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A REVIEW OF DIFFERENT CLASSIFICATION SYSTEMS ON IMPLANT FAILURES

Dental Science

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ABSTRACT

The success of any therapeutic treatment depends upon a variety of parameters including careful selection of suitable patients for each treatment, formation of a treatment plan and careful implementation of the treatment procedure. The selection of patient and treatment planning is the critical step in the prevention of iatrogenically induced damage during implant treatment. This review discusses the classification and different reasons of implant failure.

KEYWORDS

Classification, implants, failures.

INTRODUCTION

Dentistry has undergone many changes during the past quarter century; however, no changes have been more profound than those in the field of implant dentistry. Successful endosseous alloplastic implants can be found dating back to AD 600, but the surge in implants for tooth replacement did not flourish until the middle of 1900s. [1]

The osseointegrated implant systems that we typically see today were first presented in 1975 by Swedish surgeon Professor Per-Ingvar Branemark. Now that its scientific foundations have been laid, this branch of reconstructive dentistry has passed out of the phase of mere empiricism and sheer wishful thinking.

As a result, implant dentistry is now taken much more seriously than was the case, 10 or 20 years ago. As the patient's ability to benefit from implant therapy increases, the clinician is faced with increasingly complex options. Though the success rates reported with this form of therapy are relatively high, failures do occur. Hence, a thorough knowledge regarding the various aspects of failure is deemed necessary.[1]

CLASSIFICATION OF FAILURES

Various authors have classified implant failures depending on several criteria:

I. Rosenberg et al. in the year 1991 classified implant failures as[2]

1. Infectious failure

An implant was determined to have failed from infection if one or more of the following criteria were seen; clinical signs of infection with classic symptoms of inflammation, high plaque and gingival indices score, pocketing, bleeding, suppuration, attachment loss, radiographic peri-implant radiolucency and presence of granulomatous tissue upon removal.

2. Traumatic failure

Implant was suspected to fail from traumatic conditions if the following conditions existed; radiographic peri-implant radiolucency, mobility, lack of granulomatous tissue upon removal, lack of increased probing depths and low plaque and gingival indices.

II. Hobo et al. in the year 1996 listed out the various complications occurring in implants as follows[3]

Loss of bone anchorage 1.Mucoperiosteal perforation 2.Surgical trauma	Complications in Stage I surgery 1. Mental nerve damage 2. Penetration into a sinus, nasal cavity, or through inferior border of the mandible. 3. Excess countersink 4. Thread exposure 5. Eccentric drills, taps 6. Stripping of threads 7. Jaw fracture 8. Ecchymosis, more common in older patients. 9. Wound dehiscence 10. Facial abscess, submental space submandibular, Ludwig's angina 11. Suture abscess 12. Loose cover screw
Gingival problems 1.Proliferative gingivitis 2.Fistula formation	Complications in Stage II surgery 1. Poor selection of fixture height 2. Incorrect fixture placement more than 35^0 cannot be used prosthetically 3. Damaged hex nut on top of fixture. 4. Loose abutment 5. Fractured abutment screw 6. Early loading by prostheses 7. Poor air-flow pattern with "high-water" design 8. Aspiration of instruments 9. Thread exposure 10. Fixture fractures 11. Excess bone resorption 12. Plaque/calculus formation, periodontal problems 13. Poor selection of abutment height.
Mechanical complications 1.Fracture of prostheses, abutment screws, gold screws	Prosthetic complications 1. Insufficient space beneath the fully bone anchored prosthesis 2. Abutments penetrate through alveolar mucosa (unattached tissue). 3. Screw fractures: gold or abutment screws. 4. Acrylic or porcelain fracture 5. Posterior fixture failures in the maxilla

III. Esposito et al. in the 1998 have classified oral implant failures according to the osseointegration concept[4]

Biological

- Early or primary (before loading): failure to establish osseointegration.
- Late and secondary (after loading): failure to maintain the achieved osseointegration.

Mechanical

- Fracture of implants,
- Screws,
- Bridge frameworks,

- Coating etc.

Iatrogenic
- Nerve damages,
- Wrong alignment of implants, etc.
- Inadequate patient adaptation
- Phonetic
- Esthetic
- Psychological problems, etc.

IV. Truhlar in the year 1998 classified failures as[5]
Early failures
- That occurs within weeks to few months after placement
- Caused by factors that can interfere with normal healing processes or by an altered healing response.

Late failure
- Failure that arise from pathologic processes that involve a previously osseointegrated implant.

V. El Askary et al in the year 1999 have divided the failures into seven categories[6]

According to etiology
Failures because of host factors
- Medical status — Osteoporosis and other bone diseases; uncontrolled diabetes
- Habits — smoking, Para-functional habits
- Oral status — poor home care, juvenile, and rapidly progressive periodontitis, irradiation therapy

Restorative problems
- Excessive cantilever
- Pier abutments
- No passive fit
- Improper fit of the abutment
- Improper prosthetic design
- Improper occlusal scheme
- Bending movements
- Connecting implants to natural dentition
- Premature loading
- Excessive torqueing

Surgical placement
- Off axis placement (severe angulation)
- Lack of initial stabilization
- Impaired healing and infection because of improper flap design or others
- Overheating the bone and exerting too much pressure
- Minimal space between implants
- Placing the implant in immature bone grafted sites
- Placement the implant in an infected socket or a pathologic lesion
- Contamination of the implant body before insertion

Implant selection
- Improper implant type in improper bone type
- Length of the implant (too short. crown—implant ratio unfavorable)
- Diameter of the implant

According to origin of infection
- Peri-implantitis (infective process, bacterial origin)
- Retrograde peri-implantitis (traumatic occlusion origin, non-infective, forces off the long axis, premature, or excessive loading)

According to timing of failure
- Before stage II (after surgery)
- At stage II (With healing head and or abutment insertion)
- After restoration

According to condition of failure: (clinical and radiographic status)
- Ailing implants
- Failing implants
- Failed implants
- Surviving implants

According to responsible personnel
- Dentist (oral surgeon, prosthodontist, periodontist)
- Dental hygienist
- Laboratory technician
- Patient

According to failure mode
- Lack of osseointegration (usually mobility)
- Unacceptable esthetics
- Functional problems
- Psychological problems

According to supporting tissue type
- Soft tissue problems (lack of keratinized tissues, inflammation, etc.)
- Bone loss (Radiographic changes, etc.)
- Both soft tissue and bone loss

VI. Heydenrijik et al in the year 2002 classified implant failures referring to occurrence in time[7]
Early failures
Osseointegration has never been established, thus representing an interference with healing process. The authors suggest that early failures occur prior to prosthetic rehabilitation.

Surgical trauma Insufficient quality & quantity of bone Premature loading of the implant	Cause attributed to early failure

- Bacterial infection.

Late failures
Osseointegration not maintained implying processes involving loss of osseointegration.

Late failures, which occur following prosthetic rehabilitation, have been divided into:

Soon late failures
- Overloading in relation to poor bone quality and insufficient bone volume
- Implants failing during the first year of loading

Delayed late failures
- Progressive changes of the loading conditions in relation to bone quality and volume and peri implantitis
- Implants failing in subsequent years

VII. Nancy E. McDermott et al in the year 2003[8]
Inflammatory complications included the following conditions:
1. Implant mobility as evidenced by documentation in the chart
2. Pain, defined as the patient's complaint of pain at least 7 days after implant surgery requiring dispensation of additional pain medication or additional follow-up appointments
3. Infection, defined as the presence of purulent exudate, fistula (e), cellulitis, sinusitis, or written diagnosis of infection requiring antibiotic treatment or other therapeutic agent (i.e., chlorhexidine gluconate)
4. Peri-implantitis, defined as the radiographic evidence of progressive peri- implant bone loss or radiolucency associated with the implant
5. Impaired wound healing, as evidenced by soft tissue breakdown occurring 21 days or more after implant surgery, exposing bone, graft material, or the implant
6. Gingival recession requiring free gingival graft procedure

Inflammatory complications were further categorized as major or minor
1. A major complication was defined as a complication that occurred more than 2 times or resulted in implant failure.
2. A minor complication was defined as a complication occurring only 1 or 2 times and not associated with implant loss.

Prosthetic complications included:
1. Abutment fracture or loosening
2. Need for O-ring replacement less than 12 months after placement of the prosthesis.
3. Need for occlusal or prosthetic adjustment more than 2 weeks after definitive restoration

4. Need for recementation of loose fixed prosthesis within 2 weeks of delivery.

Operative complications included:

1. Inadvertent placement of an implant into the sinus or the submandibular space.
2. Parasthesia, defined as the patients subjective coin plaint numbness/tingling lasting at least 7 days after implant surgery.

SUMMARY & CONCLUSION

It is not how much success we obtain, but how best we tackle complex situations and failures that determine the skill of a clinician. No doubt, failures are stepping stones to success but not until their aetiologies are established and their occurrence is prevented. Early detection and treatment of early progressive bone loss around dental implants is the key to saving early failing implants. Hence, it is mandatory for every clinician to know, how and why the failures occur and how best we can prevent them in order to give the upcoming branch of dentistry a new horizon.[9] For the success in implant dentistry, one should ideally evaluate a long term primary outcome of an implant prosthetic complex as a whole.[10]

REFERENCES

1. Sheldon Winkler. Extraordinary implant failure- review. Journal of oral implantology. 2010;36
2. Rosenberg ES, Torosian JP, slots J. Microbial differences in two clinically distinct types of failures of osseointegrated implants. Clin Oral Imp Res 1991;2:135-144
3. Hobo S, Ichida E, Garcia LT. Osseointegration and occlusal rehabilitation. Quintessence Int. 1996:39-54
4. Esposito M, Hirsch JM, Lekholm U, Thomsen P. Biological factors contributing to failures of osseointegrated oral implants success criteria and epidemiology. Eur J Oral Sci 1998;106:527-551
5. Truhlar RS. Perimplantitis- causes and treatment. Oral Maxillofac Surg Clin North Am 1998;10:299-308
6. El Askary AS, Meffert Rm, Griffin T. Why do dental implants fail? (part I) Implant Dnt 1999;8:173-185
7. Heydenrijk K, Meijer HJ, Reijden Vander WA, raghoebar GM, Vissik A, Stegenga B. Microbiota around root form endosseous implants. A review of the literature. Int J Oral Maxillofac Implants 2002;17:829-839
8. Nancy E. Mcdermott, Sung-Kiang Chauang, Valerie V. Woo, Thomas B. Dodson. Complications of Dental Implants: Identification, Frequency and Associated Risk Factors, The international Journal of Oral and Maxillofacial Implants. 2003;18:39-44
9. Prashanti E, Suresh Sajjan, Jagan Mohan Reddy. Failures in implants. Indian J Dent Res 2011;22(3):446-453
10. Poonam M Singh, Arvind Shetty, Amit Bhirani, Ankita Deshmukh. Evidence Based Periodontology and Oral Implantology: A Review Update. J Res Adv Dent 2015;4:1:1-10.