



CURRENT UNDERSTANDING OF DIAGNOSIS, CLINICAL IMPLICATION AND TREATMENT PROTOCOL OF PERI IMPLANT MUCOSITIS & PERI IMPLANTITIS : A REVIEW

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ABSTRACT The implant therapeutics for management of edentulous span has revolutionized dentistry. This is accompanied by many complications as well. Peri implant interface as well as the tissues are not immune to complications arising from poor surgical, prosthetic or long/short maintenance resulting in the peri implant destruction of soft and hard tissues. This peri implant breakdown surfaces as Peri implant mucositis and Peri implantitis. The management of these complications is feasible if timely and correct diagnosis is established resulting in the success of implants. This article attempts to assess the risk factors for peri implant diseases, establish a thorough diagnosis that could act as a blueprint for management of peri implant lesions. The prophylactic measures to prevent the beginning of the lesion is also highlighted in this review.

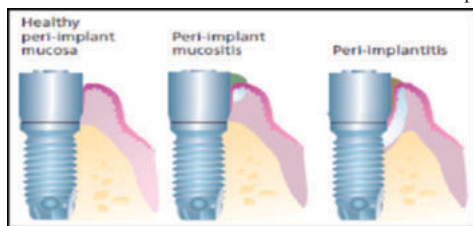
KEYWORDS : Peri implant mucositis, Peri implantitis, Diagnosis, Management

INTRODUCTION

The paradigm shift from the removable prosthesis through fixed partial dentures and ultimately Dental Implants have superceded the traditional dentistry. This evolution not only maintains the integrity of the alveolar ridge but also provides management of highest level in cases of distal extension and in situations where other traditional prosthesis fails. With every treatment option comes its complication. Peri implant interface as well as the tissues are not immune to complications arising from poor surgical, prosthetic or long/short maintenance resulting in the peri implant destruction of soft and hard tissues. This peri implant breakdown surfaces as Peri implant mucositis and Peri implantitis.

Case Definition

Peri implant-mucositis has been described as a disease where the presence of inflammation is confined to the soft tissues, with no loss of the supporting bone around the dental implant. It is characterized by bleeding upon probing, suppuration, and clinical probing depths less than or equal to 4 mm. While, **Peri-implantitis** is the inflammatory process which includes the soft tissues as well as bone loss around the implant.



As the diagnosis is said to be the blueprint for management of any lesion so are the risk factors in determining about the etiology and progression. Following are the risk factors with the level of evidence-

Risk Factors And Indicators

1. Risk factors for peri implant disease with substantial evidence

a) Poor oral hygiene

Ferreira et al.^[1] showed poor oral hygiene was strongly associated with peri implant disease.

b) History of Periodontitis

The systematic review by Schou et al.^[2] concluded that there was a significantly increased incidence of peri-implantitis and increased peri-implant marginal bone loss in individuals with periodontitis-associated tooth loss.

c) Cigarette Smoking

Systematic review by Strietzel et al.^[3] indicated significantly exaggerated risks of biologic complications among smokers compared with non-smokers.

2. Risk factors for peri implant disease with limited evidence

a) Occlusal overload

As the implants are non tolerable to the non axial forces owing to the absence of Periodontal ligaments, the change in the direction, duration, frequency may develop undue stress at the implant bone margin resulting in bone loss. Detailed study needs to be conducted.^[4]

b) Diabetes

Ferreira et al.^[5] concluded that subjects with periodontitis and diabetes (poor metabolic control) is associated with greater risk of peri implantitis.

c) Alcohol consumption

The only study by Galindo- Moreno et al.^[6] concluded that peri-implant marginal bone loss was significantly related to a daily consumption of >10 g of alcohol, tobacco use, increased plaque levels and gingival inflammation.

3. Risk factors for peri implant disease with conflicting and limited evidence

a) Genetic trait

- Laine et al.^[7] showed a significant association of genetic trait with peri-implantitis.
- Wilson^[8] showed no significant association of genetic trait with periimplantitis.

b) Implant surface

- Astrand et al.^[9] found a rough surface was worse than a smooth surface in causing the disease.
- Wennstrom et al.^[10] found a moderately rough surface similar to a smooth surface in causing the disease.

c) Residual cement

According to Linkevicius T^[11], the use of cement retained prosthesis increases the risk of accumulation of residual cement which in turn favours plaque accumulation and initiation of peri implant lesion.

d) Other non confirmed risk factors

Excessive apical placement of the implant in maxillary anterior region for optimum aesthetics increases the peri implant sulcus depth compounding to the peri implant disease as stated by Bert M.^[12]

Xerostomia and viscous saliva change the bacterial phenotype contributing to the peri implant lesion.

Diagnostic Approach And Diagnosis

Diagnosis is the blueprint to the management of any pathology. The earlier the diagnosis and intervention, better the therapeutic results. The peri implant diseases are diagnosed by various approaches. They include-

1. Probing, bleeding and suppuration

Initial probing with light force of 0.25N should be done after final restoration as a baseline measurement against which further comparisons are made. The alternations in the finding is important as compared to the baseline record in cases where implants are placed apically to compensate the aesthetics resulting in greater peri implant sulcus depth. Bleeding on gentle probing or increase in the probing depth, suppuration indicates soft tissue inflammation(Peri implant mucositis) while suspected bone loss(Peri implantitis) needs further evaluation by taking radiographs.

2. Radiographs

Wennstrom J^[13] stated that Long cone paralleling technique radiographs after the removal of prosthesis are advocated for monitoring the progression of the lesion. For severe progressive lesions CBCT is employed. The marginal bone loss should not exceed 2 mm between prosthesis installation and 5 years of follow up.

3. Mobility

Mobility of an implant is not a good diagnostic aid as it would require explanation as a definitive treatment. But perceived implant mobility would require a thorough check on loosened prosthetic components as it would favour further plaque deposition resulting in the peri implant pathology.

Secondary diagnosis can be achieved by bacterial culturing, inflammatory markers and genetic studies.

What Is The Current Scenario For Diagnosis??

The current periodontal classification system (according to the world workshop 2017) in contrast to the 1999 Periodontal classification includes the peri implant disease and conditions (According to the Peri implant disease and condition consensus report 2017).

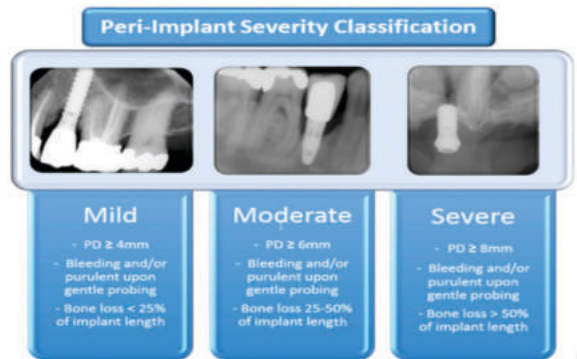
The classification is as follows-

- Peri implant health
- Peri implant mucositis
- Peri implantitis
- Peri implant soft tissues and hard tissue deficiency



Algorithm To Diagnosis Of Peri Implant Lesion

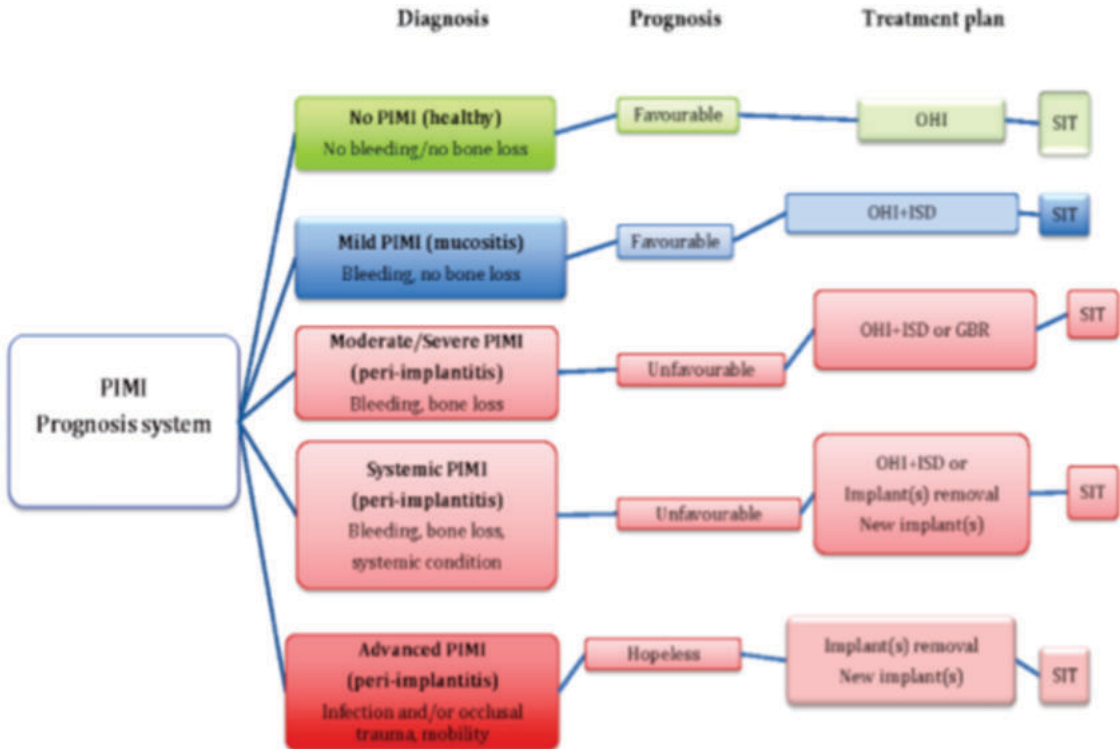
Classification Of Peri Implant Lesion On Basis Of Severity-



Classification Of Peri Implant Lesion

Prognosis Of Peri Implant Lesions

The probable outcome of the peri implant lesion is listed as below-



Prognosis determining Algorithm for dental implants with peri implant mucosal inflammation (PIMI). GBR=Guided Bone Regeneration, ISD= Implant surface Debridement, OHI=Oral Hygiene Instructions, SIT= Supportive Implant Therapy

Decision Making Tree For Peri Implant Management Cases

Differential Diagnosis

LESION/ DESCRIPTION	OCCLUSAL OVERLOAD	RETROGRADE PERI -IMPLANTITIS	INFLAMMATORY IMPLANT PERI APICAL LESION
CLINICAL FEATURE	<ul style="list-style-type: none"> • Marginal bone loss due to overload is often accompanied by attachment loss and deepening of the pockets. • Bone destruction is accelerated when occlusal trauma is accompanied with peri-implant infection. 	<ul style="list-style-type: none"> • Clinically symptomatic periapical lesion which develops shortly after implant insertion. • Presence of pain, swelling, tenderness or presence of fistulous tract. • Lesion confined apically not extending coronally, proximally or facially 	Pain but no implant mobility after implant placement with or without periapical radiolucency.
ETIOLOGY	<ul style="list-style-type: none"> • Cantilever/offset in prosthesis • Faulty implant alignments, angulation • Poor ratio of crown height/implant length • Discrepancy in dimensions between the implant head and occlusal table. 	<ul style="list-style-type: none"> • Pre-existing infection(cyst /granuloma after tooth extraction) or bacterial contamination after implant insertion. • History of endodontic pathology. 	<ul style="list-style-type: none"> • Poor vascularization. Ischemia can cause bone loss • Inadequate osteotomy site preparation, overheating during osteotomy
MANAGEMENT	Occlusal correction	Complete removal of granulation tissue, curettage of bony wall, and GBR	Surgical removal of periapical granulation tissue with chlorhexidine irrigation.
PREVENTION	Prosthetic driven implant placement	Preoperative assessment of the implant site, adjacent teeth and postoperative evaluation after implant placement.	Strict adherence to hygienic rules and manufacturer's guidelines.

Clinical Implications

Peri implant mucositis and peri implantitis are the two sides of the same coin having different extent of tissue destruction and hence treatment strategies. The lesions can be treated successfully when diagnosed early. Thus routine monitoring of the implants should be a mandatory part of supportive periodontal and peri implant therapy. Peri implant mucositis can be treated with nonsurgical approach while peri implantitis requires surgical intervention.

Treatment Objective

American Academy of Periodontology^[14] states elimination of both plaque biofilm and factors favouring its retention are essential in the management of peri implant diseases.

According to **Klinge B^[15]**, Non surgical therapy is advocated for the early lesion of peri implant mucositis management but advanced surgical management is the choice for progressive lesions of peri implantitis.

According to **Claffey N^[16]**, various procedures listed in the management include air- powder abrasion, saline wash, citric acid application, laser therapy, peroxide treatment, ultrasonic/manual debridement, and application of topical medication but none of them is labeled as gold standard.

Treatment Modalities

A. Non Surgical Treatment

1. Mechanical Therapy Alone

Dental plaque biofilm spirals the peri implant lesion. Elimination of the biofilm is the ultimate goal of the peri implantitis treatment. **Karring et al^[17]** concluded that non surgical mechanical treatment alone is insufficient in management as it reduces the bleeding on probing but not the pocket depth.

2. Mechanical Therapy With Adjunctive Antiseptic Agent

Mechanical non surgical debridement alone around the infected implants was insufficient to treat the lesion , thus **Schwarz F^[18]** suggested a combination of plastic curette with an antiseptic 0.2% chlorhexidine which was more efficacious in reducing bleeding on probing as well as pocket depth but not treating osseous lesions.. Thus it has limited role in the management of advanced lesions.

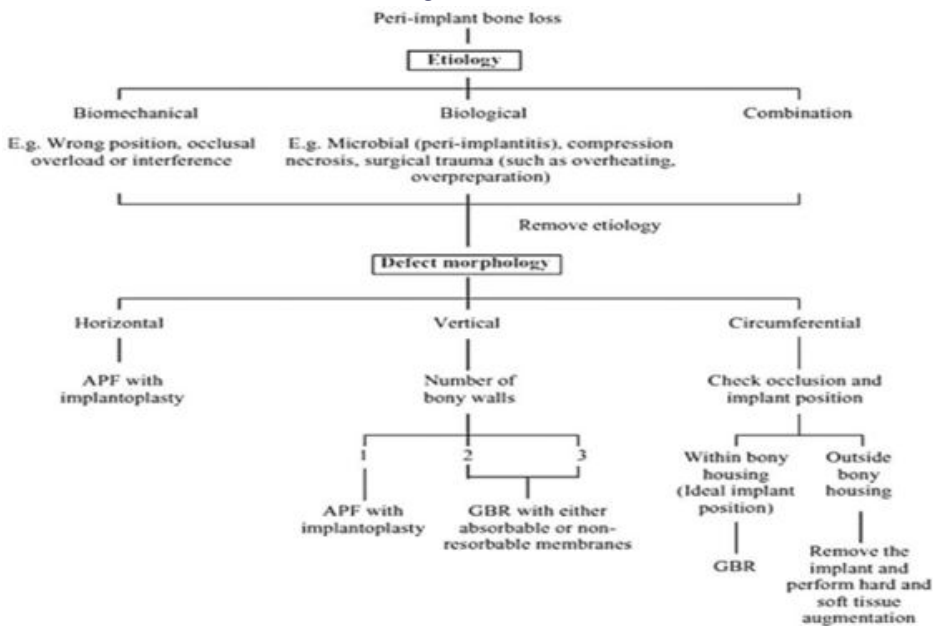
3. Mechanical Therapy With Adjunctive Antibiotic Therapy

Butcher A.^[19] suggested that mechanical debridement with repeated use of local drug delivery of doxycycline, minocycline showed improvement in non tangible peri implant parameters. Limitations juggle between the placement of the drug deep into the pocket and poor oral hygiene.

B. Laser Assisted Treatment Of Peri Implantitis

Schwarz^[20] demonstrated Er:YAG laser has the potential to remove dental plaque and calculus from the smooth and porous surface of the implants. There was gain in the Clinical Attachment Level (CAL) after 6 months.

C.Surgical Treatment



Algorithm for surgical management

1. Resective Surgery

Romeo E.[21] showed Peri-implantitis condition with buccal dehiscence or suprabony destruction is best managed by resective surgery including osteotomy or osteoplasty along with implantoplasty and **Apically Positioned Flaps(APF)**.

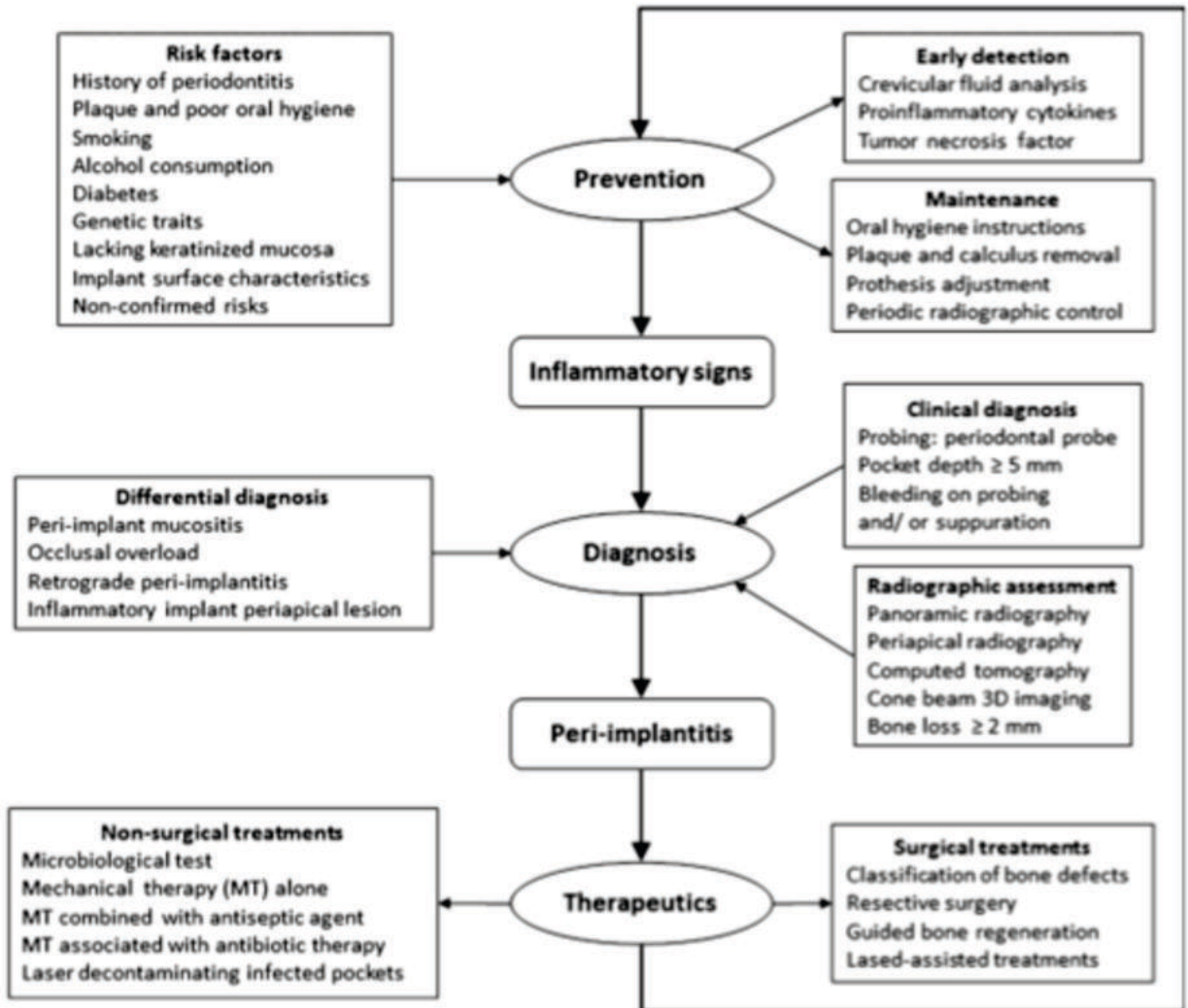
2. Regenerative Surgery

Haas[22] suggested that the use of (curettage + laser assisted decontamination of implant surfaces + autogenous bone graft + e-PTFE membrane + systemic antibiotic therapy for 5 days) showed

great results for peri-implantitis treatment with a 36.4% bone gain after 10 months.

SUMMARY AND CONCLUSION

Implants have revolutionized the dentistry since the dawn of millennium. The mastering of the skills in management of peri implant pathology still remains a grey area. Thus, taking into consideration the risk factors, diagnosis and proper treatment planning can help us avert the initiation of the disease. Periodic recalls with supportive implant care is the key for a successful implants.



Summary of the risk factors, diagnosis , treatment planning for peri implant lesions.

My point your take

- Identification of risk factors which are associated with progressive peri-implant diseases.
- Establish radiographic evidence as baseline at the time of implant placement.
- Maintain clinical and radiographic baseline records at final prosthesis insertion.
- Adapt methods to monitor implant health and determine inflammatory complications as part of an ongoing periodontal maintenance program.
- Establishing an early diagnosis and intervening impromptu, for more effective management of peri-implant diseases.

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