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Complications In Implant Dentistry. A Review

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Abstract: The possible occurrence of implant failure is a major concern for implantologists and knowledge in such unavoidable fact is clinically essential. Periimplantitis is an inflammatory response in which there is a loss of the bony support of the implant. Diagnosis is based on the clinical signs of infection such as hyperplastic soft tissues, suppuration, colourchanges of the marginal peri-implant tissues and gradual bone loss. Progressive marginal bone loss without marked mobility is referring to a failing implant. The purpose of this concise review was to discuss the implant complications and failure by highlighting the major etiologic factors as well as the management such failure.

Keywords: Implant failure, peri-implantitis, marginal bone loss, implant mobility

Introduction

Implantology is continually developing as new research results provide a better understanding of the biologic principles that direct the development of a dynamic interface between the living tissue and an artificial structure. However, in spite of high success rate, occurrence of implants failure has been reported.[1] Implant failure may be referred to as the status of the implant performance that when using some quantitative measurements, falls below an acceptable level. This definition encompasses clinical situations, ranging from all symptomatic mobile implants to implants show more than 0.2mm of peri-implant bone loss after the first year of loading [2] or bleeding depth exceeding 5mm of probing depth.[3] The distinction between failed implant and failing implant is clinically important. The lack of osseointegration is generally characterized by implant mobility and peri- fixtural radiolucency. In this situation, the implant is considered to be "failed".[4] On the other hand, the failure process might be slow and continuing.[5] Therefore, an implant characterized by progressive marginal bone loss without marked mobility is considered to be "failing".[4]

A. Complication associated with Systemic Disorders and Medications

The disease often leading to complications are:

i. *Myocardial infarction:* Alteration in blood and oxygen supply interferes with the process of osseointegration.

ii. *Cerebrovascular disease (stroke):* No direct role on failure of implants has beendocumented.[6]

iii. *Osteoporosis:* The impaired bone metabolism as it occurs in osteoporosis may affect osseointegration of implants.

iv. *Paget's disease:* Paget's disease has compromised bone density and may be contraindicatedfor dental implant surgery.

v. *Parkinson's disease:* Poor motor control, often a cause of improper oral hygienemaintenance.

vi. *Diabetes:* Studies of implants in the anterior mandible have shown 5-year survival rates of88 to 94% in subjects with type II diabetes.[6]

vii. *Smoking:* Smoking increases the rate of implant complications.
viii. *Immunodeficiency:* Long-term systemic steroids can induce osteoporosis, which should beconsidered in the risk–benefit assessment for implant therapy.
ix. *Cancer therapy – radiation:* When implants are placed following irradiation, the failure ratemay be higher.

B. Complication associated with Implant Planning

a. Lack of proper diagnosis, patient history especially of the systemic conditions is often responsible for the complications of implants.

• Using too few implants can lead to occlusal overload and ultimate failure of the prosthesis. Patient's motivation for cleanliness and implant maintenance also plays a vital role as poor oral hygiene can often result in peri-implantitis.

b. Proper implant planning of treatment is of outmost importance. Improper planning may result in Tooth or root proximity to a planned implant site can cause adjacent tooth devitalization.

• An adjacent tooth with an undiagnosed periapical lesion could lead to implant failure, when the infection spreads and reaches the implant surface.

• Implant fenestration or dehiscence may occur due to improper placement of implant.

• Another factor of prime importance concerns vital anatomic structures. Structures ofimportance to note before beginning treatment are the proximity of the inferior alveolar canal,mental foramen, sinus, nasal floor, and incisive canal. Anatomic variations can lead toperforations of the alveolar bone during treatment. This could lead to soft tissue and/or artery damage, with the ensuing complications.

C. Implant Fractures

a. Implant fracture is an infrequent and late biomechanical complication.
b. *Incidence:* 0.6% of all implant placements, with a lower incidence in edentulous jaws(0.2%) and more frequent occurrence in partially edentulous jaws (1.5%).[6]
c. Etiology:
i. Bone loss may be a factor that is associated with implant fracture.
ii. *Manufacturing defects:* Defects in the raw materials and in the manufacturing process arecertainly possible when implants are made.
iii. *Biomechanics:* Excessive occlusal load can lead to implant fracture. Typically, fracturedimplants are found in the molar areas where this force potential is quite high.
iv. Patient-related habits.

D. Peri-implantitis

a. Peri-implant mucositis is a term used to describe reversible inflammatory reactions in the mucosa adjacent to an implant. Peri-implantitis is defined as an inflammatory process that (i) affects the tissues around an osseointegrated implant in function and (ii) results in loss of supporting bone.
b. Diagnostic aspects:
i. Mobility
ii. Bleeding on probing
iii. Increased probing death and loss of attachment
iv. Pus formations.

E. Esthetic Complications due to Implant Malposition

a. Malposition of implant can lead to significant and permanent loss of hard and soft tissuesupport with extremely adverse esthetic outcomes.

b. Coronoapical malposition- A coronoapical malposition can cause two differentComplications

- Superficial implant placement—unesthetic display of metal
- Deep apical malposition of implant can cause recession of the facial mucosa, if the implantonly has a thin facial bone wall at implant placement.

c. Orofacial malposition- An orofacial malposition of an implant can also cause two different complications

- Palatal placement may result in tongue interference
- Facial placement may cause recession of the facial mucosa.

F. Implant Complications related to Immediate Implant Placement into Extraction Sites

Most common complications that occur with immediate implant placement after extraction ofthe natural tooth include:

- Poor implant positioning
- Membrane exposure during healing
- Inadequate bands of keratinized tissue after healing
- Gingival recession
- Implant failure
- Unacceptable esthetic outcomes.

G. Complications related to Immediately Loaded Dental Implants

Complications addressed in this chapter that are associated with the immediate implant loadingprotocol include:

- Failure of the implant to osseointegrate
- Surgical complications
- Esthetic complications
- Implant malposition
- Restorative complications
- Complications with guided surgery and prefabricated restorations.

H. Implant Failures

a. Criteria for implant success were defined by Albrektsson and Zarb[7] in 1986, followed andmodified later by Roos et al.[8] These criteria for success include:

- No mobility
- No radiographic evidence of peri-implant translucency
- ≤1 mm bone loss 1 year following implant loadingand ≤0.2 mm annually thereafter,
- Absence of pain and pathology around the implant,
- Functional survival for 5 years in 90% and 10 years in 85%, of cases respectively.

b. *Classification of implant failure:* There are two commonly used periods to assess an implant failure that relate to the time of occurrence:

- *Early failures*: Failures before osseointegration, primarily the result of surgical and/or postoperative complications.
- *Late failures*: Failures after the osseointegration period, usually arising during and after the restorative phase.

c. *Incidence:* Rosenberg and Torosian[9] reported an overall failure rate of 7.0% in a 7.5-year investigation that aimed to identify clinical and/or microbiological differences associated with failure in five different implant systems.

d. *Etiology and risk factors:* Implant failure can be caused by several factors, including:

- Infection

- Tissue trauma (e.g. overheating of bone, pressure necrosis)
- overload (e.g. transmucosal loading, occlusal trauma)
- Iatrogenic and improper angulations.

Management

A detailed knowledge of the complication is essential. This will enable its prompt management and thereby ensuring implant success. Management of the stated complication isas follows:

A. Systemic Disorder and Medication-related Complications

a. Proper case history and systemic evaluation
b. Stop the procedure, in case of complication, during surgery and seek medical help. It is wiseto have nitroglycerine, adrenaline and oxygen handy.
c. Proper postoperative antibiotic course
d. Regular recalls
e. Abstaining from habits – smoking.

B. Complication associated with Implant Planning

a. Proper diagnosis, evaluation of patient and treatment planning.
b. Necessary investigations should be thoroughly performed.
c. Patient instructions should be given prior to surgery.
d. Manufacturing instructions regarding implant placement should be followed.

C. Implant Fractures

Three management options have been described in the event of implant fracture.[10]

i. Complete removal of the fractured implant using explantation trephines.
ii. Removal of the coronal portion of the fractured implant with the purpose of placing a newprosthetic post.
iii. Removal of the coronal portion of the fractured implant, leaving the remaining apical part integrated in the bone.

D. Peri-implantitis

a. Cumulative interceptive supportive therapy (CIST):
Four-step procedure, along with antibiotics.
1. Mechanical debridement
2. Antiseptic treatment
3. Antibiotic treatment
4. Regenerative or resective therapy.
b. Removal of implant if mobile, entire length and circumference of implant involved.
c. Proper plaque control measures.

E. Improper Angulations

a. Correct any implant malposition at the time of implant placement
b. Removal of implant if necessary (if angulation is not possible to correct)
c. Proper oral hygiene
d. In case of recession or membrane exposure, adequate bands of keratinized tissue can be created by flap positioning or connective tissue grafting at the time of or after implant placement.

F. Implant Complications related to Immediate Implant Placement intoExtraction Sites

a. Correct any implant malposition at the time of implant placement
b. Removal of implant if necessary (if angulation is not possible to correct)
c. Proper oral hygiene
d. In case of recession or membrane exposure, adequate bands of keratinized tissue can becreated by flap positioning or connective tissue grafting at the time of or after implant placement.

G. Complications related to Immediately loaded Dental Implants

a. If immediately restored implants are found to be mobile within a short time after placement, it may be possible to save them by eliminating or minimizing forces on them.
b. Regular recall appointments.

H. Implant Failures

a. Diagnose and identify the failed implant.
b. Note the clinical signs: Mobility, edema, pain, pus, bleeding and radiographic signs ofperi-implant bone loss.
c. In any case of implant failure where mobility is apparent, the implant should be removedimmediately.
d. Replacement of failed implant.

Conclusion

The ultimate success of implants is not only based on diagnosis, evaluation, treatment planning but also on having a knowledge regarding the complications of implants and their fruitful management. In short it is always better to remember: 'Prevention is better than cure'and 'a stitch in time saves nine.'

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