Implant Maintenance Therapy 101 for the Dental Team

Overview

- Peri-Implant Diseases: Are they different?
- What is Unique to Dental Implants?
- Probing: How, When and Why?
- Predictable Implant Maintenance Protocol
- Complications and Failures
- Treatment of Peri-Implant Diseases

Peri-implant Disease

PREVENTION IS PARAMOUNT

EARLY DETECTION OF DISEASE ESSENTIAL!
Goals of Treating Peri-implant Diseases

1. Reduce the microbial burden
2. Achieve a state of peri-implant soft and hard tissue health
3. Regenerate peri-implant tissues lost during the inflammatory process

What is the Prevalence of Peri-Implant Diseases?
### Peri-Implant Diseases

**PREVALENCE:**

**BOTTOM LINE:**

- Literature presents controversial findings about the frequency of peri-implant disease
- This wide variability may be explained by the use of different parameters to evaluate and diagnose peri-implant diseases

Abou-Arraj RV, Basma HS. Inside Dentistry 2018

---

**PREVALENCE:**

**BOTTOM LINE:**

- Early detection, treatment and management are essential to prevent implant loss
- Dental implants are not immune to the inflammatory processes

Abou-Arraj RV, Basma HS. Inside Dentistry 2018

---

**PREVALENCE:**

**BOTTOM LINE:**

- Future studies on the epidemiology of peri-implant diseases should consider: (1) applying consistent case definitions and (2) assessing random patient samples of adequate size and function time

Peri-implant Mucositis and Peri-Implantitis

Why and How??

A failure to recognize risk factors:

• Previous PD (Karoussis, IK at al. 2007; Schou, S at al. 2006)
• Poor homecare (Serino, G et al. 2009)
• Smoking (Streitzel, FP et al. 2007; Heitz-Mayfield, LJ et al. 2009)

• Genetics (Bormann, KH et al. 2010; Laine, ML et al. 2006)
• Diabetes (Salvi, GE et al. 2008; Abiko, Y et al. 2010)
• Occlusal Overload (Rungsiyakull, C et al. 2011; Fu, JH et al. 2012)
• Residual Cement (Wilson, TG 2009; Linkevicious, T et al. 2012)

Fundamentals:

• Inappropriate treatment planning
• Less than optimal surgical and/or prosthetic result
• Lack of proper maintenance care
What are the Risk Factors for Peri-Implant Diseases?

Exogenous Risk Factors
- Operator experience
- Bacterial contamination
- Surgical trauma
- Immediate placement vs. delayed placement
- Immediate loading
- Overloading
- Connecting implants to natural teeth
- Characteristics of the implant, e.g., shape, diameter, surface configuration, prosthetic connection

Endogenous Risk Factors
- Age of patient
- Health status
- Smoking
- Bone quantity and quality
- Radiation treatment
- History of periodontal disease
- History of endodontic infection
- Lack of keratinized tissue
How Do We Classify Peri-implant Diseases?

Peri-implantitis etiology classification:

- **Early**: > 4 mm periodontal probing depth, bleeding on probing and/or exudate*, bone loss < 25% of implant length**
- **Moderate**: > 6 mm periodontal probing depth at one site; possible bleeding on probing and/or exudate*, bone loss 25% to 50% of the implant length**
- **Advanced**: > 8 mm at one site; bleeding on probing, exudate present, bone loss > 50% of the implant length**

* Bleeding on probing and/or exudate on two or more aspects of implant
** Measured on radiograph from the time of healing to current radiograph if not available, earliest radiograph following coating

A Classification System for Peri-implant Diseases and Conditions
Classifications

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pathogenic Bacteria</td>
<td>78.8%</td>
</tr>
<tr>
<td>Exogenous Trauma</td>
<td>8.5%</td>
</tr>
<tr>
<td>Exogenous Irritants</td>
<td>5.5%</td>
</tr>
<tr>
<td>Absence of KT</td>
<td>4.8%</td>
</tr>
<tr>
<td>Extrinsic Pathology</td>
<td>2.2%</td>
</tr>
</tbody>
</table>

Terminology

**Success:** Meets criteria related to health, function and esthetics

**Survival:** Loss of the abutment or restoration

**Complication:** An unacceptable result that compromises health, function and esthetics

**Failure:** Loss of the implant, early or late

Criteria for Long Term Implant Success

- Initial hard and soft tissue integration
- Properly positioned implants
- Properly designed restorations
- Regular and appropriate hygiene maintenance
Implants vs. Natural Teeth

<table>
<thead>
<tr>
<th>Natural Tooth</th>
<th>Implant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gingival sulcus</td>
<td>0.69</td>
</tr>
<tr>
<td>Epithelial attachment</td>
<td>0.79</td>
</tr>
<tr>
<td>Connective tissue</td>
<td>1.07</td>
</tr>
<tr>
<td>Biologic width</td>
<td>2.55</td>
</tr>
</tbody>
</table>

To Probe or Not to Probe?? That is the Question

To Probe or Not to Probe??

- **Controversies** in the periodontal/implant literature:
  - Stems from the concern that probing could damage/interrupt the delicate peri-mucosal seal between the implant/abutment and the soft tissue
  - Standard (normal) probing depths around dental implant restorations vary considerably
Is there a difference between probing around a natural tooth and an implant?

It is very important to probe around a dental implant to detect any potential problem, e.g., peri-implantitis.

Careful, gentle probing (0.25N) does not appear to compromise the integrity of oral implants and healing of the epithelial attachment is complete 5 days after clinical probing.
Dental Implant Probing Recommendations

Depending upon the height of the soft tissue, restorative abutments can be anywhere from 1-5mm or longer, resulting in significantly different “normal” PPD’s surrounding dental implants.

Summary:
Dental Implant Probing Recommendations

The following protocol is recommended for clinical probing around both natural teeth and dental implants: (1) use a smooth, unindented probe with a round tip diameter of approximately 0.4 mm to 0.5 mm; (2) use a gentle probing force of less than 0.25 N; (3) clean the probe in chlorhexidine after it is used in contaminated or infected sites (i.e., in abscess areas around teeth or implants or in areas of moderate to advanced peri-implantitis with exudate) before using the instrument to probe other areas in the same patient.

Risks and Benefits of Probing Around Natural Teeth and Dental Implants

Stuart J. Froum, DDS; and Wendy C.W. Wang, BDS, MSc

Compendium of Continuing Education in Dentistry, January 2018

Maintenance Appointment Assessments

Include:
- Peri-implant evaluation
- Prosthetic evaluation
- Removal of all deposits
- Reinforcement of home care practice
- Radiographs (where & when indicated)
Key Factors in Radiographic Assessment

What is the Radiographic Protocol?

- Baseline established with the completion of restoration
- Compare to baseline 6 months later at recall appointment
- One year assessment: if no changes then next radiograph 2-3 years unless symptomatic

What is Maintenance Interval Based Risk Stratification?
Peri-implant Mucositis and Peri-Implantitis

Suggested Maintenance Interval Based on Risk Stratification

<table>
<thead>
<tr>
<th>TIME ELAPSED SINCE LOADING</th>
<th>MAINTAINING HEALTH/LOW RISK*</th>
<th>UNHEALTHY/HIGH RISK*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 1 Year?</td>
<td>Every 3 months</td>
<td>1-3 months</td>
</tr>
<tr>
<td>After 1 year</td>
<td>4-6 month</td>
<td>3-4 months</td>
</tr>
</tbody>
</table>

Peri-implant Mucositis and Peri-Implantitis

<table>
<thead>
<tr>
<th>PERI-IMPLANT TISSUE PRESENTATION</th>
<th>SIGNS</th>
<th>INTERVENTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy-</td>
<td>Firm, pink, resilient, keratinized (ideal), no bleeding on probing,</td>
<td>DEBRIDEMENT/INSTRUMENTATION if indicated based on deposits present.</td>
</tr>
<tr>
<td>Bacterial insult and host defenses are in balance</td>
<td>pain or edemat; no radiographic bone loss; &lt;4 mm probing depth</td>
<td>Maintain optimal oral hygiene</td>
</tr>
</tbody>
</table>

Peri-implant Mucositis and Peri-Implantitis

<table>
<thead>
<tr>
<th>PERI-IMPLANT TISSUE PRESENTATION</th>
<th>SIGNS</th>
<th>INTERVENTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peri-implant Mucositis</td>
<td>Spongy, red, edema; bleeding on probing; possible and edemat on palpation possible; somewhat probing depth (although BOP and PD not as relative as around natural teeth; see Carranza p. 906 for more detail); marginal bleeding with circumferential probing may be more sensitive indicator (Young, 2006)</td>
<td>DEBRIDEMENT/INSTRUMENTATION</td>
</tr>
<tr>
<td>Estimated frequency of 90.7% of implants (Aron et al. 2013)</td>
<td></td>
<td>Responsive to non-surgical therapy (Shen, Mayfield et al. 2017) Establish optimal oral hygiene</td>
</tr>
</tbody>
</table>
Peri-implant Mucositis and Peri-Implantitis

<table>
<thead>
<tr>
<th>PERI-IMPLANT TISSUE PRESENTATION</th>
<th>SIGNS</th>
<th>INTERVENTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peri-Implantitis</td>
<td>Probe ≥ 3-6 mm. Bleeding on probing ≥2-3 mm radiographic bone loss is differentiating factor from mucositis. (although BOP and PD not as reliable as around natural teeth—see Genco p. 806 for more detail) exfoliate on palpation.</td>
<td>Surgical ( \text{INSTRUMENTATION} ) Non-responsive to non-surgical therapy (Flamant et al. 2009) Establish optimal oral hygiene</td>
</tr>
<tr>
<td>Estimated frequency of 10% of implants (Nombeli et al. 2012)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Adjunctive Antimicrobials:
- Antiseptics (CHX, Essential oils)
- Locally Delivered Antibiotics (Atridox, Arestin)
- Systemic Antibiotics (Tetracyclines, Metronidazole & Polypharmacy: Amox and Metronidazole)

Evaluation of Peri-Implant Mucositis Therapy

Treatment efficacy is based on the evaluation of the changes in PI, GI, BOP and PPD
Evaluation of Peri-Implant Mucositis Therapy

Conclusions:

- Effective treatment of peri-implant mucositis includes mechanical debridement of biofilm and calculus by professional and home care hygiene intervention.

- Professional mechanical intervention with or without the adjunctive use of antimicrobials leads to significant reduction of peri-implant tissue inflammation.

Evaluation of Peri-Implant Mucositis Therapy

Conclusions:

- In the case of home care, mechanical plaque control with the use of antiseptics may provide benefit in the treatment of peri-implant mucositis in regard to BOP and occasional PPD.

- BOTTOM LINE: with a variety of protocols available and studied, the clinician should select those which adapt best to the specific patient circumstances.

Treatment of Peri-implant Mucositis

Cleaning Effectiveness of Implant Prophylaxis Instruments

Petra Schmager, Prof Dr Med Dent; Frank Schaefer, Dr Med Dent; Jochen Varga, Prof Dr Med Dent; Thomas M. Sarrutella, MS, DMD, MS; Laura Platzek, Prof Dr Med Dent; Peter Pfeffer, Prof Dr Med Dent

Lasers in the Treatment of Peri-Implantitis: Are They Effective?

■ Er:YAG (erbium-doped yttrium aluminium garnet)
■ Diode
■ Nd:YAG (neodymium-doped yttrium aluminium garnet)
■ CO₂
■ PDT

BOTTOM LINE:

There is a need to develop standardized, ideal laser decontamination protocols that characterize the wavelength, time, power and presence of cooling that may yield ideal results for peri-implantitis treatment.
The Surgical Procedure

One Stage:
The implant and the abutment are placed at the same time and/or a temporary crown is also placed in the same appointment.

Two Stages:
The implant is placed and completely covered with tissue:
- 3-6 months are allowed for proper osseointegration
- At a second surgery, the titanium abutment is placed
- The tissues around it form the "biologic seal"

Potential problem areas:

- Inadequate keratinized tissue and/or bone
- Poor flap design leading to infection around a healing implant(s)
- Poor facial or lingual placement of the implant
Surgical Placement

Potential problem areas:

- Implant(s) too close to teeth or other implant
- Overheating bone: >47 degrees C due to drill and/or too much pressure
- Lack of primary stability

---

Surgical Treatment of Peri-implantitis

---

Treatment Algorithm

---
Peri-Implantitis: Regenerative Approach

Successful Management of Peri-Implantitis with a Regenerative Approach: A Consecutive Series of 51 Treated Implants with 3- to 7.5-Year Follow-up

Stuart J. Fineum, DDS
Scott H. Fineum, DDS
Paul S. Rosen, DMD, MS

(Int. J. Periodontics Restorative Dent. 2012;32:11-20)

Surgical Treatment of Peri-Implantitis
Reentry After Combined Surgical Resective and Regenerative Therapy of Advanced Peri-Implantitis: A Retrospective Analysis of Five Cases


Efficacy of alternative or adjunctive measures to conventional treatment of peri-implant mucositis and peri-implantitis: a systematic review and meta-analysis

While mechanical debridement alone was found to be effective for the management of peri-implant mucositis, alternative/adjunctive measures may improve the efficacy over/of conventional nonsurgical treatments at peri-implantitis sites, i.e., glycine powder air polishing, Er:YAG laser

Efficacy of alternative or adjunctive measures to conventional treatment of peri-implant mucositis and peri-implantitis: a systematic review and meta-analysis

Adjunctive resective and/or augmentative measures are promising, however, their beneficial effect on the clinical outcome of surgical treatments needs to be further investigated.


Implant Restorations

Potential problem areas:

- Improper design, occlusion
- Abutment/implant interface (gap)
- Premature loading
- Non-passive fit
- Excessive cantilevering

Mobility

- Sign of significant problem
- Mobility at the implant-abutment connection requires IMMEDIATE attention
- Mobility of the implant implies a loss of integration. (Eskow, RN et al., Comp. Cont. Educ. in Dentistry 1999)
Screw-Retained vs. Cement Retained Restoration??

Screw-Retained or Cement Retained??

After Implantation: Prevention Phase & Therapy
Goal

- Maintenance of periodontal health
- Maintain osseointegration
- Prevention of peri-implant infection

The Role of the Dental Therapist

A patient specific home care regimen should be developed by the dental therapist for the implant patient.

Care & Maintenance (CIST)

- Cumulative
- Interceptive
- Supportive
- Therapy
Biological complications with dental implants: their prevention, diagnosis and treatment

Plaque index <1 and BOP – (neg.)

Plaque index >1 and BOP + (pos.)

BOP + (pos.) No cratering

BOP + (pos.) Notable cratering <2 mm

BOP + (pos.) Bone loss >2 mm

DNA Test

DNA Test

Mechanical Debridement Follow-up and Scaling

Antibiotic Chewing 0.15% CHX Gel

Two Daily 3-4 Weeks

Systemic or Local Antibiotic Therapy

Resective or Regenerative Surgery

NOTICE

CIST (Cumulative Interceptive Supportive Therapy)

N.P. Lang et al. 2000

Instruction & Recommendations

- Keep it as simple as possible

- Minimal number of home care aids
**Care & Maintenance**

Critical for a good long-term result of dental implant therapy is close communication between dentist, hygienist and patient.

---

**In Summary**

- Dental implant maintenance must be made a regular part of any dental practice.
- The dental hygienist has routine contact with the patients in the practice, and knowing the warning signs of peri-implant disease can greatly affect the long-term stability of dental implants.
- Knowing risk factors associated with the development of peri-implant disease allows for early detection and proper treatment.

---

**In Summary**

- The presence of a minimum amount of keratinized tissue around the implant and prosthesis can be a significant contributor to implant problems.
  - Finding these defects early can lead to better defect management and prognosis.
- Knowing the different parts of an implant prosthesis allows the dentist and dental hygienist to recognize iatrogenic complications, e.g., excess cement.
In Summary

- Regular clinical data collection is important for both the natural dentition as well as dental implants.
- Again, know when to REFER when peri-implant complications are FIRST recognized!

Complications Associated With Dental Implants

<table>
<thead>
<tr>
<th>Overview</th>
<th>Biologic Complications</th>
<th>Technical Complications</th>
<th>Mechanical Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adverse Soft Tissue Reactions</td>
<td>Fracture of Veneering Porcelain</td>
<td>Screw Loosening</td>
</tr>
<tr>
<td></td>
<td>Sensory Disturbances</td>
<td>Fracture of Implant Supported Frameworks</td>
<td>Screw Fracture</td>
</tr>
<tr>
<td></td>
<td>Progressive Marginal Bone Loss, Loss of Integration</td>
<td></td>
<td>Implant Fracture</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cement Failure</td>
</tr>
</tbody>
</table>

Thank You