" is extremely controversial, as it does not present a scientific consensus, as demonstrated in the results, and it is essential that new experimental studies be carried out in order to obtain data more forceful on the subject.

Moreover, with this review it is possible to deduce that there is no room for an inflexible and immutable protocol of antimicrobial prophylaxis for third molar extraction procedures, since there are countless factors that influence the severity and occurrence of postoperative complications and that deserve a detailed and careful investigation in each clinical case.

Collaborators

CD Baú, data research, writing, review, methodology and project management. PS Batista, advising and review.

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