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Dental Implants in The Medically Compromised Patients

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Abstract

The replacement of missing teeth by dental implants is currently the gold standard in dental rehabilitation. However, their placement in medically compromised patients presents unique challenges and considerations.

Medically compromised conditions, including diabetes mellitus, cardiovascular diseases, osteoporosis, immunosuppressive states can influence the healing process, osseointegration, and the overall success rate of dental implants.

This review aims to explore the impact of systemic health conditions on dental implant outcomes and to outline the risk assessment and management strategies for these patients. Nevertheless, individualizing treatment plans based on the patient's medical condition, consultation with the medical team, and long-term monitoring are critical.

Keywords: Dental implants, Osseointegration, Medically compromised conditions.

Introduction

In medically healthy patients, the success rates of some dental implant (DI) systems have reported to be between 90 and 95%.

DI may fail, however, due to a lack of osseointegration during early healing, or when in function due to

breakage, or infection of the peri-implant tissues leading to loss of implant support.

The long-term outcome of implant therapy can be affected by local or systemic diseases or other compromising factors, in fact, it has been suggested that some local and systemic factors could represent contraindications to DI treatment.[1]

Current evidence suggests that with thorough preoperative assessment, meticulous surgical techniques, and appropriate medical interventions, dental implants can be successfully placed in medically compromised patients.

Dental implants in medically compromised patients

Only patients with an ASA (American Society of Anaesthesiologists) grade I or II should qualify for an elective surgical procedure, such as DI placement and the patient's surgical risks should be weighed against the potential benefits offered by the DI.

Even though there are statements in the implant literature such as: ''certain conditions such as uncontrolled diabetes, bleeding disorders, a weakened immune system, or cognitive problems that interfere with postoperative care increase the risk of implant failure'' these are un-substantiated by scientific evidence.

Other authors have recommended as relative contraindications for DI, certain patient groups or conditions:

- Children & adolescents
- Epileptic patients
- Severe bleeding tendency
- Endocarditis risk
- Osteoradionecrosis risk
- Myocardial infarction risk

Other reported relative contraindications include: adolescence, ageing, osteoporosis, smoking, diabetes, positive interleukin-1 genotype, human immunodeficiency virus positivity, cardiovascular disease, hypothyroidism and Crohn disease.[1]

Diabetes mellitus

Most case series, cohort studies, and systematic reviews support that DI in diabetics with good metabolic control have similar success rates when compared to matched healthy controls, maintenance programme receiving conventional or advanced implant surgery (sinus floor elevation, immediate loading, and guided bone regeneration). However, impaired implant integration has been reported in relation to hyperglycaemic conditions in diabetic patients.

Use of prophylactic antibiotic, longer duration of post surgical antibiotic course, chlorhexidine mouth rinse, bioactive material coated implants and implant with higher width and length seems to further improve the survival of implant in diabetic individuals.

There is no evidence that diabetes is a contraindication to DI therapy, but as HbA1C (glycosylated haemoglobin) may represent an independent factor correlated with postoperative complications and due to the known effects of hyperglycaemic states on healing, medical advice and strict glycaemic control before and after DI therapy are recommended.[2]

Cardiovascular disease

Hypertension is a chronic medical condition in which the blood pressure in the arteries is elevated. According to the Global Burden of Disease Study, more than 640 million people in the world suffer from hypertension.

The prevalence of hypertension among people over the age of 60 years can reach 66%, with more than half of them taking antihypertensive medications. Antihypertensive medications, such as beta-blockers, thiazide diuretics, angiotensin-converting-enzyme (ACE) inhibitors, and the angiotensin II receptor

blockers (ARBs), are the most commonly prescribed drugs for people suffering from high blood pressure.

Antihypertensive drugs also have an effect on bone, especially in bone formation, metabolism, and healing and suggested that treatment with antihypertensive drugs may be associated with an increased survival rate of osseointegrated implants.

It has been suggested that some cardiovascular events such as recent myocardial infarction, stroke and cardiovascular surgery might represent an absolute contraindication to implant therapy.

In a retrospective analysis of 246 consecutively treated DI patients, including cardiovascular disease patients, patients with a history of other systemic disease, and healthy controls, there were no significant differences in implant failure rates between the groups.

In a recent case–control study, it has been suggested that intravenous sedation using midazolam and propofol during DI surgery prevented excessive increases in blood pressure, and stabilized haemodynamics, which could be useful in patients with cardiovascular disease. However intravenous midazolam does not prevent the myocardial arrhythmias that may arise during DI placement.[3]

Head and neck cancer patients

Surgical resection of head and neck cancer can be severely mutilating. DI in oral cancer patients are successfully used for dental rehabilitation after bony reconstruction of the jaws, and for retention of a prosthetic device (e.g.: palatal obturator), used as the primary means of maxillary reconstruction.

It has been suggested that some patients may benefit from having the placement of DI during ablative tumour surgery. Radiotherapy can significantly affect DI outcomes mainly during the healing period.

Radiotherapy may induce endarteritis obliterans, and hence can predispose to osteoradionecrosis of the jaw. Twelve studies involving 643 DI placed in adult patients who have received radiotherapy, reported lower success rates, ranging from 40 to 100%.

There are, however, several clinical studies demonstrating that DI can osseointegrate and remain functionally stable in patients who had received radiotherapy.

To increase implant success in irradiated head & neck cancer patients, the following precautions should be considered

- Implant surgery is best carried out >21 days before radiotherapy.
- Total radiation dose should be <66 Gy if the risks of ORN are to be minimized or 50 Gy radiation is used.
- No implant surgery should be carried out during radiotherapy.
- No implant surgery should be carried out during mucositis.
- Defer implant placement for 9 months after radiotherapy.
- Use implant-supported prostheses without any mucosal contact.
- Avoid immediate loading.
- Ensure strict asepsis.
- Consider antimicrobial prophylaxis.[4]

Smoking

Effects of smoking on implant survival and success are more pronounced in areas of poor quality trabecular bone. In smokers, maxillary implants have more failure rate as compared to mandibular implants. Probably, maxillary bone is of lower quality and consequently more susceptible to the damaging effects of smoking. Vasoconstriction caused by the local absorption of

nicotine into the bloodstream is shown to be a significant factor for implant failure by some studies.

Smoking does not affect the process of osseointegration; rather, its negative effects seem to arise after the second stage surgery.

Gorman et al., in a study on patients who had received over 2000 implants, found significantly more failures in smokers after second-stage surgery.

Failure rate of implants is more in smokers compared to nonsmokers and is directly proportional to tobacco use.

In smokers, marginal bone loss and incidence of periimplantitis is more after implant placement. Implants placed in grafted maxillary sinuses of smokers fail two times more compared to that in nonsmokers.[5]

Neuro-psychiatric disorders

The prevalence rate of neuropsychiatric and neurocognitive disorders (NDs) among individuals is increasing in recent times.

Various neuropsychiatric symptoms, such as agitation, depression, apathy, delusions, and hallucinations, are highly prevalent in older adults with dementia or milder forms of cognitive impairment. These symptoms can lead to a higher risk of functional decline.

The literature with respect to DI placement in patients with neuro-psychiatric disorders is sparse and contradictory. Some case reports and case series have shown DI treatment to be successful in some patients with various degrees of both intellectual and physical disability, including cases of cerebral palsy, Down syndrome, psychiatric disorders, dementia, bulimia, Parkinson disease and severe epilepsy.

However, poor oral hygiene, oral parafunctions such as bruxism, harmful habits such as repeated introduction of the fingers into the mouth and behavioural problems are not uncommon in patients with neuro-psychiatric diseases, and DI in such patients may lead to complications. Therefore, the success of oral rehabilitation depends fundamentally on appropriate patient selection and adequate medical advice should be seeked prior to implant therapy.[6]

Bleeding disorders

In patients with bleeding disorders haemorrhage associated with implant surgeries is more common and can be prolonged, particularly with warfarin or acenocoumarol. In these patients, the current recommendation is to undertake the implant surgical procedure without modifying the anticoagulation, provided the INR is less than 3 or 3.5.

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. [1]

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.[7]

Bone diseases

Osteoporosis is the most studied bone-related disease. It is a common condition characterized by generalized reduction in bone mass with no other bone abnormality. When evaluating whether DI in osteoporotic patients have a different long-term outcome, even though failure rates have been reportedly higher in animal models and patients, a systematic review revealed

no association between systemic bone mineral density (BMD) status, mandibular BMD status, bone quality, and implant loss, concluding that the use of DI in osteoporosis patients is not contraindicated.[1]

Osteoporosis has no detrimental effect on implant failure rates neither on percentage of osseointegration. Regarding the impact of osteoporosis on bone-to-implant contact, there is a weak evidence to support or refute the hypothesis that osteoporosis may have detrimental effects on bone healing.[8]

Based on three studies included in the systematic review, implants placed in patients with osteoporosis presented greater marginal bone loss than those placed in patients without osteoporosis.

A further potential complication in osteoporotic patients is the possible effect on bone turnover at the DI interface of systemic anti-resorptive medication. This risk in patients using bisphosphonates (BPs) is well recognized, in terms of bisphosphonate-related osteonecrosis of the jaws (BRONJ).

The largest series of patients developing BRONJ following DI published to date involved 27 patients on BPs, 11 orally and 16 intravenously. BRONJ developed after mean periods of 68 months, 16 months, and 50 months in patients on alendronate, zoledronic acid, and pamidronate, respectively. There was a mean duration of 16 months from implants placement until the appearance of BRONJ.

BRONJ is a real issue for patients treated with intravenous BPs but the occurrence of BRONJ in patients receiving oral BPs medication is minimal.

The use of oral BPs at the time of implant placement and during healing do not seems to affect early implant success.[9]

Rheumatoid arthritis

Cochran et al. 2007) as recommended by Friberg (1994) for soft bone quality – resulted in high absolute success and survival rates for implants placed in RA patients.

Although the results of the studies showed that implant prosthodontic outcome was also excellent for the RA population with and without concomitant connective tissues diseases, a distinction between isolated RA and RA with concomitant CTD should be made.

It is a well-known fact that clinical benefits and advantages of implant placement in conjunction with fixed prostheses were especially noted in patients suffering from CTD such as Sjogren's syndrome.

In general, no atypical pattern of prosthodontic complications and maintenance efforts was observed for implants and implant prosthodontics in RA with/without concomitant CTD. Only abutment screw loosening or denture margin adaptation for removable overdentures was predominantly observed (Payne et al. 1997).[10]

Respiratory diseases

Chronic obstructive pulmonary disease (COPD) and asthma are both widely prevalent and fatal respiratory diseases. Advancing and not entirely reversible airflow obstruction is the major clinical presentation of COPD.

Once the dyspnea caused by COPD or asthmatic attack presents during the implant surgery, it may become deadly. Therefore, dental practitioners should keep the airway unobstructed. Necessary preoperative preparations include reviewing a full medical history and

checking whether the patients take the inhaled drugs with him/her.

Because perpetuated supine position is a stimulus of asthma, we recommend that patients maintain semi-erect position during the operation.

Anti-inflammatory treatment, sedation, and analgesia are also essential. Importantly, local anesthetics with adrenaline can be used in patients with COPD in an extremely cautious way, whereas vasoconstrictors are absolutely contraindicated in those with asthma.[11]

Immunodeficient conditions (HIV/AIDS, organ transplantation, autoimmune disease, and Morbus Crohn) and dental implants

There is only little evidence for deteriorating influences of immunodeficient conditions on the survival of dental implants. Regarding the analysed immunosuppressive conditions, only Crohn's disease showed a significant effect on early implant failure and resulted in increased, however not significant, implant loss. There was no significant effect on implant survival in the remaining immunocompromised conditions detectable.

Immunosuppression after organ transplantation

Dealing with implant-based rehabilitation and immunosuppression after organ transplantation, a total of 6 studies with 107 placed implants in 39 patients were included.

The authors found no significant correlations between immunosuppression after organ transplantation and implant failure. All identified studies and case reports describe an implant survival rate of 100% with a follow-up of 58 months as mean (3–118 months) with no effect on clinical findings or on osseointegration of the implants.

The loading time after implantation differs from 3 months for the maxilla up to 9 months of the mandible.[12]

Oral mucosal diseases

Oral mucosal diseases are a group of conditions that affect the oral mucosa with variable severity and include recurrent aphthous stomatitis (RAS), oral lichen planus (OLP), pemphigus vulgaris (PV), mucous membrane pemphigoid (MMP), and systemic lupus erythematosus (SLE).

These may manifest clinically as painful oral ulcerations, reticulations and/or erosions, with differences between each. Management protocols often include initial topical and/or systemic corticosteroid (CS) therapy to control the patient's acute symptoms, followed by CS-sparing agents for long-term maintenance therapy.

RAS and dental implants

Placement of dental implants is often associated with increased anxiety and stress levels, which could trigger a RAS episode in the first days post-surgery. As sites with active oral ulcerations are more likely to have friable and less resilient soft tissues, it is advised to initiate RAS treatment before attempting to place a dental implant, with the aim of keeping the disease in a remission state.

Careful tissue management during the surgery is also recommended to prevent dehiscence and delayed wound healing at ulcer sites.[13]

Dental implants in patients seropositive for HIV

Studies after a 12-year follow-up study show that dental implant treatment in HIV-positive patients achieved long-term survival, with a success rate comparable with that seen in healthy patients. Although the decrease in BMD (bone mineral density) caused by cART (combination antiretroviral therapy) and deleterious effects of patients who are positive for HIV, our study showed no bone loss related to the therapy.

Bone loss was consistent with the physiological periimplant bone loss associated with local demineralization process and peri-implantitis.

People who are positive for HIV who received dental implants showed successful outcomes after 12 years of follow-up despite the presence of mild early signs of peri-implantitis related to poor oral hygiene.

After periodontal treatment and oral hygiene improvement, all patients had health peri-implant tissues without visible plaque or BOP. Antiretroviral drugs and immunodeficiency are not a contraindication for oral rehabilitation treatment, which is corroborated by previous clinical studies.[14]

Conclusion

In conclusion there are very few absolute contraindications to DI treatment, although a number of conditions may increase the risk of treatment failure or complications. However, due to the scarcity of prospective studies the impact of health risks on implant outcome remains unclear and well-designed observational studies are needed.

The degree of disease-control may be far more important that the nature of the systemic disorder itself, and individualized medical control should be procured prior to implant therapy, since in many of these patients the quality of life and functional benefits of dental implants may outweigh any risks.

It is very important to undertake the implant surgical procedures with strict asepsis, minimal trauma, and avoiding stress and undue haemorrhage.

Equally it is very important in these patients to ensure proper maintenance therapy with optimal standards of oral hygiene, without smoking and with avoidance of any other risk factors that may affect the outcome of dental implants.

References

1. Diz P, Scully C, Sanz M. Dental implants in the medically compromised patient.J Dent. 2013; 41: 195-206.
2. Chaudhry S, Jaiswal R, Sachdeva S. Dental considerations in cardiovascular patients: A practical perspective. Indian Heart J. 2016; 68 :572-5.
3. Wu X, Al-Abedalla K, Eimar H, Arekunnath Madathil S, Abi-Nader S, Daniel NG, Nicolau B, Tamimi F. Antihypertensive medications and the survival rate of osseointegrated dental implants: a cohort study. Clinical implant dentistry and related research. 2016; 18:1171 -82.
4. Pompa G, Saccucci M, Di Carlo G, Brauner E, Valentini V, Di Carlo S, Gentile T, Guarino G, Polimeni A. Survival of dental implants in patients with oral cancer treated by surgery and radiotherapy: a retrospective study. BMC oral health. 2015; 15: 1-6.
5. Kasat V, Ladda R. Smoking and dental implants. Journal of International Society of Preventive and Community Dentistry. 2012 Jul 1;2:38-41.
6. Bera RN, Tripathi R, Bhattacharjee B, Singh AK, Kanojia S, Kumar V. Implant survival in patients with neuropsychiatric, neurocognitive, and neurodegenerative disorders: A meta-analysis. National journal of maxillofacial surgery. 2021 May 1;12:162-70.
7. John N, Shetty M, Roy A, Ashok K, Subba TA. Management Protocols of Bleeding Disorders in Implant Dentistry: A Narrative Review. bone. 2022;1:4.
8. Giro G, Chambrone L, Goldstein A, Rodrigues JA, Zenóbio E, Feres M, Figueiredo LC, Cassoni A, Shibli JA. Impact of osteoporosis in dental implants: a systematic review. World journal of orthopedics. 2015 Mar 18;6:311.
9. De Medeiros FC, Kudo GA, Leme BG, Saraiva PP, Verri FR, Honório HM, Pellizzer EP, Junior JS. Dental implants in patients with osteoporosis: a

systematic review with meta-analysis. International journal of oral and maxillofacial surgery. 2018 Apr 1;47:480-91.

10. Krennmair G, Seemann R, Piehslinger E. Dental implants in patients with rheumatoid arthritis: clinical outcome and peri-implant findings. Journal of clinical periodontology. 2010 Oct;37:928-36.
11. Yu H, Zhou A, Liu J, Tang Y, Yuan Q, Man Y, Xiang L. Management of systemic risk factors ahead of dental implant therapy: A beard well lathered is half shaved. Journal of Leukocyte Biology. 2021 Sep;110:591-604.
12. Duttenhoefer F, Fuessinger MA, Beckmann Y, Schmelzeisen R, Groetz KA, Boeker M. Dental implants in immunocompromised patients: a systematic review and meta-analysis. International journal of implant dentistry. 2019 Dec;5:1-2.
13. Al Ramil AM, Lamfoon S, Mawardi H. Dental implants for patients with oral mucosal diseases: A narrative review and clinical guidance. Dental and Medical Problems. 2023;60:687-96.
14. Oliveira MA, Pallos D, Mecca F, Ortega KL, Gallottini M, Costa AL, Kim YJ, Martins F. Dental implants in patients seropositive for HIV: A 12-year follow-up study. Journal of the American Dental Association. 2020 Nov 1;151:863-9.
15. Katyayan PA, Katyayan M, Shah RJ. Rehabilitative considerations for dental implants in the diabetic patient. The Journal of Indian Prosthodontic Society. 2013; 13: 175-83.
16. Hurjui I, Hurjui IA, Hârțan RM, Popovici D, Șerban IL. The importance of laboratory investigations preceding dental implant therapy. Romanian Journal of Oral Rehabilitation. 2022; 14:162-8.
17. Javed F, Romanos GE. Evidence-Based Implant Dentistry and Systemic Conditions. John Wiley & Sons; 2018; 8.
18. Beikler T, Flemmig TF. Implants in the medically compromised patient. Critical Reviews in Oral Biology & Medicine. 2003; 14: 305-16.
19. Oates TW, Huynh-Ba G. Diabetes effects on dental implant survival. InForum implantologicum 2012; 8: 7.
20. Gibreel S, Mohamed HG, Suraj AR, Anil S. Osseointegration of dental implants and osteoporosis.
21. Sivakumar I, Arunachalam S, Choudhary S, Buzayan MM. Does HIV infection affect the survival of dental implants? A systematic review and meta-analysis. The Journal of prosthetic dentistry. 2021; 125: 862-9.