

Implant failures and factors affecting it -A Review.

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ABSTRACT

Dental implants are generally considered as a long-term successful treatment modality in a dental clinic. Though many cases have been reported in relation to the failure of implants. Successful implants are those which stay healthy in the oral cavity and also doesn't cause damage to its surrounding tissues. Recognizing any diseases or abnormalities in the oral cavity prior to the placement of the implant increases the chances of successful implant placement. Other factors such as age, sex, smoking, dietary habits, alcohol consumption and location of the abutment placement also play a major role in the success of implant placement. The follow up procedure after the implant placement is very important considering the longevity and stability of the implant.

INTRODUCTION

The dental implant is the gold standard in dental rehabilitation for missing teeth.[1,2] Different statistically analysed factors associated with implant failure are age and sex,[3] smoking,[4] systemic diseases,[5,6] maxillary location, bone type,[7] and implant surface treatments and characteristics.[8] Immunological[9] and genetic factors[10] have also been reported to be related to early implant failure. Implant failure is also associated with Periodontitis and cigarette smoking. Overall failure rates have been reported as 11% for smokers as compared to 5% for non-smokers. Mellado Valero et al. [11] found more failures in diabetic patients during the first year of functional loading. The failure of implant is seen in irradiated bone, excessive temperature elevation in bone during placement, resulting in necrosis of the supporting bone round the implant [12]

Age factor

Age is considered together of the important prognostic factors in implant success. Older patients are more prone to altered during the second and third decades of life when compared with the fourth and fifth.[16] The age and rate at which growth is complete is different from patient to patient.[17] The common growth spurt for males is 14 years and female is 12 years. However, this age can vary by the maximum amount as 6 years. Thus, when a dentist plan implant surgery for a child, the dentist should be aware of problematic age period that extends from 9 to 15 years for female and 11 to 17 years for male.[18]

Mesial drift of teeth within the maxilla and mandible

The spontaneous mesial drift of teeth within the step dentition phase is well understood. There is about 5 mm mesial movement/drift of teeth within the lateral segment of jaw (canine to the primary molar) between 10 and 21 years aged. Thus, an implant can stop the mesial drift, leading to an asymmetric arch. An implant in the anterior part cannot follow the teeth and will become more

lingual with time. Vertical growth can occur after puberty in slower phase. It may depend on many other factors like eruption of tooth pattern [19]

Oral hygiene and maintenance

The accumulation of bacterial plaque leads to gingivitis, periodontitis, and peri implantitis. Furthermore, the presence of any symptoms of infection, radiographic evidence of peri implant bone loss, and/or neuropathies reduced vascularity concomitant with parallel oriented collagen fibres may be indicative of failing implant.[20] It is managed with the use of interproximal brushes penetrate 3 mm into the gingival sulcus, pocket. Evaluation of prosthetic component for plaque and calculus, stability of the implant abutment, peri implant tissue margin, implant body, and radiographs should be done after every 12–18 months in maintenance. oral lichen planus, parafunctional habits are some of the other clinical and conventional flap , flapless surgery, status of dentition, piezoelectric surgical technique and causes deleterious effects of smoking habit .

Bruxism

Glauer et al. evaluated 127 immediately loaded implants in 41 patients. Their results showed that implants failure is seen more in patients with bruxism than those placed in patients with no parafunction (41% vs. 12%). The higher failure rate among the bruxers is thanks to uncontrolled functional loading of the implant, which results in micro motions above the critical limit, leading to fibrous encapsulation of the implant instead of osseointegration. Early or immediate loading is not determine osseointegration if excessive micro motions occur at the bone implant interface during the healing phase leads to implant failure.[22]

The habit of cigarette smoking

Smoking also decreases calcium absorption. Smoking affects osseointegration process by lowering blood flow thanks to increased peripheral resistance and platelet aggregation. Smoking residues are carbon monoxide gas and cyanide, which delay wound healing capacity and alongside nicotine, inhibit cell proliferation rate. Tobacco directly inhibits osteoblast function. Strietzel et al. reported that smoking affects implant prognosis with/without augmentations. Studies show significant marginal bone absorption in smokers in comparison to non-smokers.[26] Loss of implant/graft material into the sinus The immediate implant insertion within 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 the maxillary sinus and mastication be managed surgically by different approaches, including intraoral, endoscopically, trans nasal route, and bone reconstruction of maxilla.[27,28]

Bisphosphonate related osteoradionecrosis

Bisphosphonates leads to active bone remodeling sites like jaws causing surgical trauma to the alveolar bone during implant surgery and further increases the postoperative accumulation of the drug to the implanted site. Bisphosphonates interfere with the bone formation and reduction and it reduce the peri implant bone resistance to oral flora, causing increased risk of peri implantitis.[29 31]

Injury to adjacent tooth

Improper placement of implant or an excessively large implant in which excess is space available can result in an injury to adjacent tooth, leading to non-vitality of the tooth. Dilacerated roots and excessive tilting in the mesiodistal direction corrupts the implant area and doesnt allow the perfect implant placement.[32] Alternatively, differences between the apical and crestal interdental spaces due to mesial or distal tipping of the roots are often orthodontically corrected.[33]

Peri implantitis

Peri implantitis may be a progressive inflammatory condition which affects the tissues surrounding an Osseo integrated implant, resulting in the loss of the supporting bone and implant failure. It is characterized by profuse bleeding, pus discharge, increased probing depth, implant mobility, and bone loss in radiograph. This inflammatory process is more severe, progresses faster and it goes down and affects alveolar bone too around the dental implant as compared to the inflammation around the adjacent natural tooth.[34] Peri implantitis can be caused by the most common pathogens like Cocci and nonmotile rods, sub gingival microflora leads to failure of dental implants. Soft laser irradiation is effective within the removal of the bacterial pathogens causing peri implantitis.[35] Systemic antibiotics for Gram negative anaerobes alters the microbial composition and clinically improves the condition over a 1 year period.[36] To reduce bacterial count the local delivery devices such as Actisite which has fibres containing polymeric tetracycline hydrochloric acid can be used,.[37]

Hyperglycaemia

The osseointegration of dental implants is reduced in patients with increased blood glucose level. Parathyroid hormone gets altered in hyperglycaemic patients which helps in regulating the metabolism of phosphorus and calcium and inhibits osteoblastic differentiation. It effects bone matrix and its components, growth, adherence and accumulation of extracellular matrix. Hyperglycaemia may reduce bone recovery by 40% following circular osteotomies. Treatment with insulin normalizes this recovery index, thus indicating that the bone healing deterioration is strongly associated with poor diabetic control. Due to microangiopathy arising as a complication of diabetes the implant Failures that occur during the 1st year of functional loading or in second phase of surgery . This may compromise the vascularization of the flap, causing infection of sentimental tissue, and delayed wound healing. [38,39]

Irradiated bone

Malignant tumors in the craniofacial region is generally treated with irradiation alone with surgical excision. Hyperbaric oxygen therapy in irradiated patients prior to implant therapy increases the success rate of implants.[40] Osteoporotic patients Osseointegration failure in osteoporotic patients is due to the decrease in bone mass and density.[41]. In patients taking long-term bisphosphonates implant placement surgery should do with caution. [43,44]

Corticosteroid therapy

Reduced bone density, fragile epithelium, and decreases immune response is most common in patients under systemic corticosteroid therapy which in turn results in reduced osseointegration of the dental implant. Adrenal gland suppression rates and any medical intervention should be observed with caution.[45]

Immune deficiency

Frequent infection and constant tissue repair is seen in immune compromised patient. According to recent studies, dental implant placement has been performed successfully in patients with stable immune status, HIV-positive cases with a enough number of CD4+ cells and using antiviral drugs. [46,47]

Bleeding disorders

Uncontrolled haemorrhage can be caused by platelet disorders, coagulant factors deficiency, and using anticoagulant drugs such as aspirin and warfarin.[48] It is due to platelet deficiency It is due to

platelet deficiency It is due to platelet deficiency $<50,000/\text{mm}^3$. [49] The most life-threatening adverse effect of dental implant placement in these patients is upper airway obstruction. [50]

Cardiovascular disorders

Cardiovascular diseases interfere with healing and osseointegration process, resulting in reduced fibroblast activity, impaired macrophage function, and decreased collagen synthesis. [51] These pathologies include hypertension, atherosclerosis, and congestive heart failure. Cardiovascular disease does not have a significant influence on the long-term success rate of dental implant treatment. [52]

Organ (heart/liver/renal) transplantation

Patients having transplanted organs undergo long-term immunosuppressant medications to prevent graft rejection. Cyclosporine A is usually given in combination with steroids (anti-inflammatory action). Cyclosporine may have a negative impact on mechanical retention and healing of bone around the dental implant. [53,54]

CONCLUSION

There is a need to increase the knowledge and awareness regarding the potential risk factors that could impact on implant failures to those who are practicing dental implantology. This can be achieved through continuous dental educational programs and workshops. Regular assessment of the theoretical and practical knowledge of implant dentistry is mandatory to improve their implant experience.

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