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Review Article

Dental considerations in cardiovascular patients: A practical perspective

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ABSTRACT

Cardiovascular disease trends, complications, and associated therapeutics impact the dental health and treatment. Such patients require special consideration with regard to when and which dental treatment is appropriate and what precautions are required. Alertness to potential oral adverse drug reactions enables referral of patient's to his physician or cardiologist. Cardiovascular drugs are also known to have mild to potentially fatal drug interactions. Dental professionals may be the first line of defense in the detection and referral of a patient suspected of having cardiovascular disease, an uncontrolled disease status, or oral adverse drug reactions, and they have a key role to play in oral and systemic disease prevention and treatment, in partnership with the patient and his physician.

1. Introduction

Cardiovascular diseases (CVD) comprise of a group of diseases of the heart and vascular system affecting majority of individuals worldwide. Ischemic heart disease, Hypertension, Dysrhythmias, and Infective Endocarditis are some of the cardiovascular conditions most commonly seen among the population. Co-existent cardiovascular disease is the most frequently cited medical condition for patient referral from general dental practitioners to hospital departments, which reflects widespread concern over potential problems during treatment. Dentists must be able to identify medical emergencies and adopt the opportune measures to avoid them or treat them quickly and effectively. A comprehensive treatment plan should be constructed keeping in view all the pros and cons related to the patient's medical condition.[1] Thus, the present review throws some light on various cardiovascular conditions commonly seen in dental practice and a systematic approach toward their management.

2. Relationship of cardiovascular disease and periodontitis

Periodontitis has been proposed as having an etiological or modulating role in cardiovascular and cerebrovascular disease, diabetes, respiratory disease, and adverse pregnancy outcome and several mechanisms have been proposed to explain or support such theories and oral lesions are indicators of disease progression and oral cavity can be a window to overall health and body systems. One of these is based around the potential for the inflammatory phenomenon of periodontitis to have effects by the systemic dissemination of locally produced mediators such as C-reactive proteins (CRP), interleukin-1β (1L-1β) and interleukin-6 (1L-6), and TNF-α.[2]

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Another indirect effect of periodontal infection that may explain the association between periodontal disease and heart disease is that periodontal organisms contain proteins which cross-react with the heart. The heat-shock protein-60, which is produced by Tannerella forsythia and Porphyromonas gingivalis, has about 60% homology with the mammalian heat-shock protein. It is known that antibodies to the heat-shock protein are found in patients with periodontal disease. These antibodies to heat-shock proteins of periodontal bacteria are cross-reactive with the heat-shock protein that is exposed in an injured endothelium or atheromatous plaque. This could set in motion autoimmune phenomena and contribute to atheroma formation. There also may be common genetic mechanisms which provide the link between periodontal disease and cardiovascular disease.[3]

3. Prevalence

CVD is the leading cause of death in India, and its contribution to mortality is rising. It is estimated that approximately 46.9% patients with CVD in India are affected. According to the World Health Report of 2002, deaths due to coronary heart disease (CHD) in India rose from 1.17 million in 1991 to 1.59 million in 2000 and 2.03 million in 2010. In a survey conducted in 45 rural villages in India, 32% of all deaths were due to CVD. The mortality from common CVD is about 1.2 million ischemic heart disease and about 0.8 million stroke cases every year. Compared with all other countries, India suffers the highest loss due to deaths from CVD in people aged 35–64 years. The prevalence of CVD is reported to be 2–3 times higher in the urban population as compared to the rural population.[4]

4. Treatment objectives

1) Important goal of treatment to manage patients with cardiovascular diseases is to deal with all the identified risk factors involved.
2) Pre-medication should be considered to alleviate anxiety and effective analgesia is important to reduce stress.
3) Early and short morning appointments are advised for all such patients.
4) All the patients are allowed to attain a comfortable position in a dental chair.
5) Every effort should be made to keep procedure time down to a minimum, and treatment should be terminated early if the patient becomes overly anxious.
6) Current medications which the patients are taking and allergies to any drugs and also any potential drug interactions and side effects are noted.[5]

5. Dental management of hypertensive patients

The sequential treatment plan for hypertensive patients generally starts with consulting the physician regarding the current medical status, medication, and patient management during periodontal therapy. Dentist must inform the physician regarding the estimated degree of stress, length of procedures, and complexity of the individualized treatment plan.

Following are the stages in management of hypertensive patients undergoing dental treatment.

Initial evaluation of each patient with hypertension should include detailed family history of cardiovascular disease, history of hypertension, medications, duration and antihypertensive treatment history, severity of disease, and its complications. Before starting dental treatment, dentist has to assess the presence of hypertension and accordingly the treatment changes needed. Patients with hypertension are at increased risk of developing adverse effects in a dental office. Therefore, measuring blood pressure (BP) will be done in the dental office to every new patient for each visit. In patients with chronic systemic diseases, BP measurement will be carried out during more complicated dental interventions as oral surgical procedures, restorative treatment complicated with longer sessions, placing dental implants, and periodontal surgery. Routine measurement of BP may reduce the risk of cardiovascular events and acute complications during dental treatment, especially when conscious sedation or general anesthesia is required. Whenever a dentist meets a patient with hypertensive crisis, the dental procedure should be postponed and the patient should be immediately sent to a hospital.[6]

6. Dental management of angina pectoris patients

Coronary heart disease is very common in the general population, and it is therefore likely that a dentist will meet such a patient in clinical practice. Treatment sequence should start with taking complete medical history followed by short morning appointments, premedication with anxiolytics or prophylactic nitroglycerin, nitrous oxide-oxygen sedation, and slow delivery of an anesthetic with epinephrine (1:1,00,000) coupled with aspiration.

Angina pain is often felt in the mandible, with secondary radiation to the neck and throat. Therefore, the patient may initially suspect the pain to be of dental origin. The dental environment increases the likelihood of an angina attack because of fear, anxiety, and pain. A patient who has an angina episode in the dental chair should receive the following emergency dental treatment:

Dental procedure is discontinued and Patient is allowed to attain a comfortable position. Patient is reassured and restrictive garments are loosened. Patient is encouraged to have his own NTG spray 1 or 2 metered sprays depending on his usual requirement (up to 3 doses of NTG spray can be given in 15 min). If angina signs and symptoms do not resolve with this treatment within 2–3 min, administer another dose of nitroglycerin, monitor the patient's vital signs, call his or her physician, and be ready to accompany the patient to emergency department. Oxygen is administered 4–6 lit/min. Dental procedure may be restarted if it is the usual type of experience for the patient. If no improvement within

3 min – Myocardial Infarction (MI) is suspected, patient is sent to the hospital.[7]

7. Dental management of myocardial infarction (MI) patients

Although relatively uncommon in the dental settings, cardiac arrest as a result of MI can occur.

A careful medical history with short appointments along with anxiety reduction should be carried out. Supplemental Oxygen via a nasal cannula will help meeting the extra oxygen requirements of the Myocardium: 4 lit/min. Caution should be taken if more than 3 ml of 2% Lignocaine Hydrochloride with 1:80,000 adrenaline solution is required. Drug interactions with potential adverse reactions need to be taken into account after treatment (e.g. interaction between NSAIDs, Penicillin, Tetracycline, Metronidazole, and anticoagulants) because prophylactic antibiotic may need to be considered to prevent infection. In patients with pacemakers, electrocautery and the use of cavitron should be avoided. Within 6 months, if any urgent invasive treatment is required such as Extractions/RCT, with 6 months of infarction, the treatment should be delivered in a hospital setting where facilities exist should there be another attack of MI. After 6 months, myocardial infarction patients can usually be treated using techniques similar to the stable angina patient.[5]

8. Dental management of infective endocarditis patients

Management of patients with infective endocarditis will involve Health questioning which will cover history for all potential categories of risk. If any doubt exists, the patient's physician should be consulted. Oral hygiene should be practiced with methods that improve gingival health yet minimize bacteremia. In patients with significant gingival inflammation, oral hygiene is initially limited to gentle procedures. Oral irrigators are generally not recommended because their use may induce bacteremia. Susceptible patients should be encouraged to maintain the highest level of oral hygiene once soft tissue inflammation is controlled.

Severe periodontal disease and areas of periodontal suppuration or dental focus of infection require elimination. Pretreatment chlorhexidine mouthrinses are recommended before all procedures, including periodontal probing, because they significantly reduce the presence of bacteria on mucosal surfaces. Dental extraction should be avoided in healthy mouths whenever possible. Endodontic therapy is the treatment of choice. Also, single extractions are preferable to multiple extractions. All dental treatment procedures require antibiotic prophylaxis. When possible, at least 7 days are kept between appointments (preferably 10–14 days). If this is not possible, an alternative antibiotic regimen is selected for appointments within a 7-day time period. Regular recall appointments, with an emphasis on oral hygiene reinforcement and maintenance of oral health, are extremely important for patients with infective endocarditis.[8]

9. Dental management of dysrhythmia patients

A specific diagnosis of an arrhythmia during a dental appointment necessitates continuous ECG monitoring and good knowledge of interpretation of the abnormalities observed. Thus, in the usual dental setting, patient history, symptoms, and palpation of the pulse are the available diagnostic tools. The risk of harmful arrhythmias is also increased in patients with cardiomyopathies, heart failure, and valvular problems. Such patients should be carefully evaluated by their physician and adequate medication and other measures (such as an implantable cardioverter-defibrillator) should be implemented before extensive dental procedures. If a patient with known heart disease develops arrhythmia during treatment, the treatment should be discontinued, supplemental oxygen considered, and the patient status closely monitored. If the patient recovers quickly, continuation of treatment may be considered if the patient wishes. Even a brief loss of consciousness, however, may indicate significant cardiac arrhythmia, and the patient should be referred to medical evaluation. If a patient with heart disease collapses in the chair, cardiac arrest should be suspected and emergency medical services activated immediately and cardiopulmonary resuscitation initiated without delay. These patients are advised to take their medication regularly. Beta-blockers are the preferred drug of choice.[9]

10. Dental treatment of patients on anticoagulant therapy

Patients on anticoagulant therapy should be delicately handled in a dental setup. This may involve use of local hemostatic measures to control bleeding in anticoagulated patients. These include atraumatic surgical technique, adequate wound closure, pressure application, and topical clotting agents. Oral rinsing with tranexamic acid can also be used. The indication for anticoagulation should be known since many indications allow brief discontinuation of anticoagulant treatment without a substantial increase in the risk of thrombotic events. On the other hand, anticoagulant treatment should in general not be discontinued in patients with mechanical valve prostheses. Close collaboration with the patient's physician is recommended in these matters. In patients receiving long-term anticoagulant therapy and who are stably anticoagulated on warfarin, an international normalized ratio (INR) check 72 h prior to surgery is recommended. This allows sufficient time for dose modification if necessary to ensure a safe INR (2–4) on the day of dental surgery (including subgingival scaling). There is no need to check the INR for non-invasive dental procedures.[9]

11. Conclusion

Patients with a wide variety of cardiovascular diseases are frequently encountered in dental practice and it is necessary to treat them. Safe and effective dental management of such

patients requires close medical and dental coordination, an understanding of the potential hazards during dental treatment, knowledge of drugs used in treatment of cardiovascular diseases, and the potential adverse effects of drugs commonly used in periodontal practice. Successful management of such patients on a Dental Chair is thus based on knowing the patient, understanding the disease process, and judicious use of pharmacologic agents designed to produce a state of relaxation, decrease anxiety, and control the factors which may induce or contribute to the initiation of these cardiovascular diseases.

REFERENCES

1. Absi EG, Satterthwaite J, Shepherd JP, Thomas DW. The appropriateness of referral of medically compromised dental patients to hospital. *Br J Oral Maxillofac Surg*. 1997;35:133–136.
2. Saini R, Saini S, Saini SR. Periodontal diseases: a risk factor to cardiovascular disease. *Ann Card Anaesth*. 2010;13:159–161.
3. Rose LF, Genco RJ, Cohen DW, Mealey BL, eds. In: *Periodontal Medicine*. Hamilton: B.C. Decker Inc; 2000.
4. Park K. *Park's textbook of Preventive and Social Medicine*. 23rd edition 2016.
5. Jowett NI, Cabot LB. Patients with cardiac disease: considerations for the dental practitioner. *Br Dental J*. 2000;189 (6):297–302.
6. Hogan J, Radhakrishnan J. The assessment and importance of hypertension in the dental setting. *Dent Clin North Am*. 2012;56:731–745.
7. Smith GN, Pashley DH. Periodontal ligament injection: evaluation of systematic effects. *Oral Surg Oral Med Oral Pathol*. 1983;56:571–574.
8. Munroe CO, Lazarus TL. Predisposing conditions of infective endocarditis. *J Clin Dent Assoc*. 1976;42:483.
9. Kahri J, Rapola J. Cardiovascular disorders in dental practice. *Nor Tannlegeforen Tid*. 2005;115:84–90.