



Major approaches to dental treatment in patients with cardiovascular disease: a concise systematic review

Natalia Gomes Furlan^{1,*}, Gabriel Lucca de Almeida Poleti¹, Camilly Silva Camargo¹, Carlos Alberto Costa Neves Buchala¹

¹ UNORTE - University Center of Northern São Paulo - Department of Dentistry, Sao Jose do Rio Preto, Sao Paulo, Brazil.

*Corresponding author: Natalia Gomes Furlan.

UNORTE - University Center of Northern São Paulo - Department of Dentistry, Sao Jose do Rio Preto, Sao Paulo, Brazil.

E-mail: gomesfurlannatalia@gmail.com

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Abstract

Introduction: Cardiovascular diseases can have a congenital origin, that is, present from birth, such as interatrial and interventricular communication, defects of the artery, coronary arteries, or acquired coronary artery anomalies that involve several risk factors such as smoking, alcohol, old age, and a sedentary lifestyle. Thus, acquired ones are the most frequent in the routine of a dental practice, so the dentist should be able to attend to those patients who need special care, regarding the correct use of medications due to the risk of drug interactions, the type of local anesthetic to be used, and the management of patients who use anticoagulant therapy. **Objective:** It was to analyze the major approaches to dental treatment in patients with cardiovascular disease. **Methods:** A search was made in the databases Scopus, Embase, Scielo, PubMed, and Academic Google in the period 2003 to 2026, following the rules of systematic review-PRISMA. **Results:** A total of 36 papers that were submitted to the eligibility analysis were collated and, after that, 18 studies were selected. Most studies presented homogeneity in their results, with Chi-Square (χ^2)=79.7%>50%. Considering the Cochrane tool for risk of bias, the overall assessment resulted in 07 studies with a high risk of bias and 04 studies that did not meet GRADE and AMSTAR-2. In all cases of patients with cardiovascular diseases, the preoperative anamnesis should be done with all the details, always observing the risk factors, that progress to include the medications used; if the patient makes use of cardiac prostheses, monitor the vital signs before and after dental procedures, always recording all occurrences and

procedures in medical records. **Conclusion:** It is necessary for the dental treatment of these patients with heart disease to have good knowledge of the subject and requires medical and dental coordination. Dental surgeons need to be prepared to identify possible medical and dental emergencies and take steps to prevent or treat them effectively and quickly.

Keywords: Cardiovascular diseases. Oral diseases. Exodontia. Dental treatments. Prevention.

Introduction

The correct evaluation of patients with cardiovascular impairment is based on a detailed anamnesis and prior knowledge of the main coronary disorders and their sequelae [1]. Complications such as myocardial infarction and bacterial endocarditis may be described in clinical dental procedures. The management of this information is important in determining the patients' cardiac risk in order to classify it as high, moderate, or minimal [1].

Thus, the dental professional must plan the clinical consultations according to the pre-established individual risk [1,2]. Short-term consultations and limitation of stress and anxiety levels, with the use of anti-anxiolytic drugs and complementary sedation, may be important for an uncomplicated trans and postoperative period. Emergency procedures, in cases where coronary changes occur during a clinical procedure, are also evident [2].

Cardiovascular diseases can present a congenital origin, that is present from birth, such as: interatrial and interventricular communication, defects of the artery, coronary arteries, or acquired coronary artery anomalies

that involve several risk factors such as smoking, alcohol, old age, sedentary lifestyle, which contribute to the aggravation of these diseases Hypertension, atherosclerosis, arrhythmia, angina pectoris, myocardial infarction, heart failure, stroke [2,3].

Thus, the acquired ones are the most frequent in the routine of a dental practice, so the dentist should be able to attend to those patients who need special care, regarding the correct use of medications due to the risk of drug interactions, the type of local anesthetic to be used, and the management of patients who use anticoagulant therapy [4].

In dentistry we have surgical procedures such as the extraction of supernumerary teeth, removal of third molars, wisdom teeth, and residual root, with or without odontostomy and osteotomy, which, because they are more complex procedures, cover even more care in patients with heart disease, especially in the preoperative, in the trans-operative and in the postoperative period, so all care is essential [5].

The recommendations of the American Heart Association emphasize that some surgical procedures, dental procedures, and instrumentations involving mucosal surfaces or contaminated tissues may cause transient bacteremia [6]. While recognizing that the efficacy of antibiotic protection is uncertain in some cases, it recommends administration of antibiotics to patients with a potential risk of developing endocarditis [6]. Continued administration of antibiotics should be considered in patients with established infection before the procedure. However, it is not possible to predict which patients will develop this infection or which particular procedure will be responsible [6,7].

Therefore, the present study aimed to analyze the major approaches to dental treatment in patients with cardiovascular disease.

Methods

Study design

Following the criteria of literary search with the use of the Mesh Terms that were cited in the item below on "Search strategies", a total of 36 papers that were submitted to the eligibility analysis were collated and, after that, 18 studies were selected, following the rules of systematic review-PRISMA (Transparent reporting of systematic reviews and meta-analyses, available on: <http://www.prisma-statement.org/>. Accessed on: 05/20/2026).

Sources of Information

The review protocol was based on the criteria of literary search with the use of mesh terms in the main databases such as Scopus, Embase, Scielo, PubMed, and Academic Google.

Search Strategy

The search strategy in the databases above followed the following steps: - search for DeCS /Mesh Terms: *Cardiovascular diseases. Oral diseases. Exodontia. Dental treatments. Prevention*, and use of the boolean "and" between mesh terms and "or" among historical findings.

Study Quality (GRADE and AMSTAR-2) and Bias Risk

Quality was classified as high, moderate, low, or very low regarding the risk of bias, clarity of comparisons, precision, and consistency of analyses. The most evident emphasis was on systematic review articles or meta-analyses of randomized clinical trials, followed by randomized clinical trials. Low quality of evidence was attributed to case reports, editorials, and brief communications, according to the GRADE instrument. The AMSTAR-2 (Assessing the methodological quality of systematic reviews) methodological quality standards were also followed. Available at: <https://amstar.ca/>. Accessed at: 05/20/2026.

Results and discussion

A total of 36 articles were found. Initially, the duplication of articles was excluded. After this process, the abstracts were evaluated and a new exclusion was performed. A total of 32 articles were fully evaluated and 18 were included in the systematic review

(Figure 1). Most studies presented homogeneity in their results, with Chi-Square (X^2)=79.7%>50%. Considering the Cochrane tool for risk of bias, the overall assessment resulted in 07 studies with a high risk of bias and 04 studies that did not meet GRADE and AMSTAR-2.

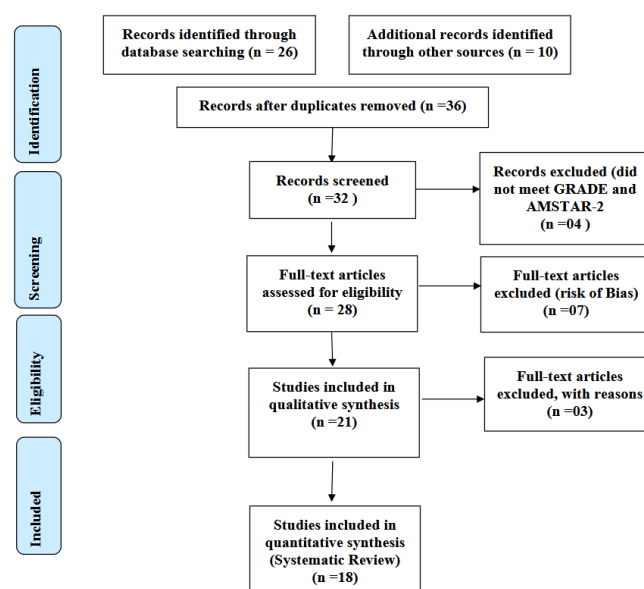


Figure 1. Article selection process. Source: Own authorship.

Major Findings

In all cases of patients with cardiovascular diseases, the preoperative anamnesis should be done with all the details, always observing the risk factors, that progress to include the medications used; if the patient makes use of cardiac prostheses, monitor the vital signs before and after dental procedures, always recording all occurrences and procedures in medical records [8-10].

Based on the recent study by Kamatani et al. (2017) [2], although cardiac arrhythmias are occasionally associated with dental extractions and dental anesthesia, an atrioventricular block is rarely seen during dental procedures. In this study, a rare case of type I second-degree atrioventricular block (Wenckebach's phenomenon) was reported after bilateral extraction of mandibular third molars retained under general anesthesia in a 16-year-old Japanese girl. Extubation of the nasotracheal tube or oral/pharyngeal suctioning could have triggered a vagal reflex that caused type I second-degree atrioventricular block. Thus, standard cardiovascular monitoring is imperative for patients undergoing dental treatment under general anesthesia.

Still, according to Forresti et al. (2017) [3], a trigger for hereditary angioedema is dental treatment with tooth extraction. Clinical symptoms may not manifest for many hours or even days after the procedure. In the example of this author, the problem resulted in death after tooth extraction, highlighting the need for dentists to be aware of this condition.

In a review of episodes of bacterial endocarditis involving litigious procedures against dental surgeons, it was found that the dental procedures that resulted in bacterial endocarditis were exodontia, periodontal scaling, root canal treatment with overinstrumentation, and minor oral surgery [11-15]. The authors observed that the dentists involved in the cases failed to prescribe a prophylactic antibiotic therapy, prescribed incorrect antibiotics, or prescribed them at inappropriate times. There was only one episode of correct antibiotic prophylaxis that resulted in bacterial endocarditis. These data highlight the importance of correct prophylaxis with antibiotics, as there is adequate evidence that this procedure reduces the risks of transient bacteremia. In addition, it is essential for the dentist to record all procedures and behaviors in the patient's clinical record because, in any litigious proceedings, the medical record is the most reliable document used to defend the professional [11-14].

Regarding the use of anticoagulants and platelet anti-aggregants, patients with heart disease usually use acetylsalicylic acid medication, sodium warfarin that interferes with blood clotting, making it difficult to

perform dental surgery [1]. In this case, the dental surgeon must request a pre-operative laboratory test called a Coagulogram for International Normalization Ratio (INR), which is recommended by the World Health Organization (WHO) to unify the prothrombin time blood clotting tendency [1].

In the trans-operative, the dental surgeon must always be prepared with hemostatic measures: 10.0 mL tranexamic acid for irrigation, collagen sponge, bone lock. In cases of bleeding, the patient should be referred to an outpatient clinic for intravenous administration of fresh frozen plasma and vitamin K (1mg) [1].

Regarding the use of vasoconstrictors, every cardiopathy patient is at greater risk of endogenous adrenaline release due to improper local anesthesia than with the use of a small amount of local anesthetic with vasoconstrictors. The dental surgeon, however, cannot exceed the limit of 0.04mg adrenaline and should perform negative aspiration so that there is no intramuscular injection. In this context, anxiety is a factor that interferes with cardiovascular systemic homeostasis; in the preoperative period, the use of anxiolytics can be used [1].

In hypertensive patients, the disease is asymptomatic and defined as the elevation of blood pressure in the arteries; systolic pressure is the maximum pressure, while the diastolic pressure is the minimum. Values at rest above 140mmHg (systolic) and 90mmHg (diastolic) are considered a hypertensive individual [6]. Checking the pressure before the consultation, even if the patient is controlled, always opt for consultations in the morning, and keep them brief, to avoid the use of NSAIDs (non-steroidal anti-inflammatory drugs) for a long period and in patients who use medications for pressure: propranolol and captopril, etc, as there may be interference in the mechanism of action of antihypertensives [6].

Indications for antibiotic prophylaxis

In dentistry, the most used antibiotic prophylaxis is for the prevention of infective endocarditis. Infective endocarditis is a remote infection involving the heart valves and may lead to death [11,12]. Recent studies emphasize changes in the profile of infective endocarditis from a streptococcal disease in patients with prior heart disease to a staphylococcal disease associated with performing dental and medical procedures in elderly patients with multiple comorbidities [14].

In this sense, the American Heart Association (AHA) suggests the adoption of antibiotic prophylaxis for the prevention of infective endocarditis under certain conditions [16,17]. This therapeutic resource has now

been indicated only for patients at high cardiac risk in invasive dental procedures. Thus, a restricted number of patients is selected, only those in whom endocarditis would lead to an increased risk of morbidity and mortality [17].

The indication of the use of antibiotic prophylaxis before invasive dental procedures is well established in patients with cardiovascular conditions predisposing to the development of infective endocarditis, such as patients with prosthetic heart valves or repaired with prosthetic material, previous history of endocarditis, cardiac transplantation that develops with dysfunction valvular heart disease, uncorrected or corrected cyanotic congenital heart disease, but evolved to residual lesion, corrected with a prosthetic material or device, during the first six months after the procedure, any corrected congenital heart disease with a residual defect at or adjacent to the prosthesis [16,17].

Systemic conditions

Some clinical conditions may predispose patients to the development of remote infection [17]. In these individuals, antibiotic prophylaxis is indicated and should be discussed with the attending physician, considering comorbidities and vulnerabilities. This includes patients with Acquired Immunodeficiency Syndrome-AIDS (CD4 <1,000 / mm³), in chemotherapeutic treatments, transplanted solid organs or bone marrow, in radiotherapy treatments of head and neck, using immunosuppressants, autoimmune disease, Skeletal anemia, splenectomy, use of bisphosphonates, injecting drug users, chronic renal failure, severe facial infection, chronic or active hepatitis, diabetes mellitus and patients with orthopedic joint prostheses [17].

Use of Anesthetics

Another important issue is the dosage of anesthesia; in order to avoid complications, the maximum dose of anesthetics must be respected. In those with severe risk, it is recommended that the physician in charge request anesthetics without vasoconstrictors to avoid undesirable complications, such as tachycardia and even cardiac arrest. This brings with it many disadvantages during the treatment because, in addition to decreasing the time of action of the drug due to the rapid leakage of the anesthetic components into the bloodstream, it provides a potential increase in systemic toxicity.

In the case of lidocaine, the maximum dose is 4.4 mg/kg or 300mg; mepivacaine is 4.4 mg/kg or 300mg; prilocaine 6 mg/kg or 400mg; and articaine 7 mg/kg or 500mg. Likewise, vasoconstrictors should be well adjusted. Adrenaline, for example, has a maximum recommended dose of 0.2mg, while noradrenaline

0.34mg per session [4,5]. The use of anesthetic prilocaine should be carefully monitored because doses above 600 mg may cause episodes of methemoglobinemia (Meta-hemoglobin is a form of hemoglobin protein, in which the iron in the heme group is in the Fe³⁺ state and not in Fe²⁺ of normal hemoglobin. In this disorder, iron atoms in the form of ferric ions lose the ability to release oxygen to tissues causing episodes of tachycardia, cyanosis, dyspnea, fatigue, headache, vomiting and dizziness, and may progress to coma and death. of this table can be obtained by intravenous administration of 1% methylene blue (1.5 mg/kg) [9].

In this context, in the case of endodontic procedures, it is also verified that the absence of hemostatic action promotes greater bleeding of the pulp tissue and less control of pain during treatment. In cases of stress, pain and tension can generate an amount of endogenous adrenaline greater than that administered in local dental anesthesia, when the correct dosage is respected. Thus, if the patient is able to tolerate the stress of the dental procedure, he may receive local anesthesia with a vasoconstrictor [9].

In this scenario, for a patient with a history of angina or previous myocardial infarction, every effort should be made to reduce stress levels through an efficient and deep anesthesia for dental and soft tissue procedures [5,9]. During the consultation with the patient's physician, the dental surgeon may report the intention to prescribe anxiolytic medication prior to the dental procedure. The prescription of anxiolytics and preventive medication for angina helps in the comfort and stability of the patient. Monitoring of blood pressure and heart rate should be performed during the procedure and for the next 30 minutes [5,9].

The dental care of patients with cardiovascular impairment requires correct planning of the clinical procedures to be performed [9]. To this end, prior contact with the patient's physician and a detailed anamnesis will provide crucial information for the determination of the risk factors. These will depend on the choice of care in the office or hospital setting and the determination of the need for antibiotic prophylaxis [9].

Thus, short-term visits and use of complementary sedation may make the service safer and more comfortable for both the patient and the professional [18]. It is also worth remembering that the more informed and prepared the dentist is at the moment of the clinical consultation, the lower the chances of intraoperative and postoperative complications. In addition, there will be more tranquility and speed in dealing with possible emergencies, increasing the

patient's chances of survival [18].

Conclusion

It is necessary for the dental treatment of these patients with heart disease requires good knowledge of the subject and requires medical and dental coordination. Dental surgeons need to be prepared to identify possible medical and dental emergencies and take steps to prevent or treat them effectively and quickly.

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