

DENTAL IMPLANTS IN PATIENTS WITH CARDIOVASCULAR DISEASES

* Silpa Abraham ** Anil Mathew

*PG. Student, **HOD and Professor, Department of Prosthodontics, Amrita School of Dentistry, Kochi | Corresponding Author: Dr. Anil Mathew, Email: anilmathew@aims.amrita.edu

Introduction

According to WHO¹, 17.9 million people die each year from cardiovascular diseases(CVDs), an estimated 31% of all deaths worldwide. It is estimated that approximately 46.9% of the patients are affected by CVD in India.²

Evidence suggests that even though people are living longer, it is accompanied by different health problems³. Edentulism is a common condition which has considerable impact on quality of life of an individual^{4,5}. Dental implants are fast becoming the best novel method to confront edentulism. The possibility that the impaired blood supply and the consequent hypoxia may negatively affect the healing process of bone around implants may cause a higher risk of implant failures in patients with cardiovascular diseases⁶.

The different forms of CVDs like hypertension, atherosclerosis, vascular stenosis, coronary artery disease and congestive heart failure can have direct effect on blood tissue supply through different mechanisms⁷. Wound infection is prevented by the presence of adequate oxygen which increases fibroblast activity, collagen synthesis, capillary growth, and macrophage activity^{8,9}. Hypoxia can lead to a decline in the fibroblast activity, collagen synthesis, capillary growth, and macrophage

actions¹⁰, which in turn is expected to influence the osseointegration of dental implants.

In contrast to these problems in CVDs, there is scarce information about the failure of dental implants in patients with CVDs. A systematic literature search of MEDLINE and EMBASE database from 1985 to 2019 was performed. All searches were performed using medical subject heading (MeSH) or free text words (Box 1). This article provides an overview of the literature to update the knowledge to decide if dental implants are contraindicated in CVDs.

Box.1	Search terms
1	DENTAL IMPLANTS.mp. or exp Dental Implants/
2	CARDIOVASCULAR DISEASE.mp. or exp Cardiovascular Diseases/
3	1 and 2

Are dental implants contraindicated in cardiovascular diseases?

A major challenge when it comes to addressing the CVDs is the vast majority of diseases in it. Hwang and Wang^{10,11} have given a list of medical conditions which are considered absolute and relative contraindications for dental implants.

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According to which the CVDs which are absolutely contraindicated include recent myocardial infarction or a cerebrovascular accident, vascular prosthesis and bleeding associated with any of these problems.

Myocardial infarction (MI) (ie, heart attack) is the irreversible death (necrosis) of heart muscle secondary to prolonged lack of oxygen supply (ischemia)¹². If a patient has had a recent myocardial infarction, it can generate necrosis and functional deficits due to prolonged ischemia. It is found that about 75% of such patients experience complications within a short period after the incident¹³.

Cerebrovascular accident (CVA) is the medical term for a stroke. A stroke is when blood flow to a part of your brain is stopped either by a blockage or the rupture of a blood vessel¹⁴. It is found that death occurs in 15% of the patients within the first 3 months. The functional recovery in such patients varies from the first month to a year ahead. This time period is crucial as it is prone to numerous dangerous complications¹⁵.

In these two conditions, patient stability occurs with intervention and a healing period of 6-12 months after preliminary care. The interim period of 3-6 months after primary stabilisation, is of prime importance as there is a chance for complications. Thus, any procedure which induces stress must be avoided in this time period. Any procedure to be done should be done only after 6 months with medical consent¹¹.

Another important factor is the medications taken by such patients. A clinician must always be aware of the anticoagulant or thrombolytic therapy administered to the patient. Evaluation of INR is necessary to prevent complications due to the intake of such medications¹¹.

Bioprosthetic valves are used in heart valve replacement. They generally offer functional

properties (eg, hemodynamics, resistance to thrombosis) that are more similar to those of native valves. Treatment of hemodynamically significant aortic or mitral valve disease by implantation of prosthetic has become increasingly common¹⁶. The three forms of prosthetic valve include bioprostheses, mechanical valves, and homografts or autografts. Among which all except autografts are more prone to cause endocarditis, as well as regurgitation, stenosis, and degeneration.

It is seen that the prevalence of endocarditis is maximum during the first 3 months after the placement and it reduces by 6 months¹⁷. This is attributed to the healing of the tissues around the valve which encloses the valve, thus protecting against microbial action¹⁸.

A patient who had a prosthetic valve replacement stabilises only after 6 months of the procedure^{17,18}. Any procedure which can cause bacteremia must be avoided during this time period. Alongside, based on the type of the valve (mechanical or bioprosthesis [porcine]), used, the patients are advised different drug regimens (anticoagulants or plasma volume elevators, respectively)¹⁸ in accordance to it. A clinician should be aware of such medications and the precautions to be taken before any invasive procedure in such patients.

Bleeding: It is important to ensure there is proper hemostasis before any elective surgery is done. Hemorrhage is attributed to a multitude of factors like platelet disorders or clotting factor disorders. But the most common reason for bleeding is the use of drugs which can cause the same. Intake of anti-coagulant drugs necessitates the monitoring of bleeding time as well as INR value. It is proposed that a patient with INR value of 3 or less can undergo procedures like dental extraction, by use of transexamic acid or epsilon aminocaproic acid to control residual bleeding from the site¹⁹. If a patient is advised to keep the INR value above 3, dental implant placement is not advisable.

Another important factor which is to be considered is the platelet count. Decreased platelet count can lead to bleeding during the procedure or postoperatively. It depends upon the platelet count in the patient. Etiology of decreased platelet count includes infection, idiopathic thrombocytopenia purpura, radiation therapy, myelosuppression, and leukemia¹¹. Mild thrombocytopenia can cause abnormal postoperative bleeding; whereas a platelet count below 50,000/mm³ can lead to major post-surgical bleeding and a count below 20,000/mm³ can cause spontaneous bleeding of the mucous membrane. These patients usually require perfusion if surgery is to be done²⁰.

Hematocrit is the volume percentage (vol%) of red blood cells in the blood. It is important as any patient who has to undergo sedation or general anesthesia necessitate at least 75 to 80% of the normal value of haematocrit. Thus, hematocrit becomes important when the level is below 60% of the normal value²¹.

CVDs such as dysrhythmia or heart murmur does not have a significant effect on the healing process. This is due to the fact that in some of these diseases, blood pressure does not change, and in others, heart function is normal²². Therefore, these diseases, might not have an effect on the osseointegration of dental implants.

In spite of all the physiologic variations happening due to CVDs, they are found to have no effect on the success of dental implants. A retrospective cohort study by Moy et al in 2005²³ evaluated the risk factors for dental implants. The results show that among the 1365 implants placed in patients with coronary artery disease or hypertension, the implant failure was similar to control patients, thus showing there is no contraindication in placing dental implants in such patients.

Alsaadi et al²⁴ in 2007 has shown that there is no risk of early implant failures associated with

hypertension and coagulation problems which was followed by another study²⁵ in 2008 which has shown no association of hypertension and coagulation problems with late implant loss.

In contrast to these studies, a retrospective study²⁶ has shown a higher risk of implant failure in CVD, in consideration with the number of implants placed, with no association with increased peri-implant pathology, but Krennmair et al²⁷ found that there is increased risk of bone loss in CVD. Later, Pedro et al²⁸ and Niedermaier et al²⁹ found that the survival rate of implants in CVD was not different from normal patients, thus dental implants are not contraindicated in CVDs.

Conclusion

There is very scarce evidence which shows Cardiovascular diseases to be an absolute contraindication. The literature suggests that dental implants can be placed in patients with CVDs provided proper precautions are taken in conditions which are detrimental. A few precautions include,

- Avoid placement of dental implants in patients with recent MI/CVA, upto 6 months after preliminary care.
- Avoid placement of dental implants in patients with prosthetic valve upto 6 months after replacement to avoid endocarditis and other complications. Also, placement of dental implants should be done only after antibiotic prophylaxis.
- Proper evaluation of INR, platelet count and Hematocrit to avoid hemorrhagic complications
- Clinician must be aware about the medications taken by patient with any CVD and the precautions to be taken for each medication.

References

1. WHO | Cardiovascular diseases (CVDs) [Internet]. WHO.

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Kerala State Branch

- [cited 2019 Mar 16]. Available from: http://www.who.int/cardiovascular_diseases/en/
2. Chaudhry S, Jaiswal R, Sachdeva S. Dental considerations in cardiovascular patients: A practical perspective. *Indian Heart J.* 2016 Jul 1;68(4):572–5.
 3. Ageing and health [Internet]. [cited 2019 Mar 13]. Available from: <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health>
 4. Divaris K, Ntounis A, Marinis A, Polyzois G, Polychronopoulou A. Loss of natural dentition: multi-level effects among a geriatric population. *Gerodontology.* 2012 Jun;29(2):e192-199.
 5. Emami E, de Souza RF, Kabawat M, Feine JS. The Impact of Edentulism on Oral and General Health. *Int J Dent [Internet].* 2013 [cited 2019 Feb 20];2013. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3664508/>
 6. (PDF) Implant Therapy in Medically Compromised Patients- A Foretaste of Literature Review! [Internet]. ResearchGate. [cited 2019 Mar 16]. Available from: https://www.researchgate.net/publication/318245046_Implant_Therapy_in_Medically_Compromised_Patients_A_Foretaste_of_Literature_Review
 7. Cardiovascular disease and treatment outcomes with osseointegration surgery. - PubMed - NCBI [Internet]. [cited 2019 Feb 7]. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/10220657>
 8. Whitney JD. The influence of tissue oxygen and perfusion on wound healing. *AACN Clin Issues Crit Care Nurs.* 1990 Nov;1(3):578–84.
 9. Rabkin JM HT. Infection and oxygen. In: *Problem wounds: the role of oxygen.* 1988. p. 1-16.
 10. Hwang D, Wang H-L. Medical contraindications to implant therapy: Part II: Relative contraindications. *Implant Dent.* 2007 Mar;16(1):13–23.
 11. Hwang D, Wang H-L. Medical contraindications to implant therapy: part I: absolute contraindications. *Implant Dent.* 2006 Dec;15(4):353–60.
 12. Myocardial Infarction: Practice Essentials, Background, Definitions. 2019 Feb 2 [cited 2019 Mar 18]; Available from: <https://emedicine.medscape.com/article/155919-overview>
 13. Schoen F. *The heart. Robbins and Cotran: Pathologic Basis of Disease.* 7th ed. 2005. 584-586. p.
 14. Cerebrovascular Accident: Symptoms, Treatment, and Prevention [Internet]. [cited 2019 Mar 18]. Available from: <https://www.healthline.com/health/cerebrovascular-accident>
 15. Zivan J. Approach to cerebrovascular diseases. In: *Cecil Textbook of Medicine.* 22nd ed. 2004. p. 2280–7.
 16. Prosthetic Heart Valves: Practice Essentials, Background, Design Features. 2019 Feb 26 [cited 2019 Mar 18]; Available from: <https://emedicine.medscape.com/article/780702-overview>
 17. Chambers H. Infective endocarditis. In: Goldman L, ed *Cecil Textbook of Medicine.* 22nd ed. St. Louis, MO: Saunders; 2004. p. 1795–6.
 18. Carabello B. Valvular heart disease. In: Goldman L, ed *Cecil Textbook of Medicine.* 22nd ed. 2004. p. 439–42.
 19. Proceedings of the Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy: evidence-based guidelines. *Chest.* 2004 Sep;126(3 Suppl):172S-696S.
 20. Critical issues in hematology: anemia, thrombocytopenia, coagulopathy, and blood product transfusions in critically ill patients. - PubMed - NCBI [Internet]. [cited 2019 Mar 18]. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/14710693>
 21. Jolly DE. Interpreting the clinical laboratory. *J Calif Dent Assoc.* 1995 Nov;23(11):32–40.
 22. Massie BM SM. Heart and great vessels. In: *Current medical diagnosis and treatment.* 1991. p. Chap. 8 and 9.
 23. Moy PK, Medina D, Shetty V, Aghaloo TL. Dental implant failure rates and associated risk factors. *Int J Oral Maxillofac Implants.* 2005 Aug;20(4):569–77.
 24. Alsaadi G, Quirynen M, Komárek A, van Steenberghe D. Impact of local and systemic factors on the incidence of oral implant failures, up to abutment connection. *J Clin Periodontol.* 2007 Jul;34(7):610–7.
 25. Alsaadi G, Quirynen M, Komárek A, Steenberghe DV. Impact of local and systemic factors on the incidence of late oral implant loss. *Clin Oral Implants Res.* 2008;19(7):670–6.
 26. Neves J, Nobre M de A, Oliveira P, Santos JM dos, Malo P. Risk Factors for Implant Failure and Peri-Implant Pathology in Systemic Compromised Patients. *J Prosthodont.* 2018;27(5):409–15.
 27. Krennmaier S, Weinländer M, Forstner T, Krennmaier G, Stimmelmayer M. Factors affecting peri-implant bone resorption in four Implant supported mandibular full-arch restorations: a 3-year prospective study. *J Clin Periodontol.* 2016 Jan;43(1):92–101.
 28. Influence of Age on Factors associated with Peri-implant Bone Loss after Prosthetic... - Abstract - Europe PMC [Internet]. [cited 2019 Mar 17]. Available from: <https://europepmc.org/abstract/med/28050977>
 29. Implant[]Supported Immediately Loaded Fixed Full[]Arch Dentures: Evaluation of Implant Survival Rates in a Case Cohort of up to 7 Years - Niedermaier - 2017 - Clinical Implant Dentistry and Related Research - Wiley Online Library [Internet]. [cited 2019 Mar 17]. Available from: <https://onlinelibrary.wiley.com/doi/full/10.1111/cid.12421>