

PERI-IMPLANTITIS IN DENTAL IMPLANTOLOGY: CLINICAL ALGORITHM FOR PREVENTION AND MANAGEMENT

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Abstract: Peri-implantitis is a destructive inflammatory condition affecting the soft and hard tissues around osseointegrated dental implants, often leading to implant failure. With the increasing popularity of dental implants, peri-implant diseases have become a major clinical challenge. This paper provides an updated overview of peri-implantitis, including its etiology, risk factors, and clinical presentation. A stepwise clinical algorithm for both prevention and treatment is proposed, based on current evidence and international consensus guidelines.

Keywords: peri-implantitis, dental implant, mucositis, bone loss, oral microbiome, risk management, surgical decontamination, maintenance protocol

Dental implants have revolutionized modern dentistry, providing predictable long-term solutions for tooth loss. However, like natural teeth, implants are susceptible to inflammatory complications, primarily **peri-implant mucositis** and **peri-implantitis**. While mucositis is reversible inflammation of the peri-implant mucosa, peri-implantitis involves **progressive bone loss**, often accompanied by pus, bleeding on probing, and pocket formation.

Peri-implantitis is a **multifactorial disease**, with key contributing factors including:

- Poor oral hygiene and plaque accumulation
- History of periodontitis
- Improper prosthetic design and implant positioning
- Smoking and uncontrolled diabetes
- Occlusal overload
- Inadequate maintenance care

The absence of a standardized treatment protocol and variability in patient responses has led to inconsistent outcomes. This paper outlines a structured **clinical decision-making algorithm** for managing peri-implantitis and emphasizes the importance of preventive strategies.

This review article is based on:

- Analysis of 45 peer-reviewed articles published between 2016 and 2024
- Guidelines from the European Federation of Periodontology (EFP) and American Academy of Periodontology (AAP)
- Clinical trials and systematic reviews on peri-implantitis prevention and treatment
- Case series documenting outcomes of various surgical and non-surgical approaches

Data were synthesized into a decision-making framework that can be applied in daily clinical practice.

Results

1. Prevention Algorithm

- **Patient Selection:** Screen for periodontitis, smoking, diabetes, and hygiene compliance
- **Surgical Protocol:** Atraumatic placement, respect for biologic width, keratinized mucosa preservation
- **Prosthetic Design:** Easy-to-clean contours, proper emergence profile, passive fit
- **Maintenance Plan:** 3–6 month recalls, professional cleaning, peri-implant probing

2. Diagnosis of Peri-Implantitis

- Probing depth ≥ 6 mm
- Bleeding and/or suppuration on probing
- Radiographic evidence of bone loss ≥ 2 mm
- Clinical mobility in advanced cases

3. Treatment Algorithm

Stage I – Early peri-implantitis (PD < 6 mm):

- Mechanical debridement with titanium or carbon fiber instruments
- Chlorhexidine irrigation (0.12–0.2%)
- Adjunctive local antimicrobials (e.g., minocycline gel)
- Oral hygiene reinforcement

Stage II – Moderate disease (PD ≥ 6 mm, moderate bone loss):

- Open flap debridement
- Implant surface decontamination (e.g., Er:YAG laser, air-abrasive powder)
- Local/systemic antibiotics if needed
- Implantoplasty (for exposed threads)

Stage III – Advanced peri-implantitis (deep defects, mobility):

- Resective or regenerative surgery based on defect morphology
- Bone grafts and membrane (GBR) if vertical bone loss present
- Consider implant removal in cases of severe bone loss or lack of primary stability

The increasing prevalence of peri-implantitis highlights the need for **early diagnosis and proactive intervention**. Mechanical plaque control remains the foundation of prevention, but **host-modifying factors** such as systemic diseases and lifestyle habits must also be addressed.

Surgical treatment yields variable outcomes depending on defect morphology, implant surface type, and operator skill. **No single treatment modality is universally effective**, and a **patient-specific, risk-based approach** is essential. Use of lasers, probiotics, or novel surface decontamination technologies shows promise, but more long-term studies are needed.

Additionally, **interprofessional collaboration** with periodontists, prosthodontists, and hygienists is crucial for long-term implant survival.

Peri-implantitis poses a significant threat to the long-term success of dental implants. Prevention through careful patient selection, surgical planning, and routine maintenance is the most effective strategy. For active disease, a staged, evidence-based algorithm offers clinicians a structured path for diagnosis and treatment.

Dentists must shift from a reactive to a **preventive and protocol-driven model** to preserve implant health and improve patient outcomes.

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