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Anoverview On Complications Of Implant Therapy

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ABSTRACT

The successful use of osseointegrated dental implants has revolutionised dentistry and greatly enhanced dentists' capacity to give patients with tooth replacement choices. Implant-related problems and failures do occur in some situations, despite the implant's long-term predictability and success.Some complications are relatively minor and easy to manage, but others are more significant and challenging to resolve. The most serious complications can result in failure of prostheses, loss of implants, and severe loss of supporting bone.

Key words: complications in implant therapy, implant failure, implant success

I. Introduction

Implant survival is defined as animplant that remains in place at the time of evaluation, regardless of any untoward signs, symptoms, or history of problems. Sleepers are the implants that are present but not connected to any restoration and not providing support or function. Implant success is defined by the presence of the implant and the criteria evaluating its condition and function at the time of examination. Albrektsson and colleagues[1]defined success as an implant with no pain, no mobility, no radiolucent peri implant areas, and not more than 0.2 mm of bone loss annually after the first year of loading.RoosJansaker and associates[2] defined a successful implant as one that loses not more than 1 mm of bone during the first year of function.

II. Prevalence of Implant Complications

According to a systematic review done by Pjetursson et al[3] (5 year cumulative complication rate) stated Fracture of Prosthesis– 13.2%, Peri-Implantitis & Peri-Implant Mucositis – 8.6%, Loss of the screw access restoration – 8.2%, Abutment screw loosening – 5.8%, Abutment screw fracture – 1.5%,Fracture of Implants – 0.4% at 5 years and 1.8% at 10 years. Goodacre et al[4] reported that edentulous patients having overdentures seemed to indicate a significantly higher percentage (33%) of complications followed by resin veneer fractures with FPDs (22%), overdentures needing to be relined (19%), and overdenture clip or attachment fracture (16%).A retrospective evaluation of 4937 implants by Eckert and colleagues[5] found that implant fractures occurred more frequently in partially edentulous restorations (1.5%) than in restorations of completely edentulous arches (0.2%), and all observed implant fractures occurred with 3.75-mm diameter threaded implants.A critical review of the literature by Esposito et al[6]included 73 publications reporting early and late failures of Brånemark implants; biologically related implant failures were relatively low at 7.7%. The study

concluded that incidence of implant failure was three times higher for the edentulous maxilla than for the edentulous mandible, whereas failure rates for the partially edentulous maxilla were similar to those for the partially edentulous mandible.

III. Surgical complications

Haemorrhageand hematoma:

An vascular trauma causes severe bleeding and the creation of huge hematomas in the mouth's floor. Petechiae (2 mm in diameter), Purpura (2 to 10 mm), and Ecchymosis (>10 mm) are three forms of hemorrhagic patches that can develop as a result of injury.Ecchymosis is a side effect of an intermental surgery. Hematomas can arise when there is a submucosal or subdermal bleeding into the connective tissues and soft tissue gaps. Airway control (of major importance) and surgical intervention to identify and halt the bleeding are among the emergency treatments.Clinicians must be aware of this danger and ready to intervene immediately if it arises. Although bleeding is considered a minor concern at the time of surgery, it can become a major complication in the hours and days after surgery.[7]

Neurosensory disturbances

Caused by drilling or implant compression of the nerve.Hypoesthesia or hyperesthesia. Most common with “Lateral nerve repositioning”. It is associated with 100% neurosensory dysfunction and 50 % remains permanent

SeddonsClassification:Neuropraxia, Axonotmesis and Neurotmesis

Neuropraxia

Nerve retraction or a little damage. There was no damage to the nerve trunk or axonal degeneration. Pressure from the retractor, hydraulic pressure, postoperative bleeding, traumatic soft tissue reflection, canal space invasion during surgery, and anesthetic needle are some of the causes.[8]

Axonotmesis

Nerve injury with axon loss but no damage to the overall structure. Stretch nerve injury from reflection, implant drill to top of canal, implant violating canal, and anesthetic needle penetration of the nerve trunk are all possible causes.

Neurotmesis

The nerve trunk is completely severed. When total anesthesia is present or hyperesthesia lasts more than 3 months, neurotmesis is suspected. Neurotmesis can also be detected by a 200 percent increase in sensibility to acute stimuli three months following the injury. Fortunately, most nerve injuries are not of this nature, and most patients can expect to recover in 3-4 months.[9]

Management

When a post-operative radiograph reveals that an implant has somewhat violated the canal space, the implant should be unthreaded and Decadron 4mg/ml injected into the osteotomy. After a 2-minute pause, a shorter implant should be placed in the location. In addition, for 3-5 days, a corticosteroid (Decadron) is administered orally. The recommended dosage is 8-12mg in the morning on the first day, 4-6mg on the second day, and 2-3mg on the third day.[10]

Implantmalpositioning

Poor treatment plan, poor communication between surgeon and restorative dentist, and lack of surgical skill are all common causes of implant malpositioning. Parameters that are ideal: 2-3mm apical to gingival edge apicocoronally. Mesiodistal implants are 1.5-2mm apart from the native tooth and 2-3mm away from another implant. Placed buccolingually, with at least 2mm of bone circumferentially surrounding the implant.Malpositioning causes nerve and vascular injury, as well as paresthesia, anesthesia, and hypoesthesia. Follow accurate diagnosis, radiographic imaging (CT, or cone beam CT imaging), careful surgical exposure, and construct a zone of safety away from the nerve to promote better placement and avoid problems.

IV. Biologic complications

Inflammation and proliferation:

The clinical appearance is comparable to that of gingival and other periodontal tissues because peri-implant soft tissue inflammation is similar to that of gingival and other periodontal tissues. There is erythema, oedema, and swelling around the teeth. The reaction of peri-implant soft tissues to bacterial buildup can be severe and uncommon at times, resulting in spectacular inflammatory growth.The bacterial pathogens attack the precipitating local component, causing mucosal hypertrophy or proliferation, as well as the formation of an abscess. The lesion can be efficiently resolved by correcting the causative circumstances. A fistula is another type of lesion caused by a loose abutment connection, and it can be promptly resolved by treating the causative reason.

Dehiscence and recession

Improper implant placement puts peri-implant tissues at risk of recession, which is a typical occurrence. In the case of anterior aesthetic areas, recession is an issue. The soft tissues around the implant are completely reliant on the surrounding bone for stability. Soft tissue thickness and height around implants are usually less than 3-4mm, and bone loss around implants frequently causes recession.

Periimplantitis and bone loss

Periimplantitis is defined as an inflammatory process which affects the tissues around an osseointegrated implant in function, resulting in the loss of the supporting bone.

Classification

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Froum and Rosen PS (2012)[11]

EARLY: PD ≥ 4mm (Bleeding and/or suppuration on probing); Bone loss <25% of implant length

MODERATE: PD ≥ 6mm (Bleeding and/or suppuration on probing); Bone loss 25% to 50% of implant length

ADVANCED: PD ≥ 8mm (Bleeding and/or suppuration on probing); Bone loss >50% of implant length

Etiology of periimplantitis

Bacterial infection, biomechanical overload, and systemic sickness are all examples of systemic disease. Factors of society functional routines, Due to a lack of host bone, the implant surface is exposed at the moment of insertion. Traumatic surgical procedures, a lack of primary stability, and premature loading during the healing period are all examples of iatrogenic causes.[12]

Clinical features

Bleeding, suppuration, increased probing depth ,calculus build up, swelling, color changes, mobility and radiographical bone loss are some of the clinical features that are observed.

Diagnosis

Peri-implant probing, Peri-implant probing depth (3-4mm normal), Bleeding after gentle probing, exudation and suppuration, mobility: late (insensitive), pain, Peri-implant sulcular fluid analysis, Peri-implant radiography, standardised IOPA radiographs or OPG, vertical bone loss, Saucer shaped defect, and progressive bone loss are all indicators.

CUMULATIVE INTERSEPTIVE AND SUPPORTIVE THERAPY (CIST) PROTOCOL by Lang et al in 2000

Lang et al suggested a novel, systematic stepwise approach for the prevention and treatment of peri-implant diseases referred to as the cumulative interceptive supportive therapy (CIST) protocol.[13]

This system is based on periodic monitoring with implementation of treatment as thresholds for a particular condition are met.

There are 4 protocols-A B C D

Protocol A is used to manage inflammation in peri-implant mucositis, which is defined as implants with a slight (+) increase in pocket depth, marginal erythema, plaque, and possibly calculus. The therapy end aim is for inflammation to be resolved with careful mechanical debridement twice daily, 0.12 percent chlorhexidine swabbing, and a review of home care and motivation.

Protocol B is used to treat conditions that have similar mucositis symptoms but have larger pocket depths but no loss of supporting bone. Protocol A therapies should be combined with locally given antibiotic-minocycline microspheres and doxycycline gel at infected implant sites.

Management of early peri-implantitis,

Protocol C is employed when there is evidence of osseo-integrated bone loss of less than 2mm and pocket depths greater than 5mm. Systemic antibiotic medication (metronidazole 250mg t.i.d. for 7 days or amoxicillin 500mg t.i.d. for 10 days) should be added to the modalities for protocols A and B.

In cases of frank peri-implantitis with probing depths >5mm,+ bop, plaque/calculus, and peri-implant bone loss of >2mm, **Protocol D** is used. Periodontal surgery is required for chemical cleaning, osseous excision, and/or guided bone regeneration in this technique.
GBR will attempt to salvage the implant through bone regeneration techniques with the use of resorbable or non resorbable semipermeable membranes and a bone replacement graft.

Later, it was modified and called AKUT-concept where no therapy was indicated for patients having probing depth of less than 3mm with no plaque or bleeding present.

Decision tree for management of periimplantitis

Peri-implantitis is commonly related with the characteristic trough type deformity. Implant removal should be considered if bone support is severely diminished and extends into the apical part of the implant. There is no reliable strategy for treating peri-implantitis, according to nine systematic reviews.A clinical study of 170 consecutively treated implants with peri-implantitis using a regenerative protocol reported more than 98% success rate.

RetrogradePeriimplantitis
It is defined as clinically symptomatic peri-apical lesion that develops within the first few months after implant insertion while the coronal portion of the implant sustains a normal bone to implant interface.[14]

Radiographic Classification of RPI

Class I Mild lesion – radiographic bone loss that extends to < 25% of the implant length from the implant apex.

Class II Moderate lesion – radiographic bone loss between 25 and 50 % of the implant length as measured from the implant apex.

Class III Advanced lesion – radiographic bone loss extending to > 50 % of the implant length from the implant apex.

Etiology of Retrograde Periimplantitis

Contamination of the implant surface The presence of nearby endodontic lesions, residual root particles or foreign materials, and residual bacteria in the implant location Retrograde Peri-implantitis is caused by a violation of the minimal spacing between neighbouring teeth, surgical drilling beyond the length of the implant, fenestration of the vestibular bone, and the development of osteomyelitis.

Treatment:

Treatment for retrograde peri-implantitis includes:Implant extraction, Peri-apical surgery, Debridement, Regenerative, Local decontamination (antimicrobials/lasers)andAntibiotics

D. Implant loss or failure

Implant loss or failure is usually measured in terms of when the implant was placed or restored. [15] Inability to accomplish osseointegration, inadequate integration, infection, and reduced wound healing are all possible causes of implant loss or failure.

V. Prosthetic or mechanical complications

Screw Loosening and Fracture

In screw-retained FPDs, this is a common occurrence. At the initial annual check-up, screw loosening happens in 6 percent to 49% of instances. Retightening the screws on the abutment or prosthesis fixes the loosening. The capacity to identify a loose screw in a patient with a prosthesis retained by several implants is considerably reduced. The restoration's biomechanical support must be assessed.[16]

Implant fracture

Implant fractures are commonly caused by implant material fatigue and flaws in prosthetic design or size. Design and material, non-passive fit of the prosthetic framework, and physiological or biomechanical overload are some of the causes. Patients with bruxism appear to be more susceptible to such an occurrence. As a result, they should be provided with occlusal guards before the final prosthesis is placed.[17]

Fracture of restorative materials

Failure or fracture of materials used for implant-retained restorations can be significant problem.Example in veneers (acrylic, composite, or ceramic) that are attached to superstructures.

VI. Aesthetic and phonetic problems

Aesthetic complications

When expectations aren't realized, aesthetic issues occur. The cosmetic outcome of implant prostheses has a wide range of patient satisfaction. Patients with high aesthetic

expectations and unsatisfactory patient-related characteristics such as a high smile line, thin periodontal soft tissues, or insufficient bone quantity and quality are more likely to experience aesthetic difficulties.[18]Some of the causes could bepoor implant position**,** deficiencies in the existing anatomy of the edentulous sites that were reconstructed with implants and insufficient bone support.

Treatment

Gingiva colored materials used to replace lost gingival anatomy, angulated abutments, superstructures – good esthetic results. In unsatisfied cases, implants could be removed, case is re-evaluated and possibly re-treated.

Phonetic problems

Implant prostheses with atypical palatal contours (e.g., restricted or narrow palatal space) or spaces under and around the superstructure can cause the patient to have phonetic issues. When full arch, implant-supported, fixed restorations are produced for patients with a significantly atrophied maxilla, this is especially difficult.[19]Such patients are best served with an implant-assisted maxillary over denture because the design facilitates replacement of missing alveolar structure and avoids creating spaces that allow air to escape during speech.

VII. Educational needs to prevent and control implant complications

Exact knowledge of anatomic features of the major blood vessels is necessary, and their anastomoses, neurovascular bundles, and alveolar ridge contours have to be properly examined prior to surgery to avoid intra- and postsurgical complications.Modern digital technology allows a 3-dimensional approach for implant surgery according to the radiological conditions and the anatomic features.[20]

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