

Long-term Prevention of Peri-Implant Complications: Assessment, Maintenance and Home-Care Protocols

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The biocompatibility of titanium has been well researched, and implants are well established as a valuable tooth replacement modality.¹ Like natural teeth, implants can accumulate plaque-forming bacteria that build up on the base of dental implants, resulting in an inflammation of the surrounding soft- and hard-tissue. To prevent peri-implant complications, professional in-office implant maintenance and effective home-care recommendations are vital.

Prevention starts once the restoration is complete and the implant is exposed to the oral environment and occlusal forces. A salivary pellicle forms followed by bacteria that become a biofilm.²⁻³ This biofilm is a risk factor for peri-implant diseases like mucositis and peri-implantitis. It can trigger a pro-inflammatory response or even a systemic toxic effect, resulting in inflammation, infection, loss of the implant and/or impaired overall health of the patient.⁴

For long-term implant success, it is necessary to **detect** early signs of any implant complications, **diagnose** these complications to provide early intervention, and perform in-office implant maintenance **treatment** on patients at least once every 6 months, including effective biofilm removal and home-care recommendations.⁵

DETECT

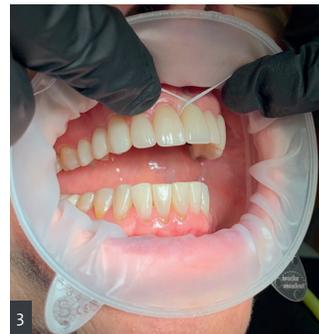
Detect complications with a five-step screening assessment; visually inspect soft tissue, probe and palpate for signs of infection, assess for residue to determine whether debridement is necessary. Assess mobility, pain, and occlusion, and finally measure the bone level to assess the health of the implant.



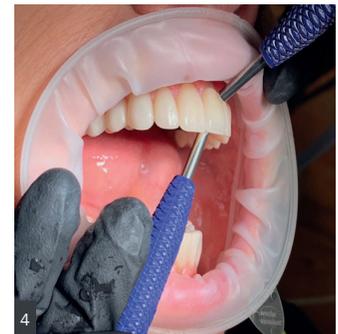
1 Visual tissue assessment



2 Probe and palpate implant



3 Floss in crisscross fashion to assess for inflammation/residue



4 Check mobility

The first step is to complete a visual soft tissue assessment and record any inflammation on a gingival index of 1 to 3 (mild, moderate or severe).

Second, probe and palpate the implant for any signs of infection. Wait 6 months after implants have been restored before probing using a titanium, metal or plastic probe. Record a base-line at 1 year, when the crestal bone has remodeled, to monitor the implant at every implant maintenance visit thereafter.⁶

Third, assess if calculus or residue is present with woven floss or dental tape. Insert floss mesially, distally and in a crisscross fashion. Move the floss in a shoeshine motion in the peri-implant crevice. Check the floss. If it is frayed or roughened or has blood on it, residue is present, and the implant will need debridement.

Forth, check mobility by placing two mirror handles on either side of the implant restoration and check for any mobility present. If mobility is present, evaluate pain based on a VAS scale of 1 to 10. The Doctor should also check occlusion, adjust and/or fabricate an occlusal device to protect fixed restorations and implants.⁵

The final step is to take a radiograph to accurately measure the crestal bone level around the implant(s) and identify implant health. For one to four implants, take a vertical bitewing or periapical radiograph of each implant. For five or more implants, take a panorex, cone beam computed tomography (CBCT) or individual periapicals of all implants.

NOTE: It is important to take a radiograph at least once a year over the entire life of the implant and to compare it against the base-line radiograph taken a year after the implant is restored and exposed to occlusal forces.^{2,6}

DIAGNOSE

A healthy implant is described as an absence of inflammation, bleeding, and suppuration and as bone loss of less than 2 mm at 1-year evaluation.

Peri-implant mucositis is reversible inflammation of the soft tissue with bone loss of less than 2 mm at 1-year evaluation.

Peri-Implantitis is an inflammatory reaction with bone loss that affects soft tissue, hard tissue and supporting bone around the implant.

Evidence shows the benefits of 2 mm of keratinized tissue around the implant for plaque control, patient comfort and reduced risk of crestal bone loss.⁷ To identify when peri-implant treatment is necessitated, follow the proposed classification by Drs. Froum and Rosen.⁸

Peri-implantitis can be classed as early, moderate or severe

- Early peri-implantitis: Probe depth > 4 mm as well as bleeding on probing and bone loss < 25% compared to the length of the implant.
- Moderate: Probe depth > 6 mm as well as bleeding on probing and bone loss 25–50% of implant length
- Advanced: Probe depth > 8 mm as well as bleeding on probing and bone loss > 50% of implant length

NOTE: Bleeding on probing and/or exudate on 2 or more aspects of the implant. Compare the radiograph against the original at restoration or earliest radiograph following restoration.

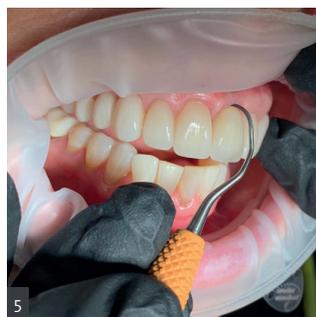
TREATMENT

Maintenance for titanium and ceramic implants begins with **biofilm removal**. Use for example a low-abrasion powder streaming device for supra- and subgingival air polishing with special application tips designed for erythritol or glycine powder (14 and 25 µm particle sizes) for biofilm removal, but not calculus removal.⁹⁻¹¹ For subgingival applications, gently insert the tip subgingivally until resistance is felt, then pull back slightly and activate for 5 seconds mesially, buccally, distally and lingually.

Alternatively, polish with silica prophylaxis paste containing xylitol to interrupt bacterial metabolism. Removing the biofilm may be the only maintenance necessary. Otherwise, continue to lavage and debride if calculus or residue is present.

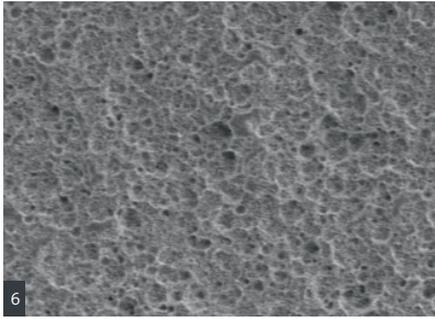
Perform lavage before and after debridement using a magnetostrictive or piezoelectric ultrasonic tip with short horizontal controlled light flow to facilitate acoustic streaming, acoustic turbulence, and cavitation effect. It is preferable to employ a titanium-compatible ultrasonic tip with titanium implants, like metals, on a *low lavage setting only*. *Be CAREFUL* never to touch the implant surface with the tip of a non-titanium magnetostrictive insert or piezo tip as this can cause damage to the outer surface of the implant or prosthesis, or leave residue behind that could lead to implant complications.¹²⁻¹³

Debridement is an important step to remove calculus or residue if present. To safely debride titanium and ceramic implants, use a **titanium implant scaler or titanium ultrasonic tip** to effectively remove the calculus or residue on the implants and, most importantly, to prevent any instrument residue from being left behind.¹⁴

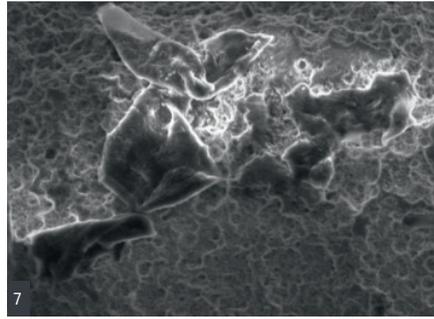


Debride Win Ti L3-4

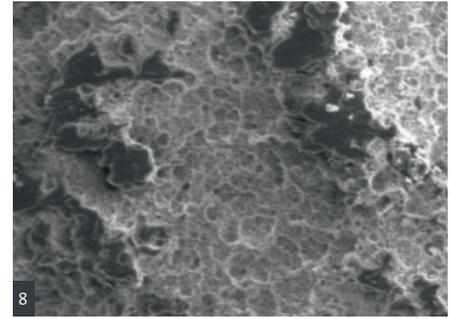
SCANNING ELECTRON MICROSCOPY (SEM) IMAGES OF CERAMIC (CER) AND TITANIUM (TI) IMPLANTS



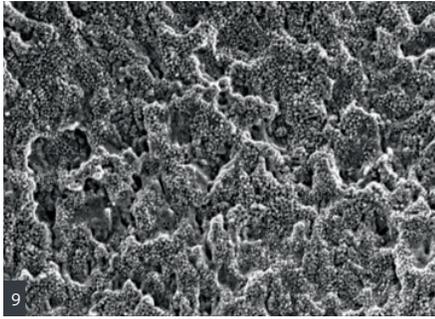
CER Implant 1000 Control



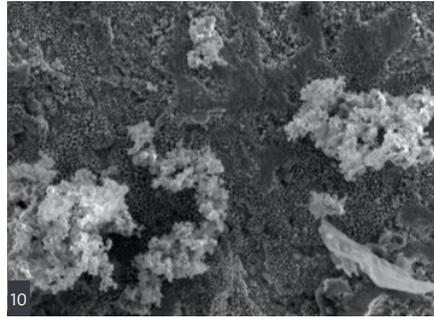
CER Implant with residue from Plastic Scaler



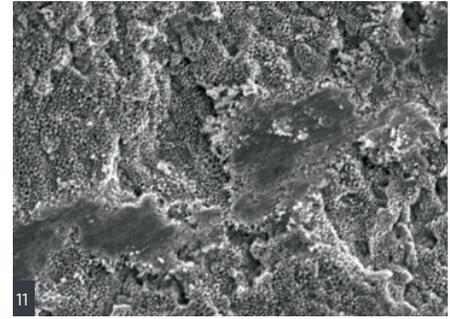
CER Implant, no residue from Titanium Scaler



Ti Implant 1000 Control



Ti Implant with residue from Plastic Scaler



Ti Implant, no residue from Titanium Scaler

Implants today have a roughened surface to encourage the patient's bone to more successfully osseointegrate with the implant. Therefore, the American College of Prosthodontists' Clinical Practice Guidelines recommend using instruments **compatible with the type and material of the implants, abutments and restorations** to prevent instrument residue from becoming lodged on the surface, which could lead to an increased risk for implant complications (Image 6-11).⁵ See table #1 for specific debridement instructions depending on implant design (narrow or wide based), access and prosthesis.

Finally, ***schedule an in-office implant recare appointment at least once every 6 months*** depending on the patient's systemic risk factors, previous periodontal disease, general health, and home-care (see table #1).⁵

TABLE #1: IMPLANT MAINTENANCE PROTOCOLS

Professional Implant Maintenance Protocol for Titanium and Ceramic Implants

1. Remove the biofilm with a powder streaming device or polish with silica paste containing xylitol to interrupt bacterial metabolism.
2. Next, lavage with a magnetostrictive or piezoelectric ultrasonic tip **before and after debridement** on a low lavage setting.
3. Debride if calculus is present. Select an appropriate titanium scaler depending on design, access and prosthesis. **Use the tip of titanium (Ti) implant scalers or Ti ultrasonic inserts/tips with *short horizontal strokes*.**

Narrow-Base Implant Instrumentation: Scale with an appropriate Ti implant scaler or ultrasonic tip to dislodge calculus on implant crowns, bridges or frameworks.

Wide-Base Implant Instrumentation: Scale with an appropriate Ti implant scaler or ultrasonic tip to dislodge calculus on implant crowns or bridges.

Locator/Ball Abutments or Mini Implants: Use a Ti implant scaler or an ultrasonic tip with a short radius tip to debride the screw indentation on top of locator abutments and around the abutment/implant interface.

Exposed Implant Threads: Use a Ti implant scaler or ultrasonic tip with a short radius blade tip and gentle horizontal strokes one thread at a time.

Under Hadar/Miller bar: Use short sweeping strokes with a Ti implant scaler or ultrasonic tip to scale under the bar buccally and lingually

4. Repeat lavage of the peri-implant area with an ultrasonic tip to remove any excess oral debris and polish the restoration with non-abrasive silica prophylaxis paste if not already completed.
5. Provide vital home-care recommendations to disrupt biofilm formation and schedule in-office implant maintenance care at least once every 6 months.

Maintenance Protocol for Removable Full-Arch Overdenture Prosthesis

1. Ask patient to remove overdenture and observe whether it is difficult or too easy to remove.
2. Follow the Professional Implant Maintenance Protocol for the implants/bar.
3. Flip overdenture over to assess attachments. Check for worn or missing O-rings, Locator caps, and/or clips.
4. Clean overdenture in an ultrasonic bath. Remove from bath, debride if necessary, polish, rinse, and **have patient try in and out.**

NOTE: Replace attachments in overdentures as needed or **at least once a year**; replace clips only when chipped or missing.²

Maintenance Protocol for Non-Removable Full-Arch Fixed Prosthesis

1. Remove biofilm with a powder streaming device.
2. Next, lavage with a magnetostrictive or piezoelectric ultrasonic tip **before and after debridement** on a *low lavage setting*.
3. Debride implant abutments and prosthesis with Ti scaler or ultrasonic tip using short horizontal strokes to remove the calculus from implants and prostheses on buccal and lingual surfaces.
4. Polish the prosthesis with a non-abrasive silica prophylaxis paste.
5. Provide specific home-care recommendations for daily biofilm removal and schedule in-office implant maintenance at least once every 6 months.

NOTE: Remove prosthesis at least once every 6–18 months to assess abutments, implants, and oral home-care.

Peri-Mucositis Protocol

Follow the Professional Implant Maintenance Protocol based on implant design, access, and prosthesis. Peri-mucositis can be treated non-surgically through submucosal biofilm removal using glycine powder streaming according to the 2012 Consensus Conference of the European Association for Osseointegration.¹⁵ Re-evaluate in 3–6 weeks. Floss and/or palpate to assess if blood and/or exudate is present. If present, an evaluation is needed for **peri-implantitis** treatment.

HOME - CARE

Home-care recommendations have taken on a new level of importance with research on the link to systemic oral health as well as inflammation and biofilm, both of which are risk factors for peri-implant disease. Daily elimination of **85% of biofilm by the patient every 8 to 12 hours is considered critical for long-term implant health.**¹⁶ According to the American College of Prosthodontists' Clinical Practice Guidelines for recall and maintenance of patients with implant-borne dental restorations, patients should be advised to use the following oral hygiene aids: dental floss, water flossers, air flossers, interdental cleaners, and electric toothbrushes to disrupt biofilm daily.⁵

Research supports daily use of fluoride dentifrice for implants. However, both sodium and stannous fluoride dentifrice at low or high pH in fluoride concentrations **can cause the oxide layer on the outside of the implant to be removed, making it susceptible to corrosion.**¹⁷ A recent study found that both sodium and stannous fluoride dentifrices are safe to use on titanium implants, but the dentifrice needs to be at or near **neutral pH composition.**¹⁸

Dental professionals can prepare their patients by providing them with home-care recommendations tailored to the type of implant and restoration/prosthesis as well as to the patient's oral hygiene, overall health, and manual dexterity (see table #2).



TABLE #2 IMPLANT HOME-CARE PROTOCOLS

Home-Care for Patients with Healthy Implant(s)

1. Brush twice daily with an electric toothbrush and a pH-neutral fluoride dentifrice.
2. Floss or use a water flosser twice daily. To floss, insert on each side of the implant restoration, crisscross in front and move in a shoeshine motion around each implant. Note: On removal of floss, do not pull through, take out individually on each side of the restoration.
3. Use a rubber tip stimulator once daily for keratinized tissue. Place the tip flat on the tissue and press firmly until the tissue blanches. Repeat 5 to 10 times on each side of the implant restoration.
4. Rinse twice daily with pH-neutral alcohol-free antimicrobial mouth rinse or add the rinse to a water flosser in a ratio of 1:9.

Home-Care for Patients with a Removable Overdenture Prosthesis

1. Remove overdenture and soak in an approved cleaner or in white household vinegar and water (1:1). **Follow Home-Care for Patients with Healthy Implant(s)** for the implants and Hadar/Miller bar when applicable.
2. Clean the inside of the overdenture with a soft sulcabrush or a small head on an electric toothbrush using pH-neutral dentifrice.
3. Thoroughly rinse overdenture with antimicrobial rinse. Do not soak in rinse.
4. Have patients do a visual check of retention attachments in the overdenture (O-rings, Locator Caps and/or clips) and contact your office if any are missing or if they have any concerns.
5. Rinse the mouth with pH-neutral alcohol-free antimicrobial rinse and place the overdenture back in the mouth.

NOTE: It is recommended that patients with overdentures remove their prosthesis at night to prevent plaque accumulation, candida and/or fungal infections.⁵

Patients with a Full-Arch Fixed Prosthesis

1. Brush implants and the fixed prosthesis twice daily with a specialized manual brush, interdental brush or a small head on an electric tooth brush and a pH-neutral dentifrice.
2. Floss or use a water flosser twice daily. To floss, use floss with a built-in threader, insert on each side of the implant restoration, crisscross in front and move in a shoeshine motion around each implant.
3. Rinse twice daily with pH-neutral alcohol-free antimicrobial mouth rinse or add mouth rinse to a water flosser in a ratio of 1:9.

Patients with Peri-Implant Mucositis

1. Brush implants and/or restoration/prosthesis **twice daily for 3 minutes**.
2. Floss or use a water flosser twice daily.
3. Rinse with pH-neutral alcohol-free antimicrobial mouth rinse twice daily or add mouth rinse to a water flosser in a ratio of 1:9.
4. Return to office for re-evaluation in 3–6 weeks.

SUMMARY

It is essential that dental professionals detect, diagnose, and treat implant patients with an emphasis on *prevention* through in-office maintenance visits at least once every 6 months.⁵

Implant complications should be treated *early* for the long-term success of implant(s). Peri-implant mucositis can occur in 43–47% of implants, and peri-implantitis in 20–22%, in the 5 to 10 years after implant placement.¹⁹ Ensure predictable long-term implant treatment success with *prevention* protocols for implant assessment, implant maintenance, and home-care recommendations to prevent peri-implant complications.

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Textbook: Peri-Implant Therapy for the Dental Hygienist: Clinical Guide to Maintenance and Disease Complications.

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