



ORIGINAL RESEARCH PAPER

Dental Science

**ABSOLUTE MADE RELATIVE
CONTRAINDICATIONS” DENTAL IMPLANTS IN
MEDICALLY COMPROMISED PATIENTS**

KEY WORDS: Dental Implants, Diabetes Mellitus, Lichen Plano Pilaris, Medically Compromised Patients MCP, Oral Submucous Fibrosis, Thalassemia.

Dr. Ritu Batra	Reader M.D.S(Prosthodontics), B.D.S Bhojia Dental College, Bhud, Baddi, H.P.
Dr. Hemant Batra	Professor & Head of Department M.D.S(Oral Surgery) H. S. Judge Dental college & Hospital, Chandigarh.
Dr. Shefali Singh Malik*	Senior Lecturer, M.D.S(Prosthodontics), B.D.S Bhojia Dental College, Bhud, Baddi, H.P. *Corresponding Author

ABSTRACT Nowadays, dental implants have become a good treatment option for replacement of missing teeth. But Patient selection is one of the key factors for the success of implant therapy, which indicates that, a thorough medical history should be carefully registered together with the assessment of the complexity of the involved surgical site. A number of systemic conditions have been reported to complicate or even contraindicate implant surgery, with different levels of evidence. Since the number of medically compromised patients requiring implant surgery is potentially increasing, understanding the effect of any systemic disease (and associated medications) on the surgical procedure and the final treatment outcome in relation to implants is of paramount importance. This critical review aims to present a summary of the available knowledge on this topic and patient management.

INTRODUCTION

A medically compromised patient has a distinctive mental attitude and physical behavior when compared with population of same age group. These patients are at higher risk during implant surgeries owing to their disease status.

Thorough medical examination and extensive lab investigations need to be done for these patients, to determine the specific measures before and after treatment for evaluation of risk factors.¹ The important factor which governs the treatment protocol are the medical control of disease, rather than the disease itself.²

The survival rate of dental implants placed in medically compromised patients, with controlled systemic factors has no evidence to indicate either absolute or relative contraindication. Even though few studies have reported implant failures in these patients, but at the same time there is negligible evidence based data to justify that the cause of failure was only due to systemic factors.³

When the disease status is not under control in these patients, then implant placement should be reconsidered because of the possibility of systemic or local factors interfering with osseointegration and affecting its longevity.⁴ It has been observed that, systemic factors are more critical than many other local factors which can be identified more easily during healing period.³

After critical analysis the goal should be to rehabilitate medically compromised patients who may be suffering from autoimmune disorders, endocrinal disorders, bone pathologies, cardiovascular and haematological disorders. The patients who have undergone head and neck radiotherapy and have been on bisphosphonate therapy require special attention. Thus, restoring such patients with dental implants to improve quality and longevity of life should be the moto.

REVIEW

Lichen Plano Pilaris

Lichen Plano Pilaris is also known as follicular Lichen Planus or Lichen Planus follicularis. It is a form of Lichen Planus (LP) affecting scalp, leading to scarred alopecia and even permanent hair loss on the scalp. It is an example of primary lymphocytic folliculitis. It commonly affects males, but can affect young adult females as well with a wide age range. Mostly, it is associated with lichen planus of skin, nails and

mucosa. The cause is unknown, but the disease is considered as lymphocyte mediated autoimmune disorder evoked by hepatitis C or drugs.⁵

The main features include scaring alopecia, macular/ popular follicles, and plaques of red scales. It is a slow progressive condition commonly involving the front, sides and lower back region of the scalp. Usually, no symptoms are associated with this condition but some patients may complain of pain, itching, tenderness, discomfort and burning. Scalp biopsy should be done to confirm diagnosis.⁵

In a patient with active LPP, Implant placement in the region of 14, showed bone loss, with obvious soft tissue recession (fig. 1,2) because of the lymphocyte altered activity. Signs of malar pigmentation and hyper melanin activity could be observed on the patients face. Patient also complained of itching of scalp. The blood analysis and histopathological examination, confirmed the diagnosis of LPP in the patient. Implants placed in 16, 17 and 35, 37 sites (fig. 3) did not show any bone loss because the planned implants were placed, after one year of treatment when the blood analysis showed decreased ESR and normal leucocyte, lymphocyte activities.



Fig 1 : Exposed threads of implants placed during active stage in 1st quadrant in lichen plano-pilaris patient.

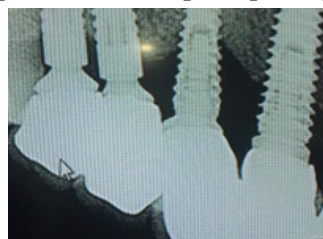


Fig. 2: IOPA wrt 16 implant showing bone loss in lichen plano-pilaris patient.

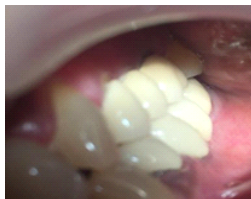


Fig. 4: Intact implant supported prosthesis in 2nd and 3rd quadrant/ without bone loss.

As per the maintenance protocol, smoothening of exposed threads using abrasive discs and silicon cuffs was done and patient was trained to use miniature brushes to clean the site to prevent further peri-implantitis and progression of bone loss.

DIABETES MELLITUS

The pathophysiology of DM is mediated by alterations of carbohydrates metabolism and insulin action. Patients complain of polydipsia, polyphagia, and polyuria, along with unexplained weight loss. Uncontrolled diabetes is the cause of delayed wound healing, blurred vision, bleeding gums, high susceptibility to infection and fatigue.⁶

Diagnosis and monitoring of these patients is essential. Testing of fasting and non-fasting glucose levels, along with restricted use of oral glucose tolerance test (GTT) is the routine investigation performed for evaluation. The glycosylated haemoglobin assay (Hb1 Ac) allows the determination of blood glucose status with exception in patients with severe iron deficiency and sickle cell diseases. Fructosamine test, widely used as glycosylated haemoglobin assay, is used to trace and manage women with gestational diabetes.⁶

Nowadays, almost all insulin-using patients use glucometers to monitor glucose levels. Self-testing of blood glucose, has revolutionized the management of DM. Primary goal for these patients is to achieve normal blood glucose levels. Prevention protocol is to avoid sustained hyperglycemia or symptomatic hypoglycemia so that the prevention of diabetic ketoacidosis is achieved. Patients are advised to manage a diet plan along with medications and control weight with the help of physical exercises.

Approach to dental care: Poor glycemic control is likely to present more severe and rapidly progressive infection. The focus is on determining severity of disease, its control and stability of glucose level in blood. Hypoglycemia is inadvertent during procedure hence patients are asked to have regular meals before dental procedures. Treatment approach to prevent infection in these patients is similar like any other patient.

Controlled DM patients can be treated with dental implants. Replacement of 35, 36 was done in a female patient aged 63 yrs. with controlled DM. After 16 yrs. Post-operative RVG x-ray showed intact and functional prosthesis with no crestal bone loss. Direct/indirect sinus lift procedure could be performed in controlled DM. (Fig.4,5) Controlled DM patients are routinely selected and chosen for rehabilitation with implant supported prosthesis wherever indicated, this improving quality of life is the prime goal of rehabilitation.

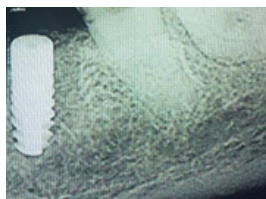


Fig. 4: Implant placed in diabetic patient.



Fig. 5: Osseointegrated implant in diabetic patient in 16 region.

THALASSEMIA

Thalassemia minor is a common disease in India. Red blood cells count tends to be higher with prominent target cells and Basophilic stippling which helps to differentiate these findings from iron deficiency patients. MCV and MCH are disproportionally low but accuracy for diagnosis is discrete and not accurate enough for clinical use. Clinically, aseptic necrosis of bone with hepatosplenomegaly is usual. Some patients are less severely affected and reach adult life without major symptoms. Many patients on the other hand have little disability and may be detected by a chance during hematological screening examination. Electrophoretic pattern clearly discernable the characteristics of this disease. Genetic evaluations are mandatory screen tests for these patients.⁶

Replacement of teeth in Thalassemia minor patient. The patients should be routinely treated and monitored by the local physician for haematological parameters. The periosteum might take more time to heal due to reduced oxygen saturation level in body. So, meticulous oral hygiene protocol along with mouth rinses is followed to avoid wound gapping or peri-implantitis during uncoverey stage. (fig.6,7) soft tissue management is critically important in them.



Fig. 6 Implant and abutments placed in 36, 37 region in thalassemic patient.

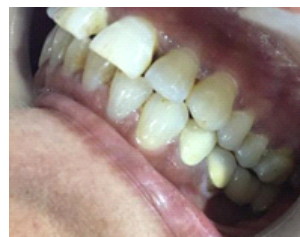


Fig. 7: Implant supported prosthesis in third quadrant in thalassemic patient.

Following strict protocol of blood screening and careful evaluation of patient, what appears initially absolute contraindication can be made possible with proper screening.

ORAL SUBMUCOUS FIBROSIS

Oral submucous fibrosis is a chronic, progressive scarring disease, predominantly affecting people of south-east Asian origin. According to WHO, oral precancerous condition is defined as a generalized pathological state of oral mucosa associated with a significantly increased risk of cancer; Accords well with the characteristics of OSF. Early symptoms of OSF include burning sensation in the mouth on consumption of spicy food, ulcerations and recurrent generalized inflammation of oral mucosa. This

hypersensitivity of oral mucosa is due to Areca nut products. 22% of cases generally have no signs and symptoms. Histological analysis reveals sustained lymphocytic infiltration.^{7,8}

With the progression of disease to advanced stage, oral mucosa becomes blanched and slightly opaque, white fibrous bands appear; which run in vertical direction. When tissue around pterygomandibular raphae is involved, varying degrees of difficulty in mouth opening occurs. On palpation, circular band can be felt around entire rima oris. Progressive fibrosis and stiffening of mucosa leads to trismus. General female preponderance may be related to factors like oral habits, deficiency states of iron, vitamin B complex among many other condition prevalent in Indian women.

IOPA X-ray showing Implant placement in a patient, 10 yrs back with symptoms of burning mouth and dysphagia associated with pain in mouth opening beyond 21mm.

Patients can be given counselling sessions to quit the habit, topical glucocorticoids application for one to two months to reduce the discomfort and burning sensation and reduce inflammation of the area.

Due to restricted mouth opening short head drills can be selected for surgical placement of oral implants and periodic intervals of rest should be given during surgery. If patient does not quit the habit, significant amount of bone loss can be seen in relation to implant placed, which is quite obvious in these patient after long term comparison. Thus, Signifying the long term follow-up protocol in these patients for crestal bone loss.

DISCUSSION:

Medically compromised patients in the active state of disease are the absolute contraindications for most of the surgical procedures and implant placement is not out of the list. But through proper examination, vigorous investigations and meticulous medicinal regime to control the disease, they can become either relative contraindication or fit for any dental procedure including implant placement or any other minor surgical procedures.

Little information is available concerning the systemic and local factors affecting the initial bone apposition till uncover and abutment placement process.^{9,10} Even then; the implants are placed making treatment possible for these patients. Under rigorous diagnosis, treatment planning & medical care, absolute contraindications can be converted into relative contraindications and patient's quality of life can be improved tremendously.

Lichen plano pilaris (LPP) is clinically characterized by perifollicular erythema, follicular hyperkeratosis, permanent hair fall. It is follicular form of Lichen Planus, associated with frequent co-existence of clinical findings of Lichen Planus disease and shared pathologic features.¹¹ Treatment should be provided as early as possible. Aim is to provide symptomatic relief and reduce the progression of disease even though its progression may slow down after treatment, but the hair loss will still continue.

Anti-inflammatory treatment options include Corticosteroids (potent topical), intralesional, oral Topical tacrolimus, Hydroxychloroquine, Tetracycline eg doxycycline, Acitretin, Methotrexate, Cyclosporine, Mycophenolate mofetil, Pioglitazone (an oral PPAR-γ agonist). Response to treatment is variable and some published studies contradict where as others add to the efficacy.¹¹ The best patients can expect is to stop progression of hair loss and to minimize discomfort.

A management protocol has been suggested by Mirmirani et al^{2,11} in 2003:

- Make diagnosis of lichen plano pilaris clinically and with a scalp biopsy.
- Severity of symptoms, extent of hair loss, and presence of disease activity are documented at each visit, approximately every 3 months.
- Oral hydroxychloroquine (usually 200 mg twice daily) is started after appropriate laboratory tests and eye check if the patient is symptomatic, has progressive hair loss or signs of active disease.
- Intralesional and potent topical corticosteroids may also be used.
- After 2-4 months, hydroxychloroquine is changed to cyclosporine (3-5mg/kg/d) if symptoms continue, extent of hair loss progresses, or there are clinical signs of disease activity. Cyclosporine is used according to the cyclosporine consensus guidelines.

Since 2009, there have been several reports of the use of the antidiabetic agent pioglitazone (off-label) for the treatment of lichen plano pilaris. Its efficacy has varied; up to 50-70% patients have reduced symptoms, inflammation, and disease progression. Some patients choose alternative therapy as homeopathic management. Placement of implants during the active stage should be avoided due to altered leucocyte activity.

Controlled diabetic patients can undergo all routine dental procedures without modifications of the treatment planning. Appointments scheduling generally is best timed for treatment either before or after periods of peak insulin activity, in the blood. Before treatment the blood glucose level should be checked, and a source of carbohydrate should be available in the dental office to avoid state of hypoglycemia. Teeth with periodontally compromised state and questionable prognosis should be addressed before the procedure as a routine. Epinephrine in LA, elevated blood glucose level, thus interferes with controlled glycemic status of patient, hence during surgical procedure reduction of stress and adequate pain control is of paramount importance.⁹ In diabetic patients the synthesis of osteoblastic matrix is influenced by altered functional efficiency of insulin. The variation in differentiation of osteoblastic cells, calcium metabolism activity and hormonal influence, brings about changes in bone mineral tissue balance, leading to an alteration in the boosting of mature osteocytic activity, which is required for osseointegration of dental implants.^{12,13,14}

Dental implants in diabetic patients have been an absolute contraindication due to fibrous union, but now this has been modified as a relative one after controlling the disease.¹² The failure rate in controlled diabetes is relatively less, when aseptic techniques are followed in collaboration with chlorhexidine gluconate 0.12% and antibiotic prophylaxis.¹³ Evidence showing benefits of antibiotics usage during surgical placement of implants for patient with DM is limited. Placement of implants in OSMF patients is a complicated procedure due to trismus, but its management is dictated by the amount of mouth opening. As a preventive measure elimination of areca nut chewing can help in reduction of fibrotic band formation. The constituents of areca nut, mainly arecoline, whilst tannin may have a synergistic role. Arecoline will interfere with the molecular processes of deposition and/or degradation of extracellular matrix molecules such as collagen.^{2,4}

Due to this interference, phagocytic capacity of fibroblast is reduced, because of up or down regulation of key enzymes such as lysyl oxidase and alteration in expression of various ECM molecules.⁸ This process may also be influenced by increased secretion of inflammatory cytokines, growth factors and decreased production of anti-fibrotic cytokines. Although the above mechanism may explain the induction, maintenance and progression of fibrosis in OSMF, but still extensive research is required to identify the mechanism leading to carcinogenesis.

Among various metabolic diseases which modify the bone mass and density, most frequent area affected is the spongy bone. Present literature shows a high implant survival rate of 93.8 to 100% in such patients. It has also been observed through histomorphometric studies that an adequate percentage of contact bone-implant in women who suffer from osteoporosis may not be an absolute contraindication for the placement of dental implants. Due to low bone density the uncover stage should be delayed and loading protocol should be altered to progressive one, depending on the type of bone density available at the site of implant placement.

Selecting an altered design form and diameter of fixture can improve the success of treatment in these patients. Instead of v shaped thread design, implants with square crest and a flank angle of 3 degrees is preferred as it decreases the shear force and increases the compressive load causing condensation of bone around implant.¹⁵

Periodontal attachment loss may be influenced by the disease.¹⁶ Even though this association of osteoporosis, metabolic disorder and implant failure have not been proved yet through evidence based studies. This factor could stand important in post menopausal women.¹⁷ In a study by Beiker and Flemming, the early implant failure was associated significantly with osteoporosis.¹

The bisphosphonates drugs indicated in the prevention and treatment of illnesses associated to bony resorption (elderly osteoporosis, induced by corticoids, or Paget disease), bony metastasis of cancer from suckles and prostate, syndromes paraneoplastic (wicked hypercalcemia) and multiple myeloma. They can be used through oral or intravenous route but their i.v. administration is considered a major risk for jaw necrosis (bisphosphonate-related osteonecrosis of the jaw [BRONJ]).¹⁸

The patients who suffer from osteoporosis often consume oral BPs. Treatment with dental implants is a relative contraindication for this clinical situation, as long term follow up period is necessary to detect any clinical sign of failure. Whereas, patients receiving Cyclosporine, azathioprine, corticosteroids or hormonal therapy in case of MCPs, are absolute contraindication for implant procedures.^{19,20}

Patients with head and neck region cancer, are often subjected to higher than 50 Gy dosage of radiotherapy. These patients show poor level of osseointegration in implant placement till loading with prosthesis. Dental implants are absolutely contraindicated in these patients as they receive intravenous bisphosphonates along with corticosteroids or immune-suppressors, as a multidisciplinary treatment protocol to cure the disease.

A special consideration must be made for patients who are claustrophobic. As these patients are treated with reduced coverage of face, without nose cap or drapes, which leads to a breach of asepsis.²¹ Removal of some drapes during surgery often causes unavoidable microbial cross contamination.¹

Patients consuming tobacco are at high risk of failure. Wilson and Nunn established a failure rate of 2.5 times higher in patients who smoke,¹⁷ and this rate has been augmented in recent studies where upto 2.6 times higher failure has been reported. However, these results contradict with those found by Alsaadi in his two years of retrospective study, as he concluded that the consumption of tobacco was not a decisive factor in loss of dental implants³ which was in accordance with results found by Sverzut and Col in their retrospective study.²²

When compared smokers with non-smokers, the smokers showed a lower trabecular bone mineral content²² thus correlating to some alteration in the bone response capacity. Nicotine has been shown to increase platelet aggregation, decrease microvascular prostacyclin levels and inhibit the

function of fibroblasts, erythrocytes and macrophages.²³ Carbon monoxide binds to haemoglobin considerably more easily than oxygen, thus displacing oxygen from the molecule and lowering the oxygen tension in the tissues. Smoking has been documented to adversely affect bone mineral density, lumbar disc health, the relative risk of sustaining wrist and hip fractures, lower back pain and the dynamics of bone and wound healing. Several studies revealed the negative effect of smoking on osseointegration, and its amount of intake related effects.²³

The factor which plays main role is the frequency of smoking at the time of osseointegration and first year of loading. Chronic smoking and frequency of tobacco consumption must be evaluated before considering a patient for implants so that final outcome of the procedure is not compromised.

Crohn's disease of gastrointestinal system is an autoimmune disorder, which leads to periodontal lesions.³⁸ The disease is characterized by presence of antibody-antigen complex in the blood serum which can lead to autoimmune mediated inflammatory process of several organs, causing enteritis, vasculitis, keratoconjunctivitis and recurrent oral ulcerations. Due to malnutrition patients show impaired bone healing around implants.²⁴

Patients suffering from infective endocarditis, the antibiotic therapy is always followed as a prophylactic regimen. All the dental procedures require antibiotic prophylaxis, in accordance to BSAC and these patients should be specifically included in high risk group. Those procedures which involve detogingival manipulation, must be evaluated at caution.³

CONCLUSION

Meticulous treatment planning and vigorous investigation protocol can alter the outlook and outcome of implant supported prosthesis making things possible now which were not impossible earlier. The ultimate goal of the treatment should be to help geriatric patients to live high quality standard.

REFERENCES:

1. Beiker T, FlemmigTF, Implants in medically compromised patient, *Critical Reviews in Oral Biology and Medicine* 2003;14(4):305-316.
2. PD Dios, C Scully, M Sanz. Dental implants in the medically compromised patient. *J Dent.* 2013;41:195-206.
3. G Alsaadi, M Quiryren, A Komarek A, D van Steenberghe, Impact of local and systemic factors on the incidence of oral implant failures, up to abutment connection. *J Clin Periodontol* 2007;34:610-617.
4. D van Steenberghe, M Quiryren, L Molly, R Jacobs. Impact of systemic diseases and medication on osseointegration. *Periodontology* 2000;33: 163-171.
5. British association of dermatologist. Patient information leaflet. April 2013.
6. Pennsylvania 8ed. Kumar V, Abbas AK, Fausto N, Aster JC. Robbins and Cotran Pathologic Basis of disease. Philadelphia: Elsevier saunders, 2010.
7. Shaffer's text book of oral pathology, seventh edition. Elsevier, a division of reed Elsevier pvt limited. R Rajindran, B Sivapathasundharam. (2012) Pg 101-103.
8. Gupta M.K, Mhaske S, Ragavendra R, Intiyaz. Oral submucous fibrosis- Current Concepts in Etiopathogenesis. *People's Journal of Scientific Research*, July 2008; 1:39-44.
9. Kronstro m, M, Svenson, B., Hellman, M. & Persson, G.R. (2001) Early implant failures in patients treated with Bra nemark System titanium dental implants: a retrospective study. *International Journal of Oral & Maxillofacial Implants* 16, 201-207.
10. Kronstro m, M, Svenson B, Erickson E, Houston L, Braham P. & Persson GR. Humoral immunity host factors in subjects with failing or successful titanium dental implants. *Journal of Clinical Periodontology* 2000;27:875-882.
11. Mirmirani P, Willey A, Price VH. Short course of oral cyclosporine in lichen planopilaris. *J Am Acad Dermatol* 2003;49:667-671.
12. Michaeli E, Weinberg I, Nahlieli O. Dental implants in the diabetic patient: systemic and rehabilitative considerations. *Quintessence Int.* 2009;40:639-45.
13. Beikler T, Flemmig TF. Implants in the medically compromised patient. *Crit Rev Oral Biol Med.* 2003; 14:305-16.
14. McCracken M, Lemons JE, Rahemtulla F, Prince CW, Feldman D. Bone response to titanium alloy implants placed in diabetic rats. *Int J Oral Maxillofac Implants.* 2000;15:345-54.
15. Boggan RS, Strong JT, Misch CE, Bidez MW. Influence of hex geometry and prosthetic table width on static and fatigue strength of dental implants. *J Prosthet Dent* 1999;82:436-40.
16. Fiorellini JP, Nevins ML, Norkin A, Weber HP, Karimbux NY. The effect of insulin therapy on osseointegration in a diabetic rat model. *Clin Oral Implants Res.* 1999;10:362-68.

17. Wilson TG Jr, Nunn M. The relationship between the inter-leukin-1 periodontal genotype and implant loss. Initial data. *J Periodontol.* 1999;70:724-9.
18. Memon S, Weltman RL, Katancik JA. Oral bisphosphonates: Early endosseous dental implant success and crestal bone changes. A retrospective study. *Int J Oral Maxillofac Implants.* 2012;27:1216-22.
19. Scully C, Madrid C, Bagan J. Dental endosseous implants in patients on bisphosphonate therapy. *Implant Dent.* 2006;15:212-8.
20. Siddiqi A, Payne AG, Zafar S. Bisphosphonate-induced osteonecrosis of the jaw: a medical enigma? *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2009;108:1-8.
21. van Steenberghe, D., Yoshida, K., Papaioannou, W., Bollen, C., Reybroeck, G. I. & Quirynen, M. Complete nose coverage to prevent airborne contamination via nostrils is unnecessary. *Clinical Oral Implants Research* 1997;8:S12-S16.
22. Gómez-de Diego R, Mang-de la Rosa M, Romero-Pérez MJ, Cutando-Soriano A, López-Valverde-Centeno A. Indications and contraindications of dental implants in medically compromised patients: Update. *Med Oral Patol Oral Cir Bucal.* 2014 Sep 1;19 (5):483-9.
23. Baig MR, Rajan M. Effects of smoking on the outcome of implant treatment: A literature review. *Indian J Dent Res* 2007;18:190-5.
24. van Steenberghe D, Vanherle G, Fossion E, and Roelens J: Crohn's disease of the mouth. *J Oral Surg* 1976;34:635-638.