

IMPLANT FAILURE – A DENTIST’S NIGHTMARE

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Abstract: *Dental implants are commonly used in situations for replacement of natural teeth. Despite many advances, techniques, and implant-design, implant failure is a significant concern for the patient and dentist. The dental implants are designed that best suits the various types of bone. Different etiology for the implant failure and their contributing factors has been discussed in this review article. The purpose of this concise review is to discuss the etiology of implant failure by highlighting the various classification put forth by different authors.*

Keywords: *Dental implants, classification, periimplantitis, periodontitis, smoking.*

1. INTRODUCTION

Dental implants have become a common choice among the treatment options for missing teeth rehabilitation since they were first introduced by Branemark in the 1970's. An implant is a "graft or insert set firmly or deeply into or onto alveolar process that may be prepared for its insertion. Implants are used for single tooth replacement, partially edentulous arches and even for completely edentulous arches. Implants are inert, alloplastic material most commonly made of titanium or titanium alloy or zirconium. Alternatively, ceramic such as hydroxyapatite, bioglass or aluminium oxides can be used. Depending upon their placement within the bone, they are classified into epiosteal, endosteal and transosteal. An implant consists of an implant body which is placed within the bone, implant screw placed on the superior surface of the body to which is attached the healing cap. Abutments are placed over the implant body which provides retention to the prosthesis. Implants are placed into the body in stage 1 or stage 2 surgery. In spite of taking many precautions and surgical precision, implant failure does occur attributing to certain factors.

2. CAUSES OF IMPLANT FAILURE

The aim of this article is to study the various causes of implant failure by focusing on the etiological and aetiological factors associated to it.

2.1 AGE FACTOR

Age is one of the prognostic factors when it comes to implant success. Generally, older patients are the ones who are more prone to failure implants due to reasons such as systemic health condition, low local bone conditions etc. People above 50-60 years have an adverse outcome in two folds. Brocard et al studied cumulative successive rates in a long-term follow up study and concluded that patients above 60 years have lesser implant survival than usual. When compared to women, men are at increased failure survival rate.

2.2 MESIAL DRIFT OF TEETH IN THE MAXILLA AND MANDIBLE

It is understood that there is a rapid mesial drift of teeth in step dentition phase. Around 5mm mesial drift from canine to the first molar region is seen between the age group of 10-21 years loss of space which leads to crowding. and 2.5mm buccal movement which results in it

is said that implant can stop the mesial drift leading to asymmetric arch implant placed in anterior cannot follow the arch line and becomes lingual in period of time.

2.3 ORAL HYGIENE AND MAINTENANCE

Bacterial biofilm which are formed in oral cavity are the major causes for gingivitis, periodontitis, peri-implantitis. These conditions lead to necrosis of bone;reduced vascularity with parallel oriented collagen fibers which may be initiating of ailing or fail implants. This condition can be managed by the use of interproximal brushes which penetrate 3mm into the gingival sulcus or pocket.

Some other clinical conditions are associated with oral lichenplanus, parafunctional habits. When it comes to oral history, Derks et al found no association between a patient with an initial diagnosis of periodontitis and late failure. However,Vercruyssen et al found that a history of periodontitis was a possible influencing factor for late implant failure.

2.3 HABIT OF CIGARETTE SMOKING

Smoking affects the oral and general health of an individual. Smoking reduces leukocyte activity and causes reduced chemotactic migration rate and low phagocytic activity leads to low infection resistance and delayed wound healing.it also decreases calcium absorption. Noda et al. reported that Dental implants have a lower survival rate in smokers than in non-smokers.Smoking affects osseointegration process. Usage of Tobacco directly inhibits osteoblast function.Strietzel et alreported that smoking affects implant prognosis with /without augmentation.

2.4 BRUXISM

Occlusal parafunction includes bruxism (clenching, grinding) lip biting,thumb sucking,abnormal posture of jaw.Bruxism being the possible occurrence of parafunctional habit, which is evident in any stage of dental treatment,the risks for implant therapy must be considered a contraindication for implant treatment. Bruxism is associated with large and unpredictable occlusal forces that could cause various type of complication during implant treatment,including both biological and mechanical complication such as bone loss around the implant,prosthesis wear or fixture fracture. Glauser et el. Evaluated and reported that the higher failure rate among the bruxers ids due to uncontrolled functional loading of the implant which leads to micro-motions above the critical limit,resulting in fibrous encapsulation of the implant instead of osteointegration. However, the close attention paid by clinicians to bruxism patients along with the application of meticulous treatment plans and performing regular follow ups could reduce the effect of parafunction on outcome of dental implant.

2.5 LOSS OF IMPLANT MATERIAL INTO THE MAXILLARY SINUS

The edentulous posterior maxillary region often presents with unique conditions which challenging the implant dentistry as of that is condition where implant graft into the maxillary sinus area .The immediate implant insertion in the unstable residual bone can lead to the loss of implant or graft material into the maxillary sinus affecting the natural ciliary movement in the maxillary sinus. It can be managed surgically by different approaches,including intraoral,endoscopically, transnasal route and bone reconstruction of maxilla.The most conservative and invasive technique is the placement of short implants.

2.6 IRRADIATED BONE

Irradiation therapy along with surgical excision is the treatment protocol generally employed for malignant tumors in the craniofacial region.The success rate of placement of dental

implants in irradiated bone is around 70%. Two studies investigated the effect of radiation therapy on late failure. Alsaadi et al found that radiotherapy significantly increased the rate of late implant failure; while Doll et al found that radio- chemotherapy patients had a 1.9-fold higher risk of late implant failure compared to ablative surgery patients. Factors which contribute to the success of implant retained oral rehabilitation in radiated patients are careful selection of patients after evaluating the clinical conditions and results following surgery, reconstruction, radiation, prognosis and the cost factor. Placement of minimum number of implants is advocated.

2.7 PERI-IMPLANTITIS

Peri-implantitis is a progressive inflammatory condition which affects the tissue surrounding an osseointegrated implant, leading to the loss of the supporting bone and implant failure. It is characterized by bleeding, suppuration, increased pocket probing depth, mobility of implant, and radiographical bone loss.

2.8 HYPERGLYCEMIA

Hyperglycemia can also affect the osseointegration of dental implants. Hyperglycemia alters the response of the parathyroid hormones which helps in regulating the metabolism of phosphorus and calcium and inhibits osteoblastic differentiation. It affects bone matrix, its components and adherence, growth, and accumulation of extracellular matrix.

2.9 IMMUNE DEFICIENCY

Patients with Immune deficiency are more prone to infection and compromised tissue repair. according to recent studies, dental implant placement has been performed successfully in patients with stable immune status, HIV positive cases with a sufficient number of CD4+ cells and using antiviral drugs

2.10 IMPLANT LOCATION

Placing an implant in a posterior location was reported as a significant risk factor for late failure. Posterior region is also known to be at a higher risk of dental plaque accumulation compared to anterior regions and plaque accumulation is associated with gingival inflammation and the initiation of several oral diseases that could lead to failure of dental implant.

2.11 IMPLANT SELECTION /PROSTHESIS DESIGN

Despite the implant design and surface treatment not significantly influencing late failure of dental implant, there was a tendency for implants with a machined surface to be associated with a higher failure rate. It is advisable to place a short implant when the bone height is inadequate. An implant -supported overdenture provides several benefits over an implant-fixed prosthesis, such as being cheaper and ease of prosthesis maintenance plan. However, clinicians should avoid using a conus-type connection, which was reported as a significant risk factor for late failure.

2.12 BONE CONDITION

The demand for implant placement is higher among elderly women since they are prone to greater osteopenia or osteoporosis. Although these bones metabolic disease could have a negative impact on implant stability and have shown trends for more late failures, no significant associations between these bone conditions and late failure have been found. Neither a lack of bone volume nor the presence of bone dehiscence or fenestration significantly affected the rate of late failures. The bone condition and bone volume did not significantly influence the rate of late failures of dental implant, a low bone dentistry poses a significant threat to implant outcome.

2.13 ADJACENT DENTITION

Placement of implants along an improper axis or an excessively large implant can cause injury to adjacent tooth, resulting in nonvitality of the tooth. Dilacerated roots and excessive tilting in the mesiodistal direction obliterates the implant area and hinders the ideal implant placement. The interpretation of a radiograph with a guide pin of the depth of 5mm facilitated angulation corrections of osteotomy. Alternatively, differences between the apical and crestal interdental spaces due to mesial or distal tipping of the roots can be orthodontically corrected.

2.14 DIABETES MELLITUS

The rate of survival of dental implants is comparatively high from other conditions. It is mainly because people suffering from type 1 and type 2 diabetes takes much longer healing period after surgical implant treatment. Diabetic patients are also more prone to post-operative infections. Also, infection in gums are very common. Hence the dental implant failure increases and might lead to other infections too. Recent advancement and new research in the dental implant surgical procedures now confirm that diabetic patients have a higher rate of dental implant surgery success than thought previously. According to the latest research people with controlled and uncontrolled diabetes have an equal chance of successful dental implant surgical procedures with the only difference of people with poorly controlled diabetes needing more time for implant healing before the dentures are placed .

3. CONCLUSION

Implant therapy has become common practise and will probably gain in popularity during the next several years. This implies that dental professionals will have to deal more with implant failure and related complications. When an implant fails, a tailor made treatment plan should be provided to each patient according to all relevant variables. Patients should be informed regarding all possible treatment modalities after implant failure and give their consent to the most appropriate treatment option for them.

4. REFERENCES

1. Kourtis, S., Sotiriadou, S., Challas, A. & Voliotis, S., 2004. Private practice results of dental implants. Part I: survival and evaluation of risk factors--Part II: surgical and prosthetic complications. *Implant Dent*, pp. 13(4): 373-85.
2. Bornstein, M. et al., 2008. A retrospective analysis of patients referred for implant placement to a speciality clinic: Indications, surgical procedures, and early failures. *Int J Oral Maxillofac Implants*, Volume 23, pp. 1109-16.
3. Mellado-Valero, A., Ferret Garcia, J., Herrera Ballester, A. & Labaig Rueda, C., 2007. Effects of diabetes on the osseointegration of dental implants. *Med Oral Patol Oral Cir Bucal*, Volume 12, pp. 38-43.
4. Brocard, D. et al., 2000. A multicenter report on 1,022 consecutively placed ITI implants: A 7 year longitudinal study. *Int J Oral Maxillofac Implants*, Volume 15, pp. 691-700.
5. Derks, J. et al., 2015. Effectiveness of implant therapy analyzed in Swedish population: Early and late implant loss. *J. Dent. Res*, Volume 94, pp. 44S-51S.
6. Becker, S. et al., 2008. Prospective observation of 41 perforations of the schneiderian membrane during sinus floor elevation. *Clin Oral Implants Res*, Volume 19, pp. 1285-9.
7. Alsaadi, G., Quirynen, M., Komarek, A. & Van steenberghe, D., 2008. Implant of local and systemic factors on the incidence of late oral implant loss. *Clin. Oral Implant. Res*, Volume 19, pp. 670-676.
8. Strietzel, F., Karmon, B., Lorean, A. & Fisher, P., 2011. Implant-prosthetic rehabilitation of the edentulous maxilla and mandible with immediately loaded implants: Preliminary data from a retrospective study, considering time of implantation. *Int. J. Oral Maxillofac. Implant*, Volume 26, pp. 139-147.
9. Vercruyssen, M. et al., 2010. Long-term, retrospective evaluation (implant and patient-centred outcome). Survival rate. *Clin. Oral Implant. Res*, Volume 21, pp. 357-365.
10. Glauser, R., Ree, A. & Lundgren, A., 2001. Immediate occlusal loading of Branemark implants applied in various jawbone regions: A prospective, 1-year clinical study. *Clin Implant Dent Relat Res*, Volume 3, pp. 204-213.