

Review on Dental implants Success and Failures

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Abstract:

Success and failure of dental implants are completely dependent on the osseointegration around a dental implant. This paper reviews the success and failure of dental implant and found that no single criteria can fulfil the success of dental implant. Fixity of the fixer in the bone that is lack of mobility of the fixer in the bone is the prime factor for osseointegration and resulting in success. Implant may fail due to hard tissue or soft tissue problem. Patients over 60, smoke, uncontrolled diabetes or head and neck radiation, or postmenopausal and on hormone replacement therapy are the risk factor for implant failure.

Introduction:

Dental implants are inert, alloplastic materials set up in the Jaw to replace the lost or missing teeth. This procedure replaces the need for dental bridges to replace the lost teeth which had to involve the sound teeth for replacement of the lost one. The most common type of dental implant is endosseous comprising a discrete, single implant unit (screw- or cylinder-shaped are the most typical forms) placed within a drilled space within dentoalveolar or basal bone. Commercially pure titanium or titanium alloy or the vitallium are the common constituents of dental implants. However, alternative materials include ceramics such as aluminium oxide and other alloys (gold and nickel-chromium-vanadium). Generally, endosseous implants have a coating which may comprise plasma-sprayed titanium or a layer of hydroxyapatite to enhance early osseointegration. Osseointegration is the basic principle of dental implants success. 'Osseointegration' was discovered by Branemark in 1969 when he observed that a piece of titanium embedded in rabbit bone became firmly anchored and difficult to remove.¹ Following one year of observation, no inflammation was detected in the peri-implant bone, meanwhile soft tissue had formed an attachment to the metal and bone to the titanium.² The Branemark system of dental implants was introduced in 1971.³ After endosseous implant fixtures are surgically inserted into bone, the process of osseointegration begins. Osseointegration is considered 'a direct, structural and functional connection between organised vital bone and the surface of a titanium implant, capable of bearing the functional load. This is possible as the titanium surface oxide layer (mainly titanium dioxide) is biocompatible, reactive and

spontaneously forms calcium-phosphateapatite.⁴ Furthermore, the titanium oxide surface of implants achieves a union with the superficial gingivae restricting the ingress of oral microorganisms. Consequently, the implant/soft tissue interface is similar to the union between tooth and gingivae.^{4,5,6}

Dental implants are predominantly placed in dental chamber and in outpatient department, commonly in general dental practice under local anaesthesia. Success rates are reported as being as high as 90-95%.^{7,8} This paper reviews endosseous dental implants and factors associated with success and failure.

Success and failure :

No single criteria can fulfill the success of dental implant. A variety of factors have been proposed for the successful osseointegration of dental implant have been proposed.⁹ Of these, a lack of mobility is of prime importance as 'loosening' is the most often cited reason for implant fixture removal.¹⁰ Adell reported the success of 895 implant fixtures over an observational period of 5-9 years after placement.⁷ Eighty-one percent of maxillary and 91% of mandibular implants remained stable. Despite high success rates, implant fixture failure may occur and is defined as 'the inadequacy of the host tissue to establish or maintain osseointegration'.⁸ One review suggested that 2% of implants failed to achieve osseointegration following placement.⁹ Using a meta-analysis, failure rate for Branemark dental implants was 7.7% (excluding bone grafts) over five years.¹¹ Interestingly, failure rates within edentulous patients were almost double those for partially dentate patients (7.6% versus 3.8%).¹¹ Peri-implantitis is an inflammation around a functioning osseointegrated implant, resulting in loss of supporting bone'.¹² Failing dental implants gives the Signs similar to that of tooth with periodontitis in both clinically and radiographically.¹³ This involves measuring clinical parameters including peri-implant loss of gingival attachment, bleeding on probing, plaque/gingivitis indices, suppuration and mobility. Other relevant assessments include a peri-implant radiographic

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examination and microbiological sampling. Periimplantitis has been reported in 5-8% of cases within selected implant systems.

Classification of failures :

Implant failures can be categorised as early or late. Early failures occur before osseointegration takes place but late failures occurs after prosthetic rehabilitation.⁹ Factors affecting early failure of dental implants may be broadly classified as: implant-, patient- and surgical technique/environment-related. Late failures may be subclassified into late-early or late-delayed depending on whether they occur during or after the first year of loading. Late-delayed failures are likely due to changes in loading conditions in relation to the quality/volume of bone and peri implantitis.

Implants failure can also be described as failing or failed. A failing implant demonstrates a progressive loss of supporting bone but is clinically immobile, whereas a failed implant is clinically mobile. When an implant has failed, removal is recommended while a failing implant may be salvaged if it is diagnosed early and treated appropriately.

Implant may fail due to hard tissue problem or soft tissue problem. An implant compromised by soft-tissue problems has a more favourable prognosis than one undergoing bone loss.¹⁴ Nevertheless, infection originating in the soft tissues may potentially progress deeper into the bone and undermine the osseointegration process.^{15,16} Some of the most frequent causes of soft tissue infection during the healing period involve residual suture material, poorly seated cover screws, protruding implants and trauma from inadequately relieved dentures or occlusal trauma from opposing teeth.¹⁷

Moreover patients who are over 60, smoke, had a history of diabetes or head and neck radiation, or has postmenopausal and on hormone replacement therapy experience significantly increased implant failure compared with healthy patients.¹⁸

Despite a variety of therapeutic options, infected implants are difficult to treat and usually require removal.¹⁹ Oral agents such as doxycycline, clindamycin, co-amoxiclav, penicillin V, amoxicillin and a combination of amoxicillin and metronidazole have been recommended.

Conclusion

Overall, dental implant failure is low and there are no absolute contraindications to implant placement. Conditions that were found to be correlated with an increased risk of failure should be considered during treatment planning and factored into the informed consent process

References :

1. Worthington P. Introduction: history of implants. In:forthington P, Lang BR, Rubenstein JE, editors. Osseointegration in dentistry: an overview. 2nd ed. Illinois: Quintessence; 2003. p. 2.
2. Branemark PI. Osseointegration and its experimental background. *J Prosthet Dent* 1983;50:399-410
3. Hobo S, Ichida E, Garcia LT. Osseointegration and occlusal rehabilitation. Tokyo: Quintessence; 1990. pp. 3-4
4. Hansson HA, Albrektsson T, Branemark PI. Structural aspects of the interface between tissue and titanium implants. *J Prosthet Dent* 1983;50:108-113.
5. Branemark PI, Adell R, Breine U, Hansson BO, Lindstrom J, Ohlsson A. Intraosseous anchorage of dental prostheses. I. Experimental studies. *Scand J Plast Reconstr Surg* 1969;3:81-100.
6. Albrektsson T, Branemark PI, Hansson HA, Lindstrom J. Osseointegrated titanium implants. Requirements for ensuring a long-lasting direct bone-to-implant anchorage in man. *Acta Orthop Scand* 1981;52:155-170.
7. Adell R, Lekholm U, Rockler B, Branemark PI. A 15-year study of osseointegrated implants in the treatment of the edentulous jaw. *Int J Oral Surg* 1981;10:387-416
8. Quirynen M, De Soete, van Steenberghe D. Infectious risk for oral implants: a review of the literature. *Clin Oral Implants Res* 2000;13:1-19
9. Albrektsson T, Zarb GA, Worthington P, Eriksson AR. The long-term efficacy of currently used dental implants: a review and proposed criteria of success. *Int J Oral Maxillofac Implants* 1986;1:11-25.
10. Linden R, Pihakari A, Pera la A, Ma kela A. The 2002 dental implant yearbook. The Finnish dental implant register. Helsinki: National Agency for Medicines; 2003.
11. Esposito M, Hirsch JM, Lekholm U, Thomsen P. Biological factors contributing to failures of osseointegrated implants (I). Success criteria and epidemiology. *Eur J Oral Sci* 1998; 106:527-551.
12. Mombelli A, Lang NP. The diagnosis and treatment of periimplantitis. *Periodontol* 2000 1998;17:63-76
13. Bragger U, Hugel-Pisoni C, Burgin WB, Buser D, Lang NP. Correlations between radiographic, clinical and mobility parameters after loading of oral implants with fixed partial dentures: a 2-year longitudinal study. *Clin Oral Implants Res* 1996;7:230-239.
14. Meffert RM. Maintenance and treatment of the failing and failing implant. *J Indiana Dent Assoc* 1994;73:22-24.
15. Tonetti MS, Schmid J. Pathogenesis of implant failures. *Periodontol* 200 94;4:127-138.
16. Kaiser AB. Antimicrobial prophylaxis in surgery. *N Engl J Med* 1986;315:1129- 1138.
17. Esposito M, Hirsch J, Lekholm U, Thomsen P. Differential diagnosis and treatment strategies for biologic complications and failing oral implants: a review of the literature. *Int J Oral Maxillofac Implants* 1999;14:473-490.
18. S.K. Chuang, L.J. Wei C.W. Douglass T.B. Dodson Risk Factors for Dental Implant Failure *J Dent Res* 81(8) 2002. 572-577
19. Esposito M, Hirsch JM, Lekholm U, Thomsen P. Biological factors contributing to failures of osseointegrated oral implants . Etiopathogenesis. *Eur J Oral Sci* 1998;106:721-764.