

DENTAL IMPLANTS IN MEDICALLY COMPROMISED PATIENTS

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ABSTRACT

Dental implants have become a widely accepted solution for addressing issues related to denture stability and retention, as well as for replacing failing teeth, especially in healthy individuals. However, the application of dental implants in medically compromised patients presents unique challenges and considerations. There is a growing need to understand whether this therapy is feasible for such patients, whether they face an increased risk of implant failure and peri-implantitis, and what specific preventive measures are necessary. This review indicates that while certain medical conditions may lead to lower implant survival rates and a higher risk of compromised peri-implant health, the degree of systemic disease control is more critical than the nature of the disorder itself in determining the success of dental implants. This conclusion underscores the importance of a high level of systemic disease management over the specific type of medical condition. Consequently, despite the potential risks, the functional benefits and improvement in oral health-related quality of life offered by dental implants justify their use in most medically compromised patients. Essential to this approach are rigorous preventive measures and diligent follow-up care, ensuring that the benefits of dental implant therapy can be extended to this patient population safely and effectively.

KEYWORDS: Dental Implants, Systemic Diseases, Autoimmune Disorders, Head & Neck Radiotherapy, Mucosal Diseases, Relative & Absolute Contra Indications.

INTRODUCTION

As increase of the life expectancy, elder people live with diverse diseases conditions like systemic disorders, immune-related disorders, and psychiatric issues. Consecutively, practicing clinicians are faced with serving dental implant treatments in such a population comprised of medical characteristics.

Most commonly, implant therapy is performed among patients above middle ages which means above 35-60; therefore, clinicians often encounter medically compromised patients.

For both patients' and clinicians' benefit, systemic commodities of the patient should be well-diagnosed before DI therapy.^[1]

Proper medical history has to be recorded. If Patients treatment plan is implants, patients should be ensured to inform thoroughly about the risks and precautions based on their medical condition.

A. CARDIOVASCULAR DISEASES^[2]

- Normal level of blood pressure - 120/80 mm Hg

- Acceptable level of BP in DI - $\leq 160/100$ mm Hg
- Cardiovascular disease (CVD) compromises the blood flow which may restrict oxygen or nutrients in the osseous tissue, thus is hypothesized to have higher risk of osseointegration failure or Osteonecrosis.
- Recent myocardial infarction, stroke, and cardiovascular surgery are well-known contraindications for performing DI surgery - Absolute contraindications.

TREATMENT CONSIDERATIONS^[3]

- 1) Antibiotic prophylaxis according to the guidelines of the American Heart Association 2 g amoxicillin orally at 1 hour preoperative & postoperative antibiotics BID for 3days are more beneficial.
- 2) Intravenous sedation - midazolam and propofol used it prevents excessive \uparrow in blood pressure & anxiety control.
- 3) Based on drug type - beta blockers - adrenaline LA
- 4) NSAIDs for postoperative pain relief is contraindicated in patients with uncontrolled hypertension acetaminophen or paracetamol may be safer.
- 5) Avoid case under GA - \downarrow mean arterial pressure & addition of spinal anesthesia cause hypotension $\leq 70/60$ mmhg

B. HEMATOLOGICAL DISEASES

Even though haemorrhage can be a relatively common complication in DI placement, there is no reliable evidence to suggest that bleeding disorders are a contraindication to the placement of implants: even hemophiliacs have successfully been treated with DI.

- These patients may be at increased risk of complications it can managed by following precautions but it is not absolute contraindication.
- Medical advised needed for congenital bleeding disorders conditions.

TREATMENT CONSIDERATIONS^[2]

1) Initially clinician must know the patients anticlotting drug type & reason behind the usage. e.g clopidogrel, used to prevent post-MI atherosclerotic events

2) Half - life of drugs

Heparins Oral	3-6 hr
IV	5-7 days
Warfarins	40 hr
Esters/pyridines	7-10 days

3) Calculate Platelet count/INR/BT values-if platelets >100,000/ μ l; INR up to 1.1-3.5 Appropriate local hemostatic measures, such as microcrystalline collagen sponge & tranexamic acid mouthwash (10 ml of a 5% w/v solution).

4) Postoperative analgesia/Antibiotic therapy: acetaminophen or codeine / penicillin V or clindamycin are safe in order to prevent the anti clotting drug interactions.

5) Major surgery's are contraindicated - autogenous bone grafts, extensive flaps or sinus lift conditions.

C. ENDOCRINE DISORDERS

Diabetes Mellitus^[4]

- Prevalence of edentulism is highest, an estimated 18.4% of all individuals have some form of diabetes.
- The risk for developing periodontitis in type 2 diabetics is 2.9 - 3.4 times higher than in non-diabetics. Significance: Liability of infection due to fragility of vessels Impaired wound healing Surgical stress can release endogenous norepinephrine which can cause \uparrow in plasma glucose level.

TREATMENT CONSIDERATIONS^[5]

- 1) Screening: The acceptable HBA1C(%) is \leq 8% which means \leq 180mg/dl.
- 2) Preoperative antibiotic prophylaxis, aseptic technique, atraumatic tissue handling and frequent and close follow up.
- 3) Antibiotic selected for prophylaxis should be bactericidal and of low toxicity eg. penicillin or amoxicillin. Incases of penicillin allergy, clindamycin, metronidazole, or a first-generation cephalosporin may be an alternative choice.
- 4) Morning appointment, non-interruption of lifestyle, a good breakfast, patient administered insulin, stress

(anxiety, pain) reduction in the dental office, breaks during treatment.

5) Best time of DT after periods of peak insulin activity 2 – 3 hours after injecting regular insulin.

6) Hydroxyapatite plasma-spray-coated implants have been found to have a higher survival rate than titanium implants especially in type 2 diabetic patients.

THYROID DISODERS^[2,6]

- Acceptable range is T3 1.9-4.9pg/ml; T4 0.9-1.8ng/dl; TSH 0.4-1.5IU/ml.

- Thyroid hormones of triiodothyronine (T3) and thyroxine (T4) have been demonstrated to have influence on cortical bone healing than cancellous bone around titanium implants.

- Delayed cortical bone healing around dental implants. However, cancellous bone appeared to be less sensitive to T3 and T4 levels.

- Concerning the peri-implant pathology, thyroid disorders are reported to have the lowest potential risk compared to the other systemic disorders so, more studies are needed for clear info.

D. RESPIRATORY DISORDERS^[9,10]

- In these patients vital capacity is reduced and with decline gas exchange & low oxygen saturation.

- Chronic obstructive pulmonary disease (COPD) is including chronic bronchitis, emphysema, and chronic obstructive airway disease, characterized by a persistent cough, shortness of breath on exertion (SOBOE) and chest infections.

- COPD patients has exaggerated inflammatory response of & susceptibility to inflammatory events leads to Aggressive periodontitis & due to mouth breathing they have gingival dryness/ gingivitis.

TREATMENT CONSIDERATIONS^[7]

- 1) Upright in the dental chair in order to avoid respiratory difficulty and monitoring of blood oxygen saturation with pulse oximetry.
- 2) Epinephrine-containing LA in patients with COPD, with a limit of two cartridges of 2% lidocaine with 1 : 80,000 epinephrine.
- 3) Advise patient's to taken there own inhaler before treatment.
- 4) Proper fluid irrigation compromise the cough.
- 5) Steroid inhalers and nicotine therapy causes xerostomia, poor wound healing, ulcerations, caries, candidiasis. On long term usage may leads to osteoporosis.
- 6) Proper antibiotic therapy /oral prophylaxis recommended & evaluation of bone mineral density.
- 7) Success rate is poor in COPD pt with smoking habit, but there is no absolute contraindications seen based literature.

D. BONE DISORDERS

- Bone disorders encompass a large number of diseases and syndromes such as rheumatoid arthritis, osteoarthritis, and osteoporosis.

• Most common is osteoporosis which cause imbalance in resorption & absorption leads to thin cortical plates and rheumatoid arthritis, if it accompanied by associated

connective-tissue disorders there may be an increased incidence of peri-implant inflammation.

• So, it has high incidence of risk in implant failure.^[12]

TREATMENT CONSIDERATIONS

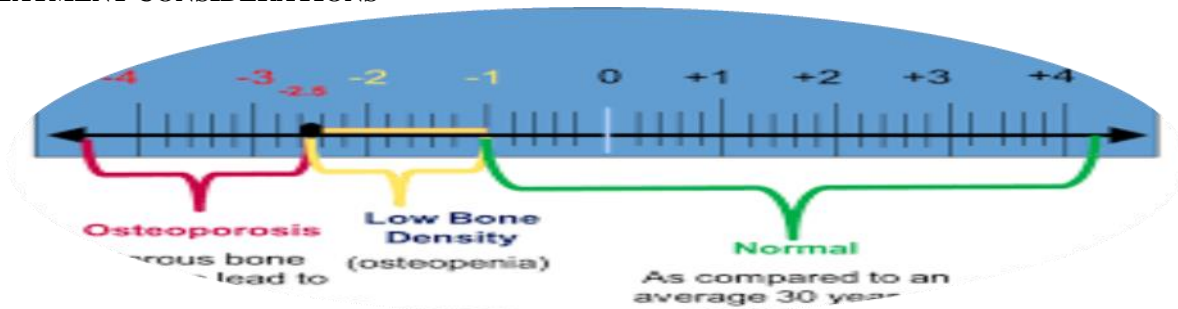


Fig.1

1) Proper bone mineral assessment before DI therapy. Advice T score for osteoporosis assessment normal: -1 to +4; acceptable for implant +4 to -2.5. fig.1

2) Grafts are mostly used while DI placement; long term follow ups has to done.

3) In osteoarthritis patients acetaminophen is not advised due to the risk of upper gastrointestinal tract bleeding. Complication in osteoporotic patients is the possible effect on bone turnover at the DI interface in anti-resorptive medication patients eg. Risk in patients using bisphosphonates leads to bisphosphonate-related osteonecrosis of the jaws (BRONJ).^[13]

4) Sinus lift - absolute contra indication for implants placements.

E. HEPATITIS^[10,11]

• Hepatitis is one of the main diseases of concern in dental office. Mostly associated with other systemic disorders eg. autoimmune, diabetes.

• These viruses transferred by single prick so, proper preventive measures and protocol has to follow.

• This viral proteins impair the immune system, increase oxidative stress and cause virus-associated organ damage including liver fibrosis, stenosis, or hepatocellular carcinoma.

• Decays, gingival bleeding, and pocket depth are seen due to the evident change in salivary flow.

TREATMENT CONSIDERATIONS

1) Control cross infections by sterilization protocols & personal safety measures.

2) Immunization: Recombivax HB10 mcg at 0,1,6months followed by anti HBs must be taken 1-2 months after last dose.

3) Antibiotic prophylaxis - NSAIDS must prescribe with care

Drug to avoid (T E A M) - Tetracyclines

Erythromycin

Aminoglycosides

Metronidazoles

F. IMMUNOCOMPROMISED^[1,14]

Immunosuppressive disorders and conditions includes autoimmune skin diseases, organ transplantation, and immunosuppressive drug e.g HIV patients. These drugs reduce osteoblast's proliferation and impair implant osseointegration. High Risk for implant placement. Organ transplantation - to reduce the risk of blood-borne infections prophylactic medication has to advice For HIV patients - therapeutic regimen of highly active antiretroviral therapy (HAART) causes osteoporosis, osteonecrosis, osteopenia so, it is absolute contraindication.

H. HEAD AND NECK CANCER^[15,18]

• Squamous cell carcinoma, adenocarcinoma, and ameloblastoma are the most common malignancies that are encountered in the head and neck regions.

• It is challenging adjuvant therapeutic procedures such as radiotherapy (RT) or chemotherapy (CT) in addition to the tumor surgery.

• CT has lesser DI failure when compared to surgical treatment.

• RT causes osteoporosis in addition to drug intake like corticosteroids/BFs therapy it is high risk so, these are absolute contraindicated but HBO therapy has +ve effect on DI than RT

TREATMENT CONSIDERATION

1) Implant surgery is best carried out Maximum 21 days before radiotherapy.

2) No implant surgery should be carried out during radiotherapy.

3) <50 Gy to reduce osseointegration failure.

4) Advice implant placement for 9 months after radiotherapy.

5) Use implant-supported prostheses without any mucosal contact Avoid immediate loading.

6) Ensure strict asepsis.

7) Consider antimicrobial prophylaxis.

I. PSYCHIATRIC DISORDERS^[1,2]

• Patients with neurological disorders such as cerebral palsy, mental retardation, epilepsy, Down syndrome,

Parkinson's diseases, autism cause many problems during implant treatment and prosthetic maintenance.

- Epilepsy mechanical trauma caused by seizures & anti epileptic drugs-associated oral complications such as gingival overgrowth, xerostomia, and yeast infections.
- Antidepressant drugs like selective serotonin re uptake inhibitors (SSRIs) reduces the bone mass and leads to fracture.
- Bone metabolism & oral condition play an important role in osseointegration that the same time hygiene maintains prevents the peri implantitis. So, these has high risk of DI failure.

J. SMOKING/ALCOHOL^[17]

- Alcoholism & smoking is a contraindication for DI but there is high risk for failure because it may cause many systemic disorders like liver disease, bleeding disorders and osteoporosis (OP), and it may impair immune response and some nutritional elements like folate and B vitamins.

- Poor wounding healing & osseointegration.
- The association between smoking and increased failure rate of implants seen in both short- and long-term periods.

K. PREGNANCY/MENOPAUSE^[19]

- Pregnancy and menopause could present challenges to implant placement. Because inflammatory response may be heightened during pregnancy.
- safe period - second trimester

L. TITANIUM ALLERGY^[16,20]

- Recently, it has been suggested that titanium, formerly considered an inert material, can induce toxicity or allergic type I or IV reactions in susceptible patients and could play a critical role in implant failure.
- MELISA Test (Memory lymphocyte immunostimulation assay) used to detect the metal allergy. In confirmed titanium-allergic patients it may be possible by using alternative materials to achieve DI rehabilitation e.g zirconium oxide.



RELATIVE & ABSOLUTE CONTRAINDICATION

RELATIVE	ABSOLUTE
Bleeding disorders	Recent MI, Stroke, surgery.
Haemophilia.	Major surgeries - Bleeding disorders, Bone disorders,
Diabetic mellitus, Thyroid disorders.	BRONJ- anti resorptive drug(bisphosphonate)
COPD disorder.	HIV patients with HAART regimen.
Osteoporosis, Rheumatoid arthritis.	Radiotherapy- Head/Neck cancers.
Hepatitis.	Smoking & Alcohol, Titanium allergy,
Anti - depressant drugs.	1st /3rd trimester of pregnant women.

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 studies the impact on implant outcome remains unclear and well-designed observational studies are needed.

- Thus, it can be stated that controlling the systemic diseases before the implant therapy and proper establishment of the medical conditions are more important than the presence of a compromise alone.

REFERENCES

1. Diz, Pedro et al. "Dental implants in the medically compromised patient." *Journal of dentistry*, 2013; 41(3): 195-206.
2. Vissink, A et al. "The medically compromised patient: Are dental implants a feasible option?." *Oral diseases*, 2018; 24,1-2: 253-260.
3. Nobre Mde A, Maló P, Gonçalves Y, Sabas A, Salvado F. Outcome of dental implants in diabetic patients with and without cardiovascular disease: A 5-year post-loading retrospective study. *European Journal of Oral Implantology*, 2016; 9(1): 87-95.

4. Abduljabbar, T., Javed, F., Malignaggi, V. R., Vohra, F., & Kellesarian, S. V. (2017). Influence of implant location in patients with and without type 2 diabetes mellitus: 2-year follow-up. *International Journal of Oral and Maxillofacial Surgery*, pii, S0901-5027(17): 31437-6.
5. Michaeli E, Weinberg I, Nahlieli O. Dental implants in the diabetic patient: Systemic and rehabilitative considerations. *Quintessence International*, 2009; 40(8): 639-645.
6. Neves J, de Araújo Nobre M, Oliveira P, Martins Dos Santos J, Malo P. Risk Factors for Implant Failure and Peri-Implant Pathology in Systemic Compromised Patients. *J Prosthodont*, 2016.
7. Bartold PM, Ivanovski S, Darby I. Implants for the aged patient: Biological, clinical and sociological considerations. *Periodontology*, 2000; 72(1): 120-136.
8. Srinivasan M, Meyer S, Mombelli A, Müller F. Dental implants in the elderly population: a systematic review and meta-analysis. *Clin Oral Implants Res*, 2017; 28(8): 920-967.
9. Moy PK, Medina D, Shetty V, Aghaloo TL. Dental implant failure rates and associated risk factors. *The International Journal of Oral & Maxillofacial Implants*, 2005; 20(4): 569-577.
10. Akay AS, Arisan V. Dental Implants in the Medically Compromised Patient Population [Internet]. *Clinical Trials in Vulnerable Populations*. In Tech, 2018.
11. Aboushelib, M. N., & Elsafi, M. H. (2017). Clinical management protocol for dental implants inserted in patients with active lichen planus. *Journal of Prosthodontics*, 26(1): 29–33. <https://doi.org/10.1111/jopr.12379>.
12. Chow, L., Chow, T. W., Chai, J., & Mattheos, N. (2017). Bone stability around implants in elderly patients with reduced bone mineral density – A prospective study on mandibular overdentures. *Clinical Oral Implants Research*, 28: 966–973. <https://doi.org/10.1111/clr.12907>
13. Chrcanovic, B. R., Albrektsson, T., & Wennerberg, A. (2016a). Bisphosphonates and dental implants: A meta-analysis. *Quintessence International*, 47(4): 329–342. <https://doi.org/10.3290/j.qi.a35523>
14. Donos, N., & Calciolari, E. (2014). Dental implants in patients affected by systemic diseases. *British Dental Journal*, 217(8): 425–430. <https://doi.org/10.1038/sj.bdj.2014.911>
15. Schoen, P. J., Raghoobar, G. M., Bouma, J., Reintsema, H., Burlage, F. R., Roodenburg, J. L., & Vissink, A. (2008). Prosthodontic rehabilitation of oral function in head-neck cancer patients with dental implants placed simultaneously during ablative tumour surgery: An assessment of treatment outcomes and quality of life. *International Journal of Oral and Maxillofacial Surgery*, 37(1): 8–16.
16. Scully, C., & Bagan, J. V. (2004). Adverse drug reactions in the orofacial region. *Critical Review in Oral Biology and Medicine*, 15(4): 221–239.
17. Galindo-Moreno P, Fauri M, Avila-Ortiz G, Fernández-Barbero JE, Cabrera León A, Sánchez-Fernández E. Influence of alcohol and tobacco habits on peri-implant marginal bone loss: A prospective study. *Clinical Oral Implants Research*, 2005; 16(5): 579-586. DOI: 10.1111/j.1600-0501.2005.01148.x
18. Gander T, Studer S, Studer G, Grätz KW, Bredell M. Medium-term outcome of Astra Tech implants in head and neck oncology patients. *International Journal of Oral and Maxillofacial Surgery*, 2014; 43(11): 1381-1385. DOI:10.1016/j.ijom.2014.05.005.
19. Arun k garg Implant dentistry 2 nd edition text book.
20. ITI volume guide F. muller.