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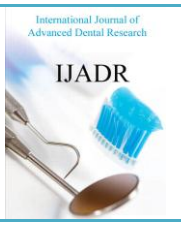

SUCCESS AND FAILURE OF DENTAL IMPLANTS

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ABSTRACT
Implant dentistry is currently being practiced in an atmosphere of enthusiasm and optimism, because our knowledge and ability to provide service to our patients has expanded so greatly in such a short period. Complications do arise in implant dentistry. These are more often due to aging, changing health conditions, long-term wear and tear, poor home care and inadequate professional maintenance. Success cannot be guaranteed, what one can guarantee is to care, to do ones best and to be there to help in the rare instance that something goes wrong, patient appreciate and benefit from straight talk. This review article presents a view of the complication that arise in the stages of diagnosis, patient selection, counseling, per-operative procedures, surgical procedures, post insertion and maintenance stages and their prevention and remedies.

INTRODUCTION

Dental Implant – "A substance that is placed into the jaws to support a crown, or fixed or removable denture". *Ailing Implant* – "An implant that may demonstrate bone loss with deeper clinical probing depths, but appears to be stable when evaluated at 3-4 months interval. A lamina dura may be present at the borders of osseous defect, possibly indicating a static of chronicity". *Failing Implant* – "An implant that may demonstrate bone loss, increasing clinical probing depth, bleeding on probing and suppuration. This bone loss may be progressive". *Failed Implant* – An implant that demonstrates clinical mobility, a peri-implant radiolucency and a dull sound when percussed. *Early failures* – Occurs weeks to few months after placement, caused by factors that can interfere with normal healing process or an altered host response. *Late failures* – Arise from pathological processes that involve a previously osseointegrated implant. *Peri-implantitis* – An inflammatory process that affects the tissue around an osseointegrated implant in function and results in loss of supporting bone.

Peri-implant mucositis – A term used to describe reversible inflammatory reactions in the mucosa adjacent to an implant [1,2].

LITERATURE REVIEW: Egyptian time – used to implant extracted teeth of poor /slaves who would sell it off. When human teeth not available they started using animal teeth e.g. goats, dogs and monkeys. Sea shells were also used. 1886 – Bugnot attempted to use tooth buds and transplantation of teeth was tried. 1940 – Farmaggini developed screw type of implants. 1952 – Dr. Branemark, orthopaedic surgeon, Sweden found that Titanium implant can be used for bone anchorage (he was doing research of microcirculation in box repair mechanism in rabbits) [3]. 1952 – Osseointegration introduced by Branemark. 1962 – Cr-Co implant, failed. 1967 – Hodosch used acrylic resin in tooth form. 1966 – Linkow introduced blade form implants (Cr-Co-Vanadium). Charles weiss – Fibro-osseous integration. He claimed that fibrous tissue will act as periodontal ligament. 1980 – Dr. J.P. Branemark

brought his research to America. American technology quickly adapted these principles.

Criterias for success of a dental implant; by Alberktsson:
Immobile, Per-implant radiolucency, Vertical bone loss <0.2mm, first year.

Absence of pain, infections, neuropathies, paresthesia, or violation of mandibular canal, Success rate of 85% - at end of 5 yrs, 80% - at end of 10 yrs[4].

Other Criterias by Misch: Longevity & Pain [5]

Unlike the tooth the implant is never temperature sensitive, hence early warning signs and symptoms are absent. Percussion with forces of 500gm is clinically used to evaluate tooth/implant pain/discomfort. Presence of pain requires removal of implant pain from rigid implant is early problem, where pain from mobile implant can occur early /late in treatment. Tenderness to percussion usually implies healing proximal to nerve /bone stress beyond physiologic limits. If implant tenderness immediately post-surgery occurs in proximity of inferior alveolar canal – implant unthreaded for few mm and re-evaluated after 3/more wks for symptoms. If tenderness is after stage-I healing and not due to surgical encroachment on an anatomic landmark, stress may be the causative element.

Rigid Fixations: It means absence of observed clinical mobility. A normal tooth moves 56 to 73 μm. The healthy implant moves <75 μm that means it has '0' clinical mobility. Lack of mobility does not always indicate direct bone-implant interface. It means at least a portion of an implant is in direct contact with the bone, although percentage of bone contact cannot be predicted. Mobile implant indicates presence of connective tissue between implant and bone. Mobility may be due to trauma/ bone loss.

Technique: To assess mobility is almost same to natural teeth. Two rigid instruments apply labio-lingual force of approximately 500gm. This can be graded as;
0 – Absence
1 – Detectable horizontal movement
2 – Visible mobility up to 0.5mm horizontally
3 – Severe horizontal movement >0.5mm
4 – Visible moderate to severe horizontal and any visible vertical movement.

Tooth with mobility of 0.5mm, which was due to occlusal trauma may revert back to normal rigid fixation by removing the cause, but this rarely occurs in implants. An implant with >0.5 mm mobility should be removed.

Periotest: Periotest (Siemens Corporation) is a computer mechanical device developed by Schulte that measures the dampening effect of objects. It develops a force of 12 to 18 gm/n. The soft surface or mobile object will give higher recordings that a hard or rigid object. Recordings range from 8 to +50 numbers. Teeth with absence of mobility –8 to +9. The bone density around the implant may be correlated with these numbers.

Percussion: It is neither an indication of clinical health nor of rigid fixation. Therefore the ranging sound that occurs on percussion will be same for both 2 mm of bone and 16mmof bone-implant interface. It can be used to diagnose pain, tenderness with an implant, but it is misleading if used to determine the status of rigid fixation.

Bone Loss: Crestal bone loss in initial therapy is an indicator of the need for initial preventive therapy. Whenever possible implant should be placed at above the level of bone crest to avoid an increase in sulcus depth subsequent to abutment placement.

Initial bone loss – is due to occlusal traumatic stress, parafunction.

Secondary bone loss – due to bacteria and increased stress.
In threaded implant – the distance between each thread (thread pitch) is usually 0.6mm and can be used as radiographic marker.

In general if bone loss is more than the one-half of implant height is said to be failure regardless of original amount of implant-bone contact.

Radiographic Evaluation: One of the easiest clinical tools to assess the implant crestal bone loss. It only illustrates mesial and distal crestal levels clearly however, early bone loss is more on facial aspects. Parallel IOPA is very difficult to take with implant therefore apex of implant will be apical to tooth and muscle attachment. Bitewing and periapical radiograph without apex are best to assess the crestal bone loss. Both the region the thread area must be very clear, if these borders are fuzzy then radiograph is not said to be diagnostic for crestal bone loss assessment. Peri-implant radiolucency-indication of failure may be due to bacteria infection, non-rigid fixation, local bone healing disorders, dehiscence, contamination of drill, overheating of bone.

Classification of Complications:
Swedish team (Branemark et al)
I. Loss of bone anchorage
Mucoperiosteal perforation
Surgical trauma
II. Gingival problems
Proliferative gingivitis.
Fistula formation
III. Mechanical complications
Fixture fractures

Fracture of prostheses, gold screws, abutment screws [6].

UCLA team (Beumer. Moy)

1. Complications in stage I surgery

Mental nerve damage
Penetration into a sinus, nasal cavity or through inferior border of the mandible.
Excess counter sink
Thread exposure
Eccentric drills, taps
Stripping of threads
Jaw fracture
Ecchymosis, more common in older patients
Wound dehiscence
Facial space abscess, submental, submandibular abscess, Ludwig's angina
Suture abscess
Loss cover screw.

2. Complication in Stage II surgery

Poor selection of fixture height
Incorrect fixture placement, more than 35^0 cannot be used prosthtically
Damaged hex nut on top of fixture
Loss abutment
Fracture abutment screw
Early loading by prostheses
Poor air-flow pattern with "high water" design
Aspiration of instruments
Thread exposure
Fixture fractures
Excess bone resorption
Plaque / calculus formation
Periodontal problems
Poor selection of abutment height

3. Prosthetic complications:

Insufficient space beneath the fully bone anchored prosthesis
Abutments penetrate through alveolar mucosa (unattached tissue)
Screw fractures: gold or abutment screws
Acrylic or porcelain fracture
Posterior fixture failures in the maxilla

Prosthodontic considerations:

Forces on Implants: Vertical forces are tolerated better compared to lateral bending forces.

Tripod Effect: Greater the tripod → increase resistance to bending
Large tripod contacts easily achieved in edentulous implant supported prosthesis.

Geometric load factors: Fewer than 3 implants, Implant connected to teeth
Implants in a line, Cantilever extensions, Occlusal plane beyond implant support. These factors will lead to failure.

Crown Implant Ratio:
Larger – better tolerated in full arch restoration
Smaller – better tolerated in partially edentulous conditions

Occlusal design: Narrow occlusal table, Centric contacts over implants, Lingualised occlusion

Strategic Extractions: Periodontaly compromised abutments should be extracted.

Single implant restorations: Problems include loose screws, Fracture of screws, Loss of osseo-integration, Fracture of implants.

Soft Tissue Complications: Exposure of cover screws because of Open wound, Residual suture material, poorly adjusted denture so a Sore spot.

Mechanical complications and management:

i) **Fixture fracture**: Remaining portion should be surgically removed with trephine bur. Fractured portion is duplicated. UCLA abutment is fitted to master cast. This abutment is then screwed into fixture and prosthesis is connected.

ii) **Abutment Screw Fracture**: If screw fractures at the level of neck or head of fixture. Cut a groove in abutment screw fragment and use smallest drill to rotate abutment screw. If it cannot be removed then splitting the fragment will damage fixture threads.

iii) **Prosthesis Fracture**: Fully bone anchored prosthesis can fracture at cantilever section, if appropriate waxing were not followed. Framework fracture is not a major complication when fixtures are in good condition.

iv) **Malpositioned Fixtures:** Angulated abutments can be used. In fully implant supported prosthesis the mesostructural bar is used. Mesostructural bar may fracture because of long span, insufficient implant support, and occlusal trauma.

Treatment: If screw retained (fixed detachable) then remove, take index, and repair. If cemented coping bar fractures; use intra-oral Ti-welding.

I – Vertical height of bone is 2mm apical to an imaginary line connecting CEJ. Here smile line framed by lip will be agreeable to the patient.
II – The vertical height of bone is 4mm apical to CEJ. Finished prosthesis will show slight cervical burning at the margins.
III – The vertical height of bone is 6mm apical to CEJ. Finished crown will be longer, it is only acceptable for low lip line patient [6].

CONCLUSION: The success or failure of an implant is as difficult to describe as the success criteria required for a tooth. The range from health to disease is similar in both conditions. The primary criteria for assessing implant quality are pain and mobility. The presence of either factor greatly compromises the implant, and removal is usually indicated."Prevention is better than cure" the successful management of implant dentistry depends on the

meticulous diagnostic, treatment planning and surgical skills of the operator.

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