

Biologic Complications and Failures of Dental Implants Revisited

Soolari A, DMD, MS^{1*} and Obiechina N²

¹Periodontics and Implant Dentistry Private Practice, Soolari Dentistry 11251 Lockwood Drive, USA

²Periodontics and Implant Dentistry Private Practice, ShadyGrove Smiles, USA

*Corresponding author:

Ahmad Soolari, DMD, MS,
Periodontics and Implant Dentistry Private Practice,
Soolari Dentistry 11251 Lockwood Drive,
Silver Spring, MD.20901 and Potomac Smiles,
USA, E-mail: asoolari@gmail.com

Received: 28 Nov 2022

Accepted: 04 Jan 2023

Published: 11 Jan 2023

J Short Name: AJSCCR

Copyright:

©2023 Soolari A, This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and build upon your work non-commercially.

Citation:

Soolari A. Biologic Complications and Failures of Dental Implants Revisited. *Ame J Surg Clin Case Rep.* 2023; 6(4): 1-4

Keywords:

Biologic complications of implants; Early implant failure; Late implant failure and Periimplantitis

1. Abstract

Dental implants like teeth are subject to complications which if not diagnosed early and treated correctly can cause implant failure. This article reviews biologic complications and how they can be prevented and treated to prevent dental implant failure.

2. Introduction

Dental Implants have been transformational to the field of dentistry affording patients with permanent, functional and esthetic replacements of missing teeth. Unfortunately, like teeth dental implants also are subject to complications such as periodontal disease and mechanical factors that can result in the implant becoming ailing or failing. A number of studies have looked at biologic causes of dental implant failures, and Esposito and colleagues concluded that cause of biologic failures of dental implants include: the medical status of the patient, smoking, bone graft instead of native bone in the site, irradiation therapy, parafunction, operator experience, extent of surgical trauma, bacterial contamination, lack of use of pre-operative antibiotics, premature loading, and inadequate number of implants supporting a prosthesis as well as implant surface characteristics and design [1].

3. Early and Late Dental Implant Failures

Biologic failures of dental implants can be divided into Early and Late failures. Early failures occur due to failure to establish intimate bone and implant contact. Factors that can cause Early implant failures include excessive surgical trauma, infection, impaired healing, and premature loading [1,3]. Late failures occur due to disruption of bond between the dental implant and surrounding bone after establishing osteointegration and it occurs during functional loading and can result from factors such mechanical overload of load bearing bone, and chronic infection such

as Periimplantitis.

Staedt and colleagues evaluated risk factors for Early and Late dental implant failures for 9080 implants over the course of 10 years and noted that the risk factors can be divided into iatrogenic, material associated and patient associated factors [2]. Side effects during surgery can include heat induced necrosis, poor implant stability and mal-positioned implants that affect dental implant failure [2]. Dental implants are also affected by local factors such as plaque accumulation, gingivitis, tight implant/tooth contact, bone quality and quantity, poor oral hygiene, periodontal disease, occlusal disharmony, and systemic factors such as xerostomia, and combination of diabetes and high blood pressure all of which can lead to dental implant failure [2].

Other local factors that can be able to impact failure have to do with presence of over-retained cement for cemented restoration. Cement around cemented restorations can promote accumulation of bacteria around the implant, causing loss of bone long term for dental implant restorations that are cemented. When cement is over-retained and if not removed it can even cause loss of the dental implant longterm [5].

4. Local and Systemic Factors Causing Biologic Failures of Dental Implants

Biologic failures of dental implant are not only divided as Early or Late failures, but also can be divided further into local and systemic factors.4 Early dental implant failures cause implants to fail prior to restoration with permanent prosthesis, late failures occur about 1-3 years after dental implant placement.4 Early failures prevent the body from accepting the dental implant and includes poor bone quality and quantity, systemic conditions such as uncontrolled diabetes, immunocompromise, medications such as corticosteroids, bisphosphonates, smoking, infection and surgical

trauma.⁴ Late failures from local factors occur due to excessive loading, peri-implantitis, retained subgingival cement, inadequate prosthetic restoration, and traumatic occlusion [4].

5. Treatment of Biologic Failures around Dental Implants

The most frequent local cause of Implant failure involves infection. Bacterial infection often results in implant failure. Although the primary cause of Peri-implant mucositis is bacteria, when it has progressed to Peri-implantitis, the cause of Peri-implantitis is multifactorial, and can include stress related factors such as mechanical overload which can lead to soft tissue manifestations such as fistulas and hyperplastic mucositis, and micromotion, as well as surgical trauma such as overheating and systemic factors related to the host [4].

The most important aspect of treating biologic complications that can lead to implant failure has to do with being able to identify the cause of the ailing or failing dental implant. Treatment of bacterial infection can be prevented by use of measures to result in reduction of bacteria such as anti-biotic prophylaxis, reduction in bacterial accumulation with adequate oral hygiene measures and disruption of plaque load with attendance of periodontal maintenance appointments [7]. Locally, ensuring that the dental implant is free of debris such as cement that can cause inflammation, bleeding, deepening of probing depth, and bone loss is essential to preventing infection and implant failure [8].

Figures 1-6 shows management of a patient with retained cement that caused Peri-implantitis. (Insert Figures 1-6) A 37-year old Asian male presented with chief complaint of severe pain and swelling in his gums around implant #31. Flap reflection revealed subgingival cement (Figure 1) which was removed and the site was grafted with demineralized freeze dried bone and a collagen membrane was used for guided tissue regeneration to regain bone around the implant (Figures 2-6).

Treatment of Periimplantitis depends on what stage that it is classified. The cause of the periimplantitis has to be identified. If it is caused by overload from prosthesis or occlusal overload the precipitating factor has to be identified and addressed prior to addressing the bone loss. If the factor causing harm to the implant is from occlusal overload, the restoration has to be removed and the bone loss addressed. If due to bruxism an occlusal guard would be needed and the bone loss in the area treated with guided regeneration surgery.

For Mild to Moderate peri-implantitis, non-surgical therapy involving local debridement, use of plastic curettes, detoxification of the implant, use of local delivery agents such as subgingival irrigation with Chlorohexidine or use of minocycline spheres (Arrestin) are usually recommended as well as use of Systemic antibiotics [9]. For advanced periimplantitis, where the decision is to save the implant, the use of bone graft and barrier membranes are recommended to help regain bone and improve stability of the

dental implant. Optimal surgical treatment of Periimplantitis has occurred if there is regeneration of the lost tissue around the dental implant [9]. In cases where the condition of the implant is not improved after surgery or when there is mobility, the implant should be removed and replaced.



Figure 1: Retained cement around dental implant

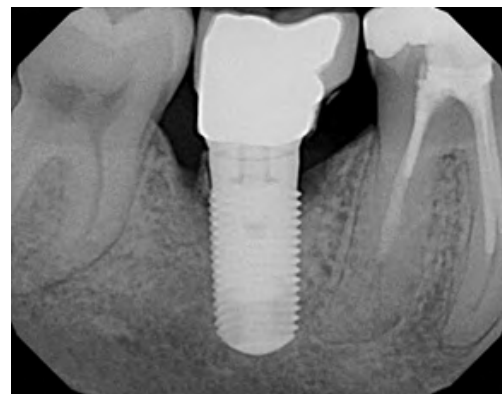


Figure 2: Xray of retained cement



Figure 3: Removal of all cement around the implant



Figure 4: Bone graft to address bone loss caused by cement retention



Figure 5: Membrane to augment site



Figure 6: Xray of implant following healing after surgery

6. Treatment of Iatrogenic Causes of Biologic Failures

Iatrogenic causes of Implant failures usually result from factors related to patient selection, choice of implants, surgical technique and precise prosthetic restoration [11]. With regard to patient selection, the goal is ensure that a thorough medical and dental history is obtained in order to be able to prevent placement of implants in patients where their medical history precludes it such as patients with uncontrolled diabetes, heavy smokers, patient on radiation therapy, patients on steroid therapy as well as patients with psychological disorders [11].

To prevent errors that are related to the choice of implants careful selection of implant type, and also size is indicated. For molar teeth, the goal is to choose implants that are wider in diameter, while for anterior teeth, the goal is to choose implants that are standard or narrow in diameter due to having a preponderance for thin facial plate in this area of the mouth. When narrow diameter implants are chosen for posterior implants that are subject to masticatory forces, there is a tendency for overloading of the implants and implant failures as a result so care must be taken to choose correct size implant for the location in the mouth.

To prevent operator errors such as inexperience and surgical errors, dentists starting implant therapy should routinely start with cases that are simple until they have gained experience, in addition strict adherence to surgical protocol such as use of aseptic technique, use of coolant to prevent overheating bone, recognizing and avoidance of vital anatomic structures as well as using of CT scans and surgical guides are vital to avoidance of surgical complications and angulation problems during dental implant placement.

Ensuring dental implant stability is also essential. Avoidance of loading implants immediately that are not stable (Torque <35Ncm, and ISQ<60) and use of a submerged conventional approach for those implants is essential to preventing implant failure. Avoidance of restorations that prematurely load submerged implant sites is also important to preventing failure of implants due to loading. To prevent premature loading of implant restorations ensuring that enough implants are present to support the prosthesis is important to preventing overloading the implants. Avoidance of off-axis forces by use of the correct occlusal scheme for the restoration type, as well as use of occlusal guards are all essential to preventing overloading of dental implants.

7. Conclusion

Biologic complications around dental implants are related to factors that can result in early or late implant failures, they are also classified as local or systemic complications that can result in dental implant failure. The ability to identify the cause of implant complication is essential to be able to correctly treat the cause of the ailing dental implant. One of the factors causing failure is Periimplantitis. When Periimplantitis has occurred the ability to accurately diagnose and treat its cause is essential to saving the dental implant. Preventing early implant failures is also very important, hence care has to be taken with patient selection, implant selection and ensuring adequate bone in implant site in addition to use of aseptic and atraumatic surgical technique. Avoidance of overload to implants is also essential to preventing late failures by choosing the correct prosthesis design, and use of occlusal guards for parafunction. When despite precautions, the implant has failed, its immediate removal and grafting of the site is essential to having adequate support for a future implant.

References

1. Esposito M, Hirsch JM, Lekholm U, Thompson P. Biologic factors contributing to failure in osteo-integrated Oral Implants II. Etiopathogenesis. *European Journal of Oral Sciences*. 1998; 106: 721-764.
2. Staedt H, Rossa M, Lehmann KM, Al-Narvas PW, Kämmerer PW, Heimes D. Potential risk factors for early and late dental implant failure: A retrospective clinical study of 9080 implants. *Int. Journal of Implant Dentistry*. 2020; 6: 81: 1-10.
3. Baroudi K, Nassan MZ. Factors associated with Early and Late failure of dental implants. *Journal of investigative and Clinical Dentistry*. 2012; 3: 258-261.
4. Kochar SP, Reche A, Paul P. The Etiology and management of Dental Implant failure: A review. *Cureus*. 14(10): E3045.
5. Jain JK, Sethuraman R, Chauhan S, Pigush J, Srivastava S, Patel R, et al. Retention failures of cements and screw retained fixed restoration on dental implants in partially edentulous arches: A systematic review with Meta-analysis. *Journal of Indian Prosthodontic Society*. 2018; 18: 201-211.

6. Dutta SR, Passi D, Singh P, Atri M, Mohan S, Sharma A. Risks and complications associated with Dental implant failure. *Critical Update. National Journal of Maxillofacial Surgery*. 2020; 11: 14-19.
7. Mohajerani H, Roozbayan R, Taherian S, Tabrisi R. The risk factors in Early Failure of Dental implants. A retrospective study. *J. Dent*. 2017; 18(4): 298-303.
8. Hughes K. Implant failures caused by Cement. Salvaging compromised cases and preventing complications. *Inside Dentistry*. 2013; 9(2).
9. Prathpachandran J, Suresh N. Management of Peri-implantitis. *Dental Research Journal*. 2012; 9(5): 516-521.
10. Levin L. Dealing with Dental Implant Failures. *Journal of Applied Oral Science*. 2008; 16(3): 171-175.
11. Mahale KM, Yeshwante BJ, Baig N, Darakh PG. Iatrogenic Complications of Implant Surgery. *J of Dental Implants*. 2013; 3: 157-159.