Review Article

Complications in Dental Implants

Rahul Patel*

***Corresponding Author: Rahul Patel BDS**, SJM Dental College and Hospital ChitraDurga, Karnataka.

MPH, University of Illinois Springfield.

Received Date: November 16, 2020

Publication Date: December 01, 2020

Abstract

The dental implant is considered the safest surgical treatment in the rehabilitation of both partially and completely edentulous patients. But like every other surgical procedure, complications also occur, leading to implant failure. One should have proper knowledge about these obstacles to avoid or resolve them. This article reviews various etiological factors, clinical features and methods of prevention of these complications.

Keywords: *Dental implant, Implant failures, Complications.*

Introduction

The twenty-first century has been considered a hallmark for advancement in the field of dentistry. The implant is an example of such progress. Implants are currently the most successful mode of treatment for tooth loss. In the beginning complications were common in implant patients but with the advancements in the field of implantology, complications are minimal these days and Implants have success rates of up to 95%. Loss of osseointegration is considered as the primary etiology responsible for implant failure.

Classification

1) Based on the complications associated with dental Implant **(**1**)**:
   a) Mechanical complications
   b) Technical complications
   c) Biological complications

2) Based on the phase of treatment:
   a) Surgical complications
   b) Prosthetic complications
   c) Delayed complications

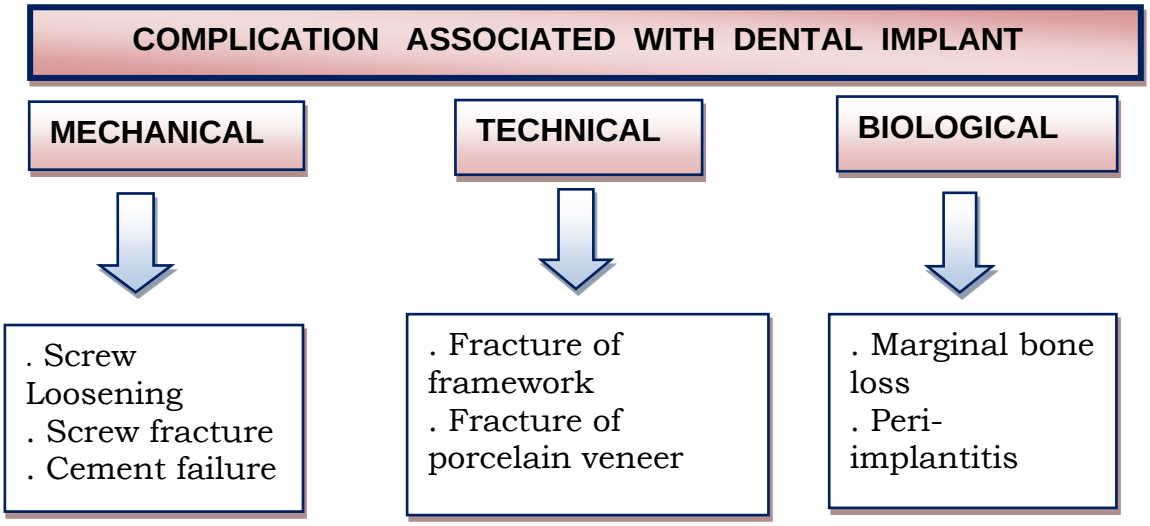

Figure 1: Complication Associated with dental implant

A. Mechanical Complications

1. Screw Loosening

Implant and abutment are complex assemble gathered together with the help of a screw. When the abutment is tightened over the implant, clamping forces are generated. These forces generate tension parallel to the implant long axis and are known as preload. During the function, this preload reduces leading to screw loosening.

Predisposing Factors and Causes

1. Screw settling
2. Biomechanical overloading
3. Cantilever prosthesis
4. Connecting Implant to natural teeth for fixed prosthesis
5. Prosthesis misfit
6. Inappropriate implant position
7. Inappropriate occlusal scheme
8.Variation in hex dimension
9.Improper screw design

Prevention

Screw retained prosthesis is indicated in full mouth rehabilitation cases and for provisional restoration, so to prevent screw loosening, various modifications have been introduced in screw:

For example

- A screw made up of gold can be tightened more effectively, than titanium **(**3**)**.
- Increasing screw diameter decreases the chances of screw loosening **(**4**).**

2. Screw Fracture

Predisposing Factors and Causes

1. Biomechanical overloading leads to compressive as well as tensile forces on the prosthesis that causes screw fracture.
2. Non-passive fitting of the prosthetic crown
3. Inadequate torquing forces
4. Structural inadequacy
5. Inadequate screw design
6. Inadequate treatment planning and design

Clinical Features (5**):**

1. Prosthesis Instability
2. Spontaneous bleeding
3. Difficulty in mastication, speech
4. Poor aesthetics

Mechanism

If screws retaining prosthesis, become loose

Granulation tissue accumulates

Fistulae formation

Plaque deposition

Screw fracture

Figure-2: Mechanism

One of the major drawbacks of a screw-retained prosthesis is screw loosening followed by screw fracture. However, chances of prosthesis failure are about 65% in screw-retained and 5% in cement-retained **(**6**)**.

Prevention

1. Adequate treatment planning
2. Good occlusal adjustment
3. Tightening of abutment with good torque (about 20 Ncm)
4. Periodic follow up

Management

1. Few **screw retrieval kits (**7**)** are available given by different companies such as Nobel Biocare, Neobiotech Screw Remover Kit, Salvin Implant Rescue Kit, etc to remove broken fragments of a screw.

2. Before using these kits **conservative approaches (**7**)** should be followed which includes the use of spoon excavator, round bur, ultrasonic scaler, explorer, a curved hemostat, etc by rotating these in a clockwise direction.

3. If the screw fragment does not loosen up, screw retrieval kits having **fork-shaped end** instruments can be used.
4. Using these retrieval instruments can affect the threads of the implant so with the help of retapping instruments these threads need to be retapped so that abutment can perfectly fit on the implant without any gap.
5. If no treatment is approachable then removal of Implant is indicated.

3. Cement Failure

Cement act as a foreign body in the mouth and is considered as a nidus for plaque and calculus. Cement shows both hard and soft tissue complications lead to inflammation which causes severe bone loss and even loss of implant fixture. And on soft tissue leading to Peri-implantitis. This is due to a biological difference in the attachment apparatus between natural teeth and Implant.

Prevention

1. The margin of the crown should be clinically visible or not more than 1.5mm subgingivally as depth over 2mm it is not possible to remove the cement.
2. Use of custom abutment rather than the stock abutment
3. Looking for excess cement on the radiograph
4. Periodically follow-up with close periodontal monitoring should be there.
5. Maintenance of oral hygiene
6. Use of resin-based cement

Management

1. Remove cement as soon as possible with the use of plastic scalers.
2. Decontaminate the implant surface and remove granulation tissue.

B. TECHNICAL COMPLICATIONS

1. Fracture of Framework

Predisposing Factors/ Causes

1. Biomechanical overloading
2. Metal fatigue
3. Parafunctional habits
4. Inadequate direction and magnitude of occlusal forces
5. Bone resorption around the implant

6. Defect in production or design of material
7. Inadequate Implant Length, location, or diameter can cause framework fracture.
8. Prosthesis misfit

Prevention

1. A framework should have dimensions of at least 4x6mm
2. Increase chances of fracture occur when mandible exceeds 20mm
3. The Prosthesis should be passive fit

Management

1. Cutting of the framework and then joining the sections by soldering or welding.
2. The fracture solder joint is reindexed intraorally and then soldered.
3. Framework fit is verified after soldering.

2. Fracture of Porcelain

Porcelain is a very brittle material. Metal-ceramic restorations are the most preferred material for restoration recommended in clinical dentistry. Over time, there is an increase in the aesthetic demands of the patients and this has dragged the focus of the clinicians on all-ceramic restorations. Zirconia restorations (Monolithic Zirconia in the posterior region) are promising and are even being used to fabricate Implant abutments for cement-retained restorations or direct veneering for a screw-retained prosthesis to avoid aesthetic complications.

Predisposing Factors/ Causes

1. Improper occlusal scheme
2. Inadequate occlusal adjustment
3. Inadequate vertical dimension

Prevention

1. Proper relief of high point in occlusion can prevent its fracture. The use of the dynamic method (T-Scan) **(**10**)** as an occlusion indicator is considered the best method for establishing ideal occlusion.
2. Use the adequate technique to record Vertical dimension followed by bite registration using polyvinylsiloxane materials.

Treatment

1. Two options included Repair or Replace.

2. Instead of Porcelain Zirconia, Aluminium based restorations can be used.

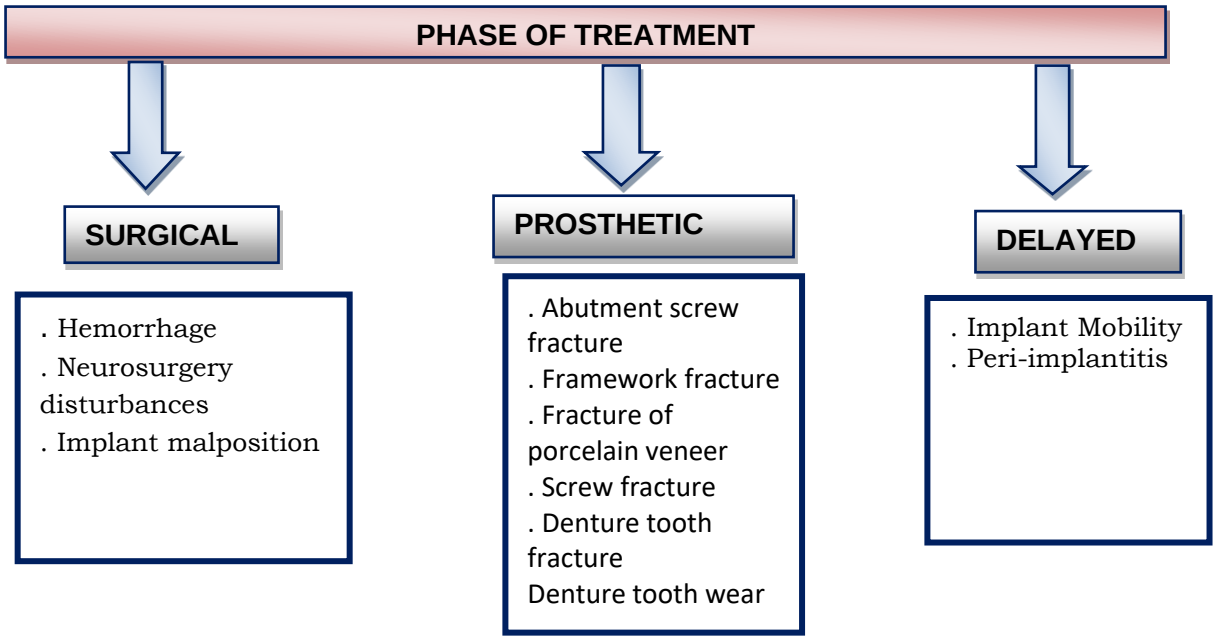

Figure 3: Phases of Treatment

C. SURGICAL COMPLICATIONS

These are defined as those problems or adverse outcomes that result from surgery including procedures used for implant placement, implant exposure, and augmentation procedures.

These includes

- Haemorrhage
- Neurosurgery disturbances
- Implant malposition

Examples

1. Nerve Injury
2. Bleeding
3. Cortical plate Perforation
4. Sinus perforation
5. Devitalisation of adjacent tooth
6. Wrong angulation
7. Improper implant location

8. Mandibular fracture
9. Ingestion/aspiration
10. Lack of primary stability

Prevention

1. Record proper history both medical and dental to avoid surgical complications.
2. Use of Panoramic radiograph to locate the Implant site.
3. The best method to evaluate bone length and bone width is CBCT.
4. Bone mapping is considered an advantageous technique to determine the accurate diameter of the implant.
5. Use of Surgical template or radiographic stent for proper Implant angulation. Both static CAD/CAM and dynamic navigation system **(**12**)** can be used. The navigation system uses a stereo vision computer triangulation setup for precise implant placement.
6. Do not apply pressure during drilling to prevent mandibular fracture.
7**.** Primary stability depends upon the bone density and surgical technique. D_2 bone is considered best for primary stability.
8. Immediate or delayed loading depends solely on clinicians, if primary stability is good one can go for immediate otherwise implant failure can occur.

D.DELAYED COMPLICATIONS

Peri-implantitis

It is an infectious condition of tissue surrounded by an Osseo integrated implant characterized by bleeding on probing, swelling around peri-implant tissue, pain, vertical bone loss, loss of attachment **(**13**)**. If left undiagnosed leads to implant mobility or failure.

Predisposing Factors

1. Patients with uncontrolled Diabetes Mellitus
2. Poor oral hygiene,
3. Habit of smoking,
4. The patient undergoing radiation therapy
5. Patients with a bone condition such as osteoporosis.

The bacterial regime found in peri-implantitis is similar to that found in the patient with chronic periodontitis that is mostly gram-negative bacteria (Porphyromonas gingivalis and Prevotella intermedia).

Radiographic evaluation: Most valuable in cases where the prosthesis is present and probing may be difficult.

Any standard IOPA or OPG can be used to evaluate.

1. Vertical bone loss
2. Saucer shaped bone defect or crater-like present at alveolar bone crest
3. Absolute indicator: Progressive bone loss

Prevention and Management of Peri-implantitis (14**)**

1. Oral hygiene instructions
2. Cessation of smoking
3. Assessment of the prosthesis, if required can be removed
4. Mechanical debridement, i.e. scaling and root planing,
5. For scaling plastic probes or gold instruments rather than metal to avoid the scarring and permanent damage of Implant.
6. Use of 0.2 % of chlorohexidine as a mouthwash,
7. Use of antiseptics, antibiotics systemic or local,
8. Regular follow up.

Conclusion

Complications in dental implants are common. Careful treatment planning, adequate knowledge of landmarks, and proper sterilization protocol with thorough information of oral implantology help to reduce these complications making implants long term success. It is imperative to have adequate knowledge about the prevention, diagnosis and management of all types of complications of dental implant procedures before practicing implants.

References

1. Henry PJ, Laney WR, Jemt T, Harris D, Krogh PH, Polizzi G, et al. “Osseointegrated implants for single-tooth replacement: A prospective 5-year multicenter study”. Int J Oral Maxillofac Implants 1996;11:450-5.
2. Seddigh, M.A. and Mostafavi, A.S., 2019. “Implant Abutment Screw Loosening: A Review of Effective Factors”. Journal of Clinical & Diagnostic Research, 13(8).
3. Andersson B, Per O¨ dman, Carlsson L, Branemark PI. “A new Branemark single tooth abutment: handling and early clinical experiences”. Int J Oral Maxillofac Implants.

1992;7:105–110.

4. Boggan RS, Strong JT, Misch CE, Bidey MN. “Influence of hex geometry and prosthetic table width on static and fatigue strength of dental implants”. J Prosthet Dent. 1999;82:436–440.
5. Goiato, M.C., Haddad, M.F., Gennari Filho, H., Villa, L.M.R., Dos Santos, D.M. and Pesqueira, A.A., 2014. “Dental implant fractures–aetiology, treatment and case report”. Journal of Clinical and Diagnostic Research: JCDR, 8(3), p.300.
6. “A Comparison Between Screw- and Cement-Retained Implant Prostheses”. A Literature Review by Rola Shadid Journal of Oral Implantology 2012.
7. Gooty, J.R., Palakuru, S.K., Guntakalla, V.R. and Nera, M., 2014. “Noninvasive method for retrieval of broken dental implant abutment screw”. Contemporary clinical dentistry, 5(2), p.264.
8. Steven Present, D.M.D., “Complications with excess cement & dental implants: Diagnosis, recommendations & treatment of 7 clinical cases”.
9. Pommer, B., Bucur, L., Zauza, K., Tepper, G., Hof, M. and Watzek, G., 2014. “Meta-analysis of oral implant fracture incidence and related determinants. Journal of Oral Implants, 2014”.
10. Babu, R.R. and Nayar, S.V., 2007. “Occlusion indicators: A review”. The Journal of Indian Prosthodontic Society, 7(4), p.170.
11. Misch, K. and Wang, H.L., 2008. “Implant surgery complications: etiology and treatment”. Implant dentistry, 17(2), pp.159-168.
12. Benjamin, A. and Phadnis, N., 2018. “Dynamic Implant Navigation Systems: A Review”. World Journal of Advanced Scientific Research, 1(2), pp.117-122.
13. Klinge B, Hultin M, Berglundh T. “Peri-implantitis”. Dent Clin North Am 2005;49:661-76, vii-viii.
14. Prathapachandran J, Suresh N. “Management of peri-implantitis”. Dent Res J (Isfahan) 2012;9:516-21.
15. Wu, Y., Wang, F., Fan, S. and Chow, J.K.F., 2019. “Robotics in dental implantology”. Oral and Maxillofacial Surgery Clinics, 31(3), pp.513-518.

Volume 1 Issue 4 December 2020