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RESEARCH ARTICLE

PERI- IMPLANTITIS AND ITS CLINICAL MANAGEMENT- AN OVERVIEW

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Abstract

In peri-implantitis, gum inflammation is found around the soft tissue and there is deterioration in the bone supporting the dental implant. Peri-implantitis usually requires surgical treatment. Signs of peri-implant diseases are similar to symptoms of gum disease: red or tender gums around the implants, or bleeding when brushing. And just like your natural teeth, implants require regular tooth brushing and flossing and regular check-ups from a dental professional. Other risks factors for developing peri-implant disease include previous periodontal disease diagnosis, poor plaque control, smoking, and diabetes. It is essential to routinely monitor dental implants as part of a comprehensive periodontal evaluation. The up side to dental implants is they function just like your natural tooth. The down side is, they are capable of becoming diseased just like a natural tooth. With a proper oral health routine, your dental implant can last a lifetime.

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Introduction:-

Definition- american academy of periodontology defines
Peri-implantitis as
"***progressiveperi implant bone loss in conjunction with a soft tissue inflammatory lesion.[1]"***

Causes

Bacterial accumulation
Overloading or
Combination

Etiologic factors

Two primary etiologic factors are acknowledged today as causative in peri implant marginal bone loss:

- Biomechanical overload
- Bacterial infection

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Biomechanical overload

Bone loss at the coronal aspect of implants can result form biomechanical overloading and the resultant microfractures at the coronal aspect of the implant-bone interface.
The loss of osseointegration in this region results in apical down growth of epithelium and connective tissue.
The role of over loading is likely to increase in four clinical situations[2]:

1. The implant is placed in poor quality bone.
2. The implant position or the total amount of implants placed does not favor ideal load transmission over the implant surface.
3. The patient has a pattern of heavy occlusal function associated with para function.
4. The prosthetic superstructure does not fit the implants precisely.

Bacterial infections

Peri-implant diseases (mucositis, peri-implantitis) are primarily plaque-induced.

If plaque accumulates on the implant surface, the sub epithelial connective tissue becomes infiltrated by large number inflammatory cells and the epithelium appears ulcerated and loosely adherent.

When the plaque front continues to migrate apically, the clinical and radiographic signs of tissue destruction are seen around both implants and teeth.

Peri-implantitis has been shown to exhibit similar microbial flora as chronic periodontitis.

Chaparro et al. identified three commonly occurring pathogens associated with peri-implantitis[3]:

Porphyromonasgingivalis,
Treponemadenticola, and
Tannerella forsythia

Bacterial biofilms attached onto the surface of implants were shown to create a highly acidic environment that causes corrosion, pitting, cracking, etc.

Clinical symptoms

- Vertical bone loss (radiographic, probing, or both)
- Peri-Implant pockets
- Bleeding on probing
- Exudate
- Mucosal swelling
- Erythema

Diagnosis

Following diagnostic parameters have been recommended: (lang et al 2004)

1. Presence of plaque and calculus.
2. Probing depth measurements using a light probing force (0.25 ncm).
3. Presence or absence of bleeding on probing/ suppuration using a light probing force (0.25 ncm).
4. Radiographic assessment if indicated

Classification

CLASS 1- Slight horizontal bone loss with minimal peri-implant defects
CLASS 2- Moderate horizontal bone loss with isolated vertical defects
CLASS 3- Moderate to advanced horizontal bone loss with broad circular bony defects
CLASS 4- Advanced horizontal bone loss with broad, circumferential vertical defcts as well as loss of the oral and /or vestibular bony wall.

Management

The objective of treatment for peri-implantitis is for osseous regeneration of the implant-bone defect.

However, such treatment has been challenging because the implant surface needs to be detoxified, along with modifying the soft and hard tissues.

This may involve nonsurgical and surgical treatment.

Nonsurgical management of peri-implantitis

The nonsurgical treatment of peri-implantitis usually involves the debridement and detoxification of implant surfaces

Low-abrasive amino acid glycine powder

An air-powder mixture with reduced pressure is expelled through the nozzle.

The nozzle is moved in a circumferential movement around the implant surface

Ultrasonic devices.

For treatment of peri-implantitis, tip modifications (i.e., carbon fiber, silicone, or plastic) must be used.

Care must be exercised not to use metal tips as they may alter the implant surface

Lasers.

One of the newer and least invasive methodologies to treat peri-implant mucositis and peri-implantitis involves the use of laser photonic energy

Similar to their use in treating periodontal disease, lasers provide different treatment approaches for periimplantitis:

a. nonsurgical,
b. Surgical,
c. Antimicrobial photodynamic therapy, and
d. Photobiomodulation.

Nonsurgical:

In the nonsurgical modality, lasers are used adjunctively to help remove calculus, reduce inflammation and remove diseased soft tissue, and reduce subgingival pathogens.

Using different types of lasers, such as the diode, NG:YAG (neodymium-doped yttrium aluminum garnet), erbium, or carbon dioxide laser

Surgical:

Minimally invasive laser-assisted surgical techniques involve removal of diseased epithelial lining[4].

More invasive surgical procedures involve conventional elevation of a fullthickness flap for surgical access, followed by laser-assisted degranulation, surface debridement and decontamination, and osseous tissue removal or recontouring

Antimicrobial photodynamic therapy

A photoactivatable substance (photosensitizer) is applied to the targeted area (i.e., within the sulcus) and then activated by laser light.

Singlet oxygen and other cytotoxic reactive agents are produced to reduce periodontopathogens[5].

Photobiomodulation:

Is a form of light therapy that uses nonionizing forms of light, including lasers in the visible and infrared spectrum.

The nonthermal technique is used to elicit photophysical and photochemical events.6Inimplantology, it is used to promote wound healing and tissue regeneration.

It has also been shown to increase osteoblastic proliferation, collagen deposition, and bone formation.

Surgical management of peri-implantitis

Sulcular incision around desired dentition being careful to extend at least one tooth mesial and one tooth distal in anticipation to the area of treatment

Full-thickness flap reflection is complete past the mucogingival junction on both buccal and palatal/lingual if necessary

Implants are detoxified with tetracycline paste, edta, or citric acid, cleaned with curettes and titanium brushes

Air powder glycine to further clean implant threads previously exposed

Bone graft of choice (i.e., ideally an autograft or allograft) is placed on defect.

A resorbable membrane (extended resorbable collagen membrane: 4–6 months) is then draped over bone graft, being careful to cover 3 mm past all edges of bone graft.

Flaps are sutured being careful to provide tension-free closure to produce maximal contact between tissue edges (primary closure)

Platelet concentrate growth factors.

The blood sample is immediately centrifuged for 12 minutes at approximately 2700 rpm. Because there is no anticoagulant, the platelets are activated and trigger the coagulation cascade when they contact the tube walls. There will exist three distinct layers: (1) top layer—platelet-poor plasma (ppp); (2) middle layer—prf; and (3) bottom layer—red blood cells.

The acellular plasma (ppp), which is the top layer, may be removed with a pipette into a syringe. The prf fibrin clot is then placed into a prf box and processed into a membrane. The liquid part (prf) of the prf box is then collected and placed in with the graft material

After grafting the defect, the prf membrane is placed over the defect. If a second membrane is used (e.g., collagen), then the membrane may be moistened with acellular plasma.

The soft tissue flaps are approximated and closed with a hightensile-strength suture material

Locally Applied Antibiotics

The recommended locally applied antibiotic (lda) during surgical implant rescue is tetracycline at 50 mg/ml solution.

Tetracycline capsules can be opened and mixed with small amounts of saline solution to create a paste.

This paste is burnished onto implant surfaces for 60 seconds, then thoroughly rinsed with saline.

Systemic antibiotics

Metronidazole is bactericidal to anaerobic organisms and disrupts dna synthesis.

It has been shown to be especially effective against a. Actinomycetemcomitans, p. Gingivalis, and p. Intermedia.

The combination of amoxicillin and metronidazole has also been shown to have long-term effects against a. Actinomycetemcomitans

For patients who are allergic to amoxicillin, alternative systemic antibiotics are clindamycin, ciprofloxacin, metronidazole, or azithromycin

Suzuki-Resnik Peri-Implant Disease Protocol

This consists of four protocols with associated detailed step-by-step regimen

Protocol 1:

< 3mm probing depths
No plaque or no bleeding on probing (bop)
Treatment
• maintain regular home care
• 3 - 6 month hygiene recall

Protocol 2

: (peri-implant mucositis) < 3mm probing depths
Plaque presence / bleeding on probing (bop) or 3 – 5 mm probing depths plaque presence / bleeding on probing (bop)
Treatment
• follow treatment regimen A
• increase hygiene recall frequency (~ 3 months)
• increase home care education
• if no resolution, proceed to protocol 3

Protocol 3:

(peri-implantitis) > 5 mm probing depths plaque presence / bleeding on probing crestal bone loss > 2 mm
Treatment
• follow treatment regimen A, B, C, & D
• increase hygiene recall frequency (~ 3 months)
• increase home care education
• rx

Protocol 4:

Implant mobility pain upon function bone loss > 50% of implant length uncontrolled exudate
Treatment
• follow treatment regimen E

Peri-implant disease treatment regimen

Treatment Regimen A:

Mechanical closed debridement (acceptable instrumentation)

• resin, titanium, graphite, carbon-fiber, and gold-tipped instruments can be used to remove deposits
• prophy cup/brush
• air-polisher with glycine powder (hu-friedy), prophy jet (dentsply)
• rx: chlorhexidine (0.12%, 0.2%) or cetylpyridinium chloride
• check occlusion

Treatment Regimen B: antiseptic therapy

• Subgingival antiseptic irrigation (0.12%, 0.2% chlorhexidine) is added to the mechanical therapy
○ Irrigate intra crevicularly to disrupt and dislodge the biofilm, then thoroughly debride the implant surface with a curette. Irrigate a 2nd time to rinse out the debris and further detoxify the subgingival area. Pressure is then applied for one minute to obtain intimate soft tissue/restoration contact.

• Alternative antiseptic; diluted sodium hypochlorite (naocl). - diluted (.25%) naocl solution = one teaspoon (5ml) of standard 6% household bleach (clorox) and diluting it with 4 oz (125ml) of water7.
• check occlusion, possible occlusal guard

Treatment Regimen C: antibiotics
• Add systemic and/or local antibiotic treatment
systemic : amoxicillin, metronidazole (500 mg, 3 times/daily for 8 days)
Alternative: clindamycin, augmentin, tetracycline, bactrim, ciprofloxacin
local : tetracycline
Alternative: , doxycycline, minocycline spheres (arestin®)

Treatment Regimen D: surgery (access, open debridement, bone graft, closure)8

Step 1: access flap, open debridement with hand instruments, implantoplasty (salvin bur kit)
Step 2: detoxify with:
• 1. Apply 0.12% or 0.2% chlorhexidine with cotton pellet for 60 sec. (rinse with saline) +
• 2a. Apply 20-40% citric acid with cotton pellet or spatula or titanium brushes (salvin) for 60 sec.(rinse with saline)
Or
• 2b. Apply tetracycline paste with titanium brushes (salvin) for 60 sec. (rinse with saline)
- Other detoxification agents: edta, hydrogen peroxide, 0.25% naocl
- er:yag laser (diode laser alone results in an unacceptable increase in implant body temperature)[9,10]

Step 3: bone graft with mineralized/demineralized (70/30) + autograft (if indicated)
Step 4: cross-linked collagen (extended collagen)
Step 5: tension-free closure with vicryl (pga) or ptfe sutures

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