DECLARATIVE TITLE: THE PRESCRIPTION OF PROPHYLACTIC ANTIBIOTICS FOR THE IMPLANT PROSTHETIC PHASE DOES NOT SIGNIFICANTLY DECREASE THE INCIDENCE OF INFECTIOUS COMPLICATIONS.

PURPOSE/QUESTION: In healthy patients starting the implant prosthetic phase does the prescription of preventive antibiotics compared to not prescribing them reduce the incidence of infectious complications?

ARTICLE TITLE AND BIBLIOGRAPHIC INFORMATION: Does the Prosthetic Phase of Dental Implants Justify the Prescription of Preventive Antibiotics in Healthy Patients? A Systematic Review. Salgado-Peralvo AO, Uribarri A, Peña-Cardelles JF, Kewalramani N, Rodríguez JLG, Velasco-Ortega E. J Oral Implantol. 2023 Feb 1;49(1):93-101.

Strength of Recommendation Taxonomy (SORT) Grading

STRENGTH OF RECOMMENDATION GRADE:

Grade B	Inconsistent or limited-quality patient-oriented evidence

LEVEL OF EVIDENCE:

Level 2	Limited-quality, patient-oriented evidence

SOURCE OF FUNDING: The authors declared that no funding was received to support the study.

TYPE OF STUDY/DESIGN: Systematic Review

KEY WORDS: Prophylactic antibiotics, Implant prosthetic phase, Postoperative infection, Second-stage implant surgery, Systematic Review.

Summary

Subjects or Study Selection: The systematic review was developed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and registered in the International Prospective Register of Systematic Reviews under the registration number CRD42021277959.

The literature search was conducted using multiple electronic databases (PubMed/MEDLINE, Web of Science, Google Scholar, and LILACS), with no language or date restrictions for studies published up to September 2021. Additionally, unpublished literature search was performed on the OpenGrey database and bibliographic references were examined for publications that did not appear in the initial search. Search strategies were executed using medical subjects headings (MeSH) terms, keywords, and various freely chosen terms while utilizing Boolean operators to combine the searches. Two researchers independently performed the selection of potentially eligible studies following a two-phase process (i.e. screening and eligibility phases), while a third researcher was consulted in case of a disagreement. Based on eligibility criteria, 3 studies were included for the qualitative and quantitative analysis.

Key Study Factor: The authors performed a systematic review that resulted in the final inclusion of a retrospective clinical study, a consensus document, and a clinical protocol. These three selected articles pertained to the risk of infection and provided recommendations in healthy patients for the administration of prophylactic antibiotics (PA) during the implant prosthetic phase, encompassing procedures such as implant exposure surgery, peri-implant plastic surgery, impression-taking, and prosthesis placement on the implants. All included articles were published between 2005 and 2008,

Main Outcome Measure: The main outcome measure is the incidence of infectious complications in healthy patients commencing the implant prosthetic phase, comparing those prescribed PA with those not prescribed. In addition, the authors performed quality assessment analyses of the included studies based on their risk of publication bias.

Main Results: In one study, no significant difference was observed in infection rates between patients who received PA and those who did not in various implant procedures. Within a clinical protocol, second-stage implant surgery is categorized as a procedure with a low risk of bacterial contamination and surgical site infection in healthy patients, making the use of PA unnecessary.

As per clinical consensus, when discussing peri-implant plastic surgery during the prosthetic implant phase, which can be referred to as mucogingival surgery, it is regarded as a high-risk procedure for infection. Consequently, the use of PA is recommended. Conversely, the authors of a clinical consensus also make reference to other potential interventions during the prosthetic implant phase, categorizing them as low-risk procedures and consequently, not advocating for the use of PA. The methodological quality of eligible studies was evaluated following Joanna Briggs Institute Critical Appraisal Tool. The concordance between the two researchers was 97.43% with a κ coefficient of 0.93 (SE, 0.08 [95% CI, 0.74–1]).

Conclusions: The prescription of PA in second-stage implant surgeries, impression-taking procedures, and/or implant prosthetic placements cannot be justified. In cases of certain second-stage implant procedures, as in peri-implant mucogingival interventions lasting more than 2 hours and in which soft tissue grafts or biomaterials are used extensively, the administration of PA may be suggested. Due to a lack of data, high-quality controlled studies are recommended to enhance the quality of primary research in this field.

Commentary and Analysis

A dental implant is a prosthetic structure, surgically implanted beneath the oral tissues, including the mucosa, periosteum, and within or through the bone. Its primary purpose is to provide support and retention for fixed or removable dental prostheses (1). Today, dental implants serve as the most optimal solution for replacing missing teeth. In the United States alone, approximately 5 million implants are placed each year (2,3).

There are three surgical approaches for dental implant placement: two-stage, one-stage, and immediate-loading. In the two-stage surgical procedure, the implant body is initially positioned beneath the soft tissue, allowing for bone healing to commence. In the second stage, soft tissues are manipulated to accommodate a transmucosal element or abutment (1). This entire process, including impression-taking and prosthesis placement, collectively constitutes the prosthetic implant phase.

Postoperative infections after dental implants, though rare (1.6%-11.5%), can cause early implant

failure (4). Using perioperative antibiotics can prevent systemic bacteremia and reduce the infection risk (5).

Recent studies have found that prescribing systemic antibiotics doesn't notably lower the risk of early implant failure in simple implant surgeries for healthy patients. Conversely, various systematic reviews and meta-analyses suggest a single preoperative prophylactic dose of amoxicillin administered one hour before dental implant surgery (5), recommending longer antibiotic administrations only for those implant procedures involving bone reconstructions such as sinus lift (6).

PA are commonly discussed during peri-implant plastic procedures, which can be considered as part of the second stage of implant surgery. However, when it comes to the prosthetic implant phase itself, placement of prosthetic attachment, impression-taking, and prosthesis placement, there is a notable scarcity of evidence regarding the use of PA.

The demand for accurate information and well-defined guidelines on this subject becomes even more crucial, especially considering the ongoing trend of antibiotic overuse, which has led to the emergence of resistant bacterial strains, increased allergic reactions and concerns about antibiotic toxicity (7). Considering this, the authors conducted a systematic review to assess the need for PA during the implant prosthetic phase and to develop evidence-based usage recommendations.

Despite conducting a comprehensive electronic search, only three articles met the eligibility criteria.

In two of the studies, the authors specifically categorized the procedures as "second-stage implant procedures." However, in the third study, the procedure used to assess infection risk was termed "mucogingival surgery," a broader term that encompasses more than precise peri-implant plastic surgery. The review went on to recommend against prescribing PA in healthy patients before these procedures, except for surgeries of long duration (more than 2 hours) or when extensive biomaterial grafting is involved, which aligns with the existing guidelines (8, 9). Furthermore, among the three articles, only one acknowledged the impression-taking procedure as a potential risk factor for local infection or bacteriemia. It categorized this procedure as low-risk, thus not warranting PA therapy. It’s important to note that the procedure mentioned in the article was related to teeth impression-taking, emphasizing the scarcity of precise literature regarding the potential infection risk associated with taking impressions for dental implants. None of the three eligible articles addressed the topic of infection risk during implant-borne prosthesis placement. In the sole high-quality retrospective clinical study, it was observed that patients who received PA

as part of the surgical protocol exhibited an infection prevalence of 2.85%, which did not significantly differ from the 1.81% observed when PA was not administered. Nevertheless, it's worth noting that the researchers did not explicitly differentiate between the risks associated with stage one and stage two implant procedures.

The present systematic review has several methodological strengths that should be acknowledged: (i) an a priori protocol was developed and registered in the PROSPERO database; (ii) a comprehensive literature search was performed in four electronic databases (PubMed/MEDLINE, Web of Science, Google Scholar, and LILACS); (iii) the literature search and data extraction were carried out by two independent reviewers, and disagreements were resolved by a third reviewer; and (iv) the quality of reviews was appraised using the Joanna Briggs Institute Prevalence Critical Appraisal Tool.

It should also be noted that the authors identified clear problems in the primary literature that limited the strength of the conclusions of the reviews included. As a result, they formulated recommendations that advocate for the design of randomized controlled trials to specifically investigate the impact of PA prescription in second-stage implant surgeries, both with and without the use of soft tissue grafts, compared to not prescribing them, and to explore the potential extent of bacteremia associated with the connection/disconnection of prosthetic components during impression-taking and prosthesis placement on implants.

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