

DENTISTRY

SHORT REPORT

A review of the failed cases of dental implants at a university hospital in Karachi, Pakistan

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Abstract

The retrospective study was conducted to assess the dental implants that experienced failure. It was conducted at the dental clinic of the Aga Khan University Hospital, Karachi, and comprised record of dental implants from July 2010 to June 2015. Variables such as patient age, gender and systemic status, length and diameter of implants, bone grafting, type of definitive prosthesis (crown or bridge or overdenture), nature of retention (cement versus screw retained), loading strategy (immediate versus delayed loading), etc. were analysed. Of the 220 implants placed, 6(2.7%) failed to integrate (as revealed by torque test) at the beginning of prosthetic phase. Besides, 1(0.5%) implant failed after six months of function. The 7(3.2%) failed cases had common variables like deficient bone volume in maxilla (or placement of bone graft), non-submerged placement protocol, early loading with prosthesis and the presence of diabetes.

Keywords: Dental implants, Implant prosthetics, Osseointegration.

Introduction

In most cases of dental rehabilitation, management of missing teeth with the dental implants is considered as the gold standard.¹ Surgical success with implant means attainment of osseointegration, i.e. achieving a direct union of living bone with the titanium surface of the implant.² On the other hand, implant failure occurs when an implant fails to achieve its function. Usually, inability to attain osseointegration is considered as an implant failure. The best management of a failed implant is an early removal.³

Despite the predictability of the modern dental implants for rehabilitation, small but significant

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subsets of patients continue to experience implant failure. The identification of those high-risk patients is essential for treatment planning and avoiding complications. The ability to anticipate outcomes is an essential part of risk management in an implant practice.²

Implant loss is the most frequently assessed outcome within the implant dentistry field. Diabetes, periodontitis and smoking habits are the most frequently reported risk factors/ exposures associated with implant loss.³

The current study was planned to assess the implants that were initially placed at a teaching hospital but later experienced failure.

Methods and Results

This retrospective charts review was conducted at the dental clinic of the Aga Khan University Hospital (AKUH), Karachi, and comprised record of all the dental implants placed in the hospital from July 2010 to June 2015. The failed implants were identified from the patient records and verified with the radiographs. Variables such as patients' age, gender and systemic status (diabetes), length and diameter of implants, bone grafting, type of definitive prosthesis (crown or bridge or over denture), nature of retention (cement versus screw retained), loading strategy (immediate versus delayed loading) were explored. All the 220 implants were Zimmer tapered screw vent. These were placed in 83 subjects, including 45(54.2%) males and 38(45.8%) females. A total of 6(2.7%) implants in 5(6%) subjects failed to osseointegrate at the prosthetic phase. Besides, 1(0.45%) implant in 1(1.2%) subject failed after six months of loading. Overall there were 7(3.2%) failed implants in 6(7.2%) subjects (Table-1).

Of the failed cases, the risk factors were diabetes mellitus, smoking, age over 50 years and pre-existing periodontal disease in 5(71.4%) cases each, osteoporosis and para-functional habits in 2(28.6%) cases each, premature loading in 3(42.9%) cases while posterior maxilla sitewas

Table-1: Characteristics of the failed implant cases.

No	Age years	Sex	Site	Zimmer Implant Size (mm)	Loading	Bone Graft	Time period placement to failure (months)	Main reason of failure	Associated factors
1	23	Male	#21	4.7x11.5	Immediate Temporisation	Yes	3	Preexisting Bones loss	Bruxism
2	68	Female	#16	4.7x8	Non-submerged No immediate loading	No	7	Diabetes + Disassembly of cemented prosthesis	Age > 50 Female
3	52	Male	#17	4.7x11.5	Non-submerged No immediate loading	No	10	Diabetes	Age > 50 Bruxism
4	53	Male	#16	4.7x8	Non-submerged No immediate loading	No	11	Diabetic, Smoker, limited bone volume	Age > 50
5	53	Male	#26	4.7x8	Non-submerged No immediate loading	No	29	Diabetic, Smoker, limited bone volume	Age > 50
6	43	Male	#25	3.7x13	Submerged protocol	Yes	5	Poor bone quality	Smoking
7	79	Female	#26	3.7x13	Submerged protocol	No	3	Atrophic maxilla and diabetes	Age > 50 Female

Seven implants failed in six subjects.

Table-2: Summary data of risk factors associated with individual implant failure.

Associated factors n=7	Factor present n
Diabetes mellitus	55
Smoker	5
Age > 50 years	5
Pre-existing periodontal disease	5
Osteoporosis	2
Parafunctional habit	2
Premature loading	3
Posterior Maxilla Site	6

Individual implant was taken as the unit of analysis.

risk factor in 6(85.7%) cases (Table-2).

Conclusion

The overall five-year survival rate of implants reported in dental literature is 95-97%. The failure rate in the present study was 3.2% which is on a par with the data in the developed world. However, with increasing numbers of dental implants placed annually, even 3% failed implants may constitute a large number of cases.⁴ In our study, we found the following associated factors with failed cases: smoking, diabetes mellitus, premature loading, age more than 50 years, posterior maxilla, para-functional habits, and pre-existing periodontal disease.

Smoking contributed to failure of two of the implant cases. Both these patients were found to be chronic smokers. Clinical and scientific studies have stressed that smoking has a negative effect on the survival of implants.² It is an important risk factor for the formation of peri-implant mucositis. Kourtis et al. also found that the rate of implant failure was higher for smokers than non-

smokers. They speculated that the higher failure rate may have been owing to smokers' reduced healing capacity.⁵

Literature has shown that failure rates are much higher when the quality and quantity of bone are insufficient at the implant site. The posterior segments of both jaws exhibit a marked reduction in cortical bone and increased porosity of the trabecular bone. As a result, the implant success rates are higher for mandibular implants and failure rates are higher in the posterior maxillary region.² In our study, six of the failed cases were implants placed in posterior maxillary region while one was placed in anterior maxillary region.

Evidence indicates a bidirectional relationship between diabetes mellitus and periodontitis in which improving the overall status of the disease may improve the status of the other.⁶ As with periodontal therapy, it is believed that good control of diabetes, i.e. glycated haemoglobin (HbA1C) ≤ 7 , can contribute to successful implant therapy. Although studies have reported that several inflammatory cytokines are related to diabetes and periodontitis, there is a dearth of information on the inflammatory biomarkers related to implant failures among diabetic patients. Our study showed 3 of the failed implants belonging to patients having uncontrolled diabetes mellitus while 4 were non-diabetics.

In our study, one case was immediately loaded in anterior maxillary region, which probably led to failure of the integration of the implant. Balshand and Wolfinger immediately placed and loaded 130 Branemark implants in 10 patients.⁷ The transitional fixed implant supported prosthesis relied on 4 implants. By the end of the study, 32(80%) of the immediately loaded implants and 86(95.6%) of the submerged implants showed success.

They concluded that premature loading of dental implants can adversely affect the survival rate for osseointegration. A careful case selection, proper treatment plan, meticulous surgery and proper design of prosthesis are essential for optimal outcomes when this approach is adopted.

Titanium and its alloys have been widely used for dental prosthetic devices because of their superior mechanical properties and biocompatibility. However, the incidence of titanium hypersensitivity or allergy is still unknown and the discussion about its existence is ongoing. Unexplained implant failures have also forced dental clinicians to investigate the possibility of titanium hypersensitivity or allergy.⁸ Recently, titanium, which is used in orthopaedic devices and oral implants and is considered as an inert material, can induce toxicity or allergic type I or IV reactions. These reactions to titanium could be responsible for unexplained successive failure cases of dental implants in some patients (named cluster patients). This risk factor was not studied in our research and should be evaluated in further studies.

In our study, one patient had bruxism which led to implant failure in anterior maxillary region. The causal relationship between bruxism and dental implant failure is still a controversial topic. According to a meta-analysis by Zhou et al.,⁹ bruxism turned out to be a relative contraindication for implant placement. Their review suggested that the bruxism is a contributing factor of causing the occurrence of dental implant technical/biological complications and plays a significant role in dental implant failure. However, another meta-analysis by Chrcanovic¹⁰ stated that the actual effect of

bruxism on the osseointegration and survival of dental implants is still not well established.

We recommend that clinicians should warn smokers, diabetics, elderly patients, people with para-functional habits or pre-existing periodontal disease about the increased risk of dental implant failure. They should also take this into account during treatment planning and informed consent process.

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