

Dental implant maintenance: the role of the Dental Hygienist and Therapist

Susan S Wingrove

The role of the dental hygienist and dental hygiene therapist is critical to the successful maintenance and monitoring of dental implants. It requires clinical knowledge regarding safe assessment of implants at maintenance appointments, methods of safely instrumenting implants, and knowledge of available products which can be safely recommended for home care. The previous article, Dental implants - home care is key!, Dental Health 2011: 5 (3); 10-13, focused on understanding implants, placement, restoration, and home-care protocols to equip you with the knowledge to confidently care for patients with implant prosthetic restorations. This article will focus on the key role of the dental hygienist and therapist in undertaking safe implant maintenance therapy, and following monitoring protocols to ensure the long-term success of the implant

Implant maintenance therapy

Routine maintenance therapy is necessary to maintain the peri-implant health of the implant. Implant maintenance therapy includes considering the patient's overall health in addition to the assessment and monitoring of implant(s). This is important because implants are susceptible to peri-implantitis (an inflammatory reaction in the hard and soft tissue, with loss of surrounding bone) that could result in implant failure.

Implants fail from a loss of integration generally due to bacterial infection, occlusal overload, or a poorly designed prosthesis.¹

The dental hygienist and therapist's role can be instrumental in preventing and controlling bacterial infection (peri-implantitis) with

routine in surgery implant maintenance care, which includes safe instrumentation and polishing of implant(s) every 3-4 months.

Step 1: Review of the patient's medical history

The patient's medical history and overall health should be updated and reviewed at every implant maintenance appointment. Any changes in the patient's health status could impact on the implants or treatment. If the patient has uncontrolled diabetes for example, this can increase the risk of peri-implantitis and ultimately implant failure. Implant dentistry is true interdisciplinary dentistry, requiring close collaboration with the surgical practice, the dental laboratory, and the patient's physician. Overall good general health is one of the keys to

the success of the implant(s) and may affect the length of time between implant maintenance appointments.²

Step 2: Assessment of implants

Implant assessment starts with a visual soft tissue examination of the perimucosal seal and should be carried out at every maintenance appointment. Any signs of inflammation or bleeding, including peri-mucositis (a reversible inflammatory reaction with no bone loss) or peri-implantitis (an irreversible inflammation with bone loss) should be recorded. It is important to record any clinical symptoms present, such as pain and mobility of the implant. Finally, accurate radiographs are the best assessment and enable you to monitor the crestal bone level.

Visual soft tissue assessment

The soft tissue should be visually examined for colour, texture, form, bleeding, and inflammation (see figure 2). The assessment and any tissue changes should be recorded in the patient's records as well photographically, with an intra-oral or digital camera. This photograph or digital image can be used to help educate the patient about what healthy tissue looks like and, if any inflammation is present, can be an excellent visual tool to reinforce the importance of good home-care.

Protocol for inflammation

Having undertaken the soft tissue assessment and noted redness, inflammation, or bleeding, the first step is to check for the presence of calculus deposits around the implant. The peri-implant tissues cascade from

1. Review patient's medical history
2. Assess and monitor the implant
3. Safe instrumentation and polishing of implants
4. Make home-care recommendations

Figure 1: Steps for in surgery implant maintenance therapy

Colour:	pink, red, purple, cyanotic
Surface texture:	stippled, glossy, fibrotic
Size and shape:	tight, enlarged, cratered
Bleeding:	spontaneous, none
Inflammation:	present or not present
Exudate:	present or not present
Implantitis:	peri-implantitis or peri-mucositis Keratinized or non-keratinized tissue

Figure 2: Soft tissue assessment

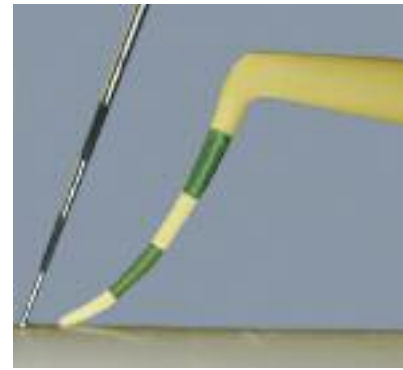


Figure 5 EasyView PDT probe and metal probe



Figure 3: Normal



Figure 4: inflammation

in the patient's notes along with any signs of inflammation present at the first implant maintenance appointment (3 months following prosthesis placement).^{5,6} Continue to record and monitor by comparing measurement to baseline, at every implant maintenance appointment and if probe depths have changed refer to the dentist. (See guidelines for safe probing around implants figure 6.)

peri-mucositis to peri-implantitis in a similar progression to that of gingivitis and periodontitis around natural teeth.³ However peri-implant infections can progress more rapidly than infection around natural teeth, a key consideration in the recommended three-month implant maintenance appointments, especially in the first year following placement of an implant prosthesis.² If an infection is present, the dental hygienist or therapist will evaluate for pain, mobility, and gather all the data for the dentist to develop a treatment plan. The plan may include shortening the interval between implant maintenance visits, possible antibiotics, a radiograph, and/or the dentist may refer the patient for a specialist evaluation.

Visual examination upon probing

Current protocol for probing around the implant is controversial: to probe or not to probe? Some implant surgeons recommend not probing the implant, or waiting three months, following abutment attachment to avoid disrupting the perimucosal seal.⁴ The perimucosal seal is fragile and penetration during probing can introduce pathogens and jeopardize

the success of the implant. If you have elected to probe, a number of considerations and guidelines should be followed when probing the tissue surrounding an implant. First, a flexible plastic probe is recommended to reduce the risk of scratching the implant's surface and reduces the potential for trauma to the perimucosal seal (Figure 5).

Secondly, use the probe as a *measuring device* for inflammation documentation or to measure exposed implant threads for monitoring. Establish a baseline measurement by identifying a location on the restoration as a monitor marker and gently probe to check the clinical parameters. Record this information

Visual signs of failing implant

The signs of a failing implant are presence of infection, pain, mobility, or unacceptable bone loss. Pain or discomfort around an implant may be the first sign of a failing implant, before it is evident on a radiograph. If pain is present, the dentist will need to evaluate whether this is due to occlusal trauma or infection. An occlusal adjustment may be necessary since an implant is held in place by bone not by the periodontal ligament and does not respond like a natural tooth to occlusal trauma. Mobility following osseointegration can be present due to a loose fixed

- Place the probe parallel to the long axis of the implant, identify a location on the restoration as a monitor marker, and gently probe using a plastic probe to check the clinical parameters.
- Record the baseline after the initial three months. Also, for new patients record an existing probe reading, placement date, or any other details the patient can supply for you.
- Record any visual changes, inflammation or bleeding.
- Report findings to the dentist for evaluation.

Figure 6: Guidelines for safe probing around implants

restoration, an infection, a loose or fractured abutment thread, an implant fracture or trauma. If the mobility is due to a loose crown, it may be possible to re-cement it or re-screw it (depending on the type of abutment). If there is mobility of the implant itself or a broken screw, this is a greater cause for concern. A radiographic assessment is your best tool to determine the cause of the mobility.

Monitoring the implant

This final step in assessment and monitoring of the dental implant(s) is a critical one. A radiograph assessment using a measurable device is recommend to accurately monitor the crestal bone level around the implant(s) and to verify that the restoration is seated properly on the implant following placement of the restoration. (Figure 7.)

Radiographs should show indentations in the implant, or the screw clearly in focus to verify visual confirmation that the abutment, which should appear as a clear line, is properly seated. Subsequent radiographs are used to determine if any crestal bone loss around the implant has occurred and, if so, to measure this. A measurement of 0.5 mm to 1 mm horizontal bone loss is acceptable in the first year, with an anticipated 0.1 mm of bone loss each subsequent year.⁷ If more than 1 mm of horizontal or vertical bone loss is detected in the first year, an evaluation by the implant surgeon is recommended. To enable accurate

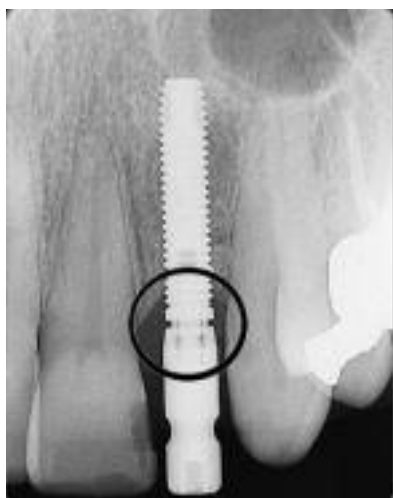


Figure 7: Radiograph of implant with seated restoration clearly in focus

For 1-4 Implants: Make a vertical bitewing or periapical film at prosthesis placement at 6 monthly and 1 year intervals.

For 5 implants: panoramic or full mouth series at prosthesis placement, 6 monthly and 1 year intervals.⁹

Figure 8: Radiographic guidelines to monitor bone level

determination of the crestal bone level follow the radiographic guidelines for protocol on monitoring bone levels in figure 8.

Step 3: Safe instrumentation and polishing of dental implants

After careful implant assessment the dental hygienist or therapist needs to ascertain if calculus is present on the implant or abutments. Minimal, or indeed no, instrumentation may be necessary for an implant with a healthy gingival attachment. Calculus or microbial deposits are primarily supragingival, softer and easily removed with short strokes following a protocol for safe instrumentation. Care must be taken by the clinician to avoid scratching or roughening the implant surface, as this may provide a niche for bacterial accumulation and subsequent inflammation.

Protocol for safe instrumentation

Instrumentation of an implant differs from scaling a natural tooth. Natural teeth are anchored in the bone by the periodontal ligament and sulcular epithelium, while implants are osseointegrated, with direct contact between bone and the dental implant. When instrumenting a natural tooth, the instrument blade is adapted to the tooth surface and gently inserted between the sulcular epithelium and the side of the tooth or root. Vertical, horizontal, and oblique strokes are used to remove calculus deposits.

Dental implant instrumentation

Proper implant instrumentation includes removing microbial deposits without altering the implant surfaces or adversely affecting biocompatibility.⁹ Scratches and

gouges may affect the titanium-oxide layer, reducing the corrosion-resistant nature of a titanium implant. The implant surface can also become contaminated with trace elements from the scaler material that remains, which can compromise the long-term osseointegration of the implant.¹⁰ Plastic, graphite and titanium scalers are all within safe limits for instrumenting on implant surfaces.¹¹ Studies using scanning electron microscopy showed these implant instruments produced no scratches or gouges on the implant surface. Recent studies have not evaluated the effectiveness of these instruments for calculus removal or the effects of instrument debris left on the implant surface. According to a 1990 Journal of Periodontology study, authors Dmytryk, Fox and Moriarty state,

“Although the use of a plastic curette did not significantly roughen the implant surface there was concern that some of the plastic material may have been smeared or deposited on the implant surface, perhaps altering the biocompatibility of the titanium surface.”¹²

Dr. Jim Driver, in a current SEM study noted *“Plastic instruments had no effect on the implant surfaces but they did leave plastic debris that was firmly attached to the surface as if melted or embedded to it.”* These research results serve to highlight the fact that more studies are needed to evaluate the effects of instrument debris left behind on the implant surface, and the biocompatibility of this debris with the titanium implant surface.

Stainless steel instruments and metallic power scaler tips have been shown to gouge or scratch the implant surface and are therefore contraindicated.¹³ However power scalers and air powder abrasive systems can be used with specific tips, sleeves and powder formulated for implants.¹⁴ Caution should be employed when using a plastic sleeve on a power scaler’s tip to prevent

aspirate of the plastic tip, should it become dislodged.

Current implant instruments on the market are; plastic, graphite, titanium coated or solid titanium. Titanium is the metal of choice because it produces instruments which are thinner than plastic or graphite instruments yet provides more strength to dislodge calculus. They are also more biocompatible with like metals since implants are made of titanium. This avoids leaving trace elements from a scaler on the implant surface.

Plastic, graphite and titanium-coated implant scalers

Implant Prophy+™ from TESS are manufactured from polycarbonate plastic and include Gracey and Columbia designs. ImplanCare™, Hu-Friedy feature a sturdy handle and plastic disposable tips in several designs. Premier Dental Facial implant scalers are made of nonmetallic, autoclavable graphite. Titanium-coated Suvan-O'Hehir implant scoop curettes are available from G. Hartzell and Son.

Solid titanium implant scalers

ImplantPro™ from Brasseler is available in the Langer series with replaceable titanium tips. Nordent makes ImplaMate™, also in the Langer series, Barnhart and universal scalers. The newest in the market are the Wingrove Series, made by Paradise



Figure 11: Suvan-O'Hehir scoop titanium-coated curettes

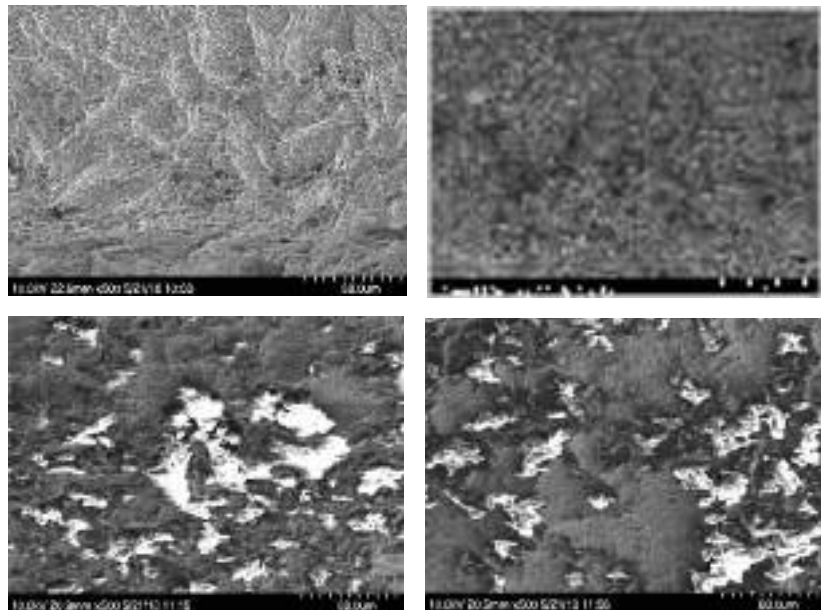


Figure 9: SEM photos - Top left: Control implant surface, Top right: Photo-Implant surface after titanium scaler, Above left: surface after plastic scaler, Above right: Photo-Implant surface after graphite scaler

Dental Technologies (PDT), uniquely processed titanium will not scratch or leave any debris behind on implants. These are available in a series of three professionally designed scalers to adapt specifically to meet all the challenges of implant maintenance in a go-to set.

Every dental surgery should have at least one go-to implant instrument set for each dental hygienist, consisting of the instruments needed to meet all implant maintenance challenges. These challenges include removing calculus from a variety of implants and restorative choices. Some are narrow base implants (narrow platform used for lower incisors, congeniality missing laterals, and area with limited available bone) while others have a wide base or wide platform. High water bridges as well as full-arch cement or screw retained implants are difficult to access. Also a small diameter instrument is needed to fit under a Hader clip bar or around O-ring ball or locator abutment that are used under overdentures.

Selecting the proper instrument to remove calculus deposits and not harm the implant surface is critical. For narrow base posterior implants or implants that replace two adjacent teeth, select a longer bladed instrument

to stretch under the more bulbous-shaped crowns and under framework of a high water bridge or full arch implant retained prosthesis. Short horizontal scaling strokes should be used to dislodge the calculus present on these implants, crowns or frameworks. For wide-base posterior implants, a universal posterior implant scaler should be used with short vertical strokes to dislodge the calculus. To scale any



Figure 12: Wingrove™ solid titanium Go-to Set

exposed implant threads; anterior or posterior use a shorter radius blade tip of an instrument carefully in a side-to-side motion one thread at a time.

For overdenture implant abutment patients remove the denture and assess the O-rings or clips inside the denture for loss or wear. Replace O-rings or plastic retention clips if worn out, or replace at least once a year.¹⁵ For hygiene maintenance on overdentures, follow routine directions for proper ultrasonic cleaning and be careful of O-rings or clips.

To scale the abutments under an overdenture adapt a thinner radius blade tip instrument to adapt under a Hader clip bar in a side-to-side stroke and a shorter radius tip instrument in short vertical strokes around a ball or locator abutment to dislodge any calculus. Understanding various implant designs and having the proper instruments for the safe implant maintenance will allow you to provide your patients with the ideal implant care to ensure the long-term success of their implants.

Polishing dental implant restorations

Basic steps for proper coronal polishing around implants include using a soft rubber tip, not brush, with appropriate nonabrasive paste. Aluminum oxide, tin oxide, APF-free prophy paste, and low-abrasive dentifrice are all considered acceptable polishing abrasives for implants.¹⁶ Coarse abrasive polishing pastes are contraindicated, as is air-polishing.¹⁷ It should be noted that acidulated phosphate fluoride (APF) products are also contraindicated, as they may etch the surface of implants.¹⁸ It may be helpful to polish first around implants with an acceptable polishing paste (i.e. Next fine polishing paste with



Figure 13: Wide based implants; short vertical strokes

diatenous earth, no pumice) to remove any plaque or debris present and to then determine if deposits need instrumentation.

Summary

After osseointegration has been confirmed and the final prosthesis or restoration is complete, the patient is largely responsible for the success of an implant and needs to understand the importance of proper in-surgery implant maintenance appointments every three months for the first year to help prevent infection or failure of the implant. After one year a mature level of bone surrounds the implant,¹⁹ and the interval between maintenance visits should be based on the patient's general health, assessment of the implant, and home care. The dental hygienist or therapist plays a key role in the success of dental implants for the patients by providing the education, assessment, safe implant maintenance and home-care recommendations.

References

1. Paquette DW, Brodala N, Williams RC. Risk factors for endosseous dental implant failure. *Dental Clinics of North America* 2006; **50**(3): 361-374.
2. Palmer RM, Pleasance C. Maintenance of osseointegrated implant prosthesis. *Dental Update* 2006; **33**: 84-86.
3. Esposito M, et al. Differential diagnosis and treatment strategies for biologic complication and failing oral implants: a review of the literature. *International Journal of Oral and Maxillofacial Implants* 1999; **14**: 473-490.
4. Bauman GR, et al. Clinical parameters of the evaluation during implant maintenance. *International Journal of Oral and Maxillofacial Implants* 1992; **7**: 220-227.
5. Mombelli A, et al. Comparison of periodontal and peri-implant probing by depth-force pattern analysis. *Clinical Oral Implant Research* 1997; **8**: 448-454.
6. Misch CE. *Contemporary Implant Dentistry*. (3rd ed). St. Louis: Mosby 2008 (pp 116).
7. Misch CE. *Contemporary Implant Dentistry*. (3rd ed). St. Louis: Mosby 2008 (pp 1061).
8. Lekholm U, et al. Osseointegrated implants in the treatment of partially edentulous jaws; a prospective 5-year multicenter study. *International Journal of Oral and Maxillofacial Implants* 1994; **9**: 627-635.
9. Meschenmoser A, et al. Effects of various hygiene procedures on the surface characteristics of titanium abutments. *Journal of Periodontology* 1996; **67**: 229-235.
10. Klauber C, Lenz LJ, Henry PJ. Oxide thickness and surface contamination of six endosseous dental implants determined by electron spectroscopy for chemical analysis: a preliminary report. *International Journal of Oral and Maxillofacial Implants* 1990; **5**: 264-271.
11. Fox SC, Moriarty JD, Kusy RP. The effects of scaling a titanium implant surface with metal and plastic instruments: An in vitro study. *Journal of Periodontology* 1990; **61**: 485-490.
12. Dmytryk JJ, Fox SC, Moriarty JD. The effects

About the author:

Susan Wingrove is a practising dental hygienist in a private practice as well as a clinical advisor, writer, and educator for The Implant Consortium. She does instrument design for Paradise Dental Technologies and is the designer of the Wingrove™ titanium implant instruments. Susan is also a National/ International speaker on Regeneration, Peri-Implant Therapy, and Advanced Instrumentation, as well as a Fellow & Certified Educator for the ADIA.

Address for correspondence: sswinrdh@gmail.com

Acknowledgements: My thanks to:

Dr. Robert Schneider DDS, MS University of Iowa Hospitals and Clinics Div. of Maxillofacial Prosthodontics for lending me the images used in Figures 3 & 4.

Dr. Jim Driver, UM Division of Biological Science, 2010 for the SEM photos used in Figure 9.

G.Hartzell & Son for the image used in Figure 11.

of scaling titanium implant surfaces with metal and plastic instruments on cell attachment. *Journal of Periodontology* 1990; **61**: 491-496.

13. Hallmon W, et al. A comparative study of the effects of metallic, nonmetallic, and sonic instrumentation on titanium surfaces. *International Journal of Oral and Maxillofacial Implants* 1997; **11**(1): 96-100.

14. Sato S, Kishida M, Ito K. The comparative effect of ultrasonic scalers on titanium surfaces: an in vitro study. *Journal of Periodontology* 2004; **75**(9): 1269-1273.

15. Staubli P, Bagley D. Attachments and implants reference manual, 8th ed., San Mateo, CA: Strong Design 2007.

16. Matarasso S, et al. Maintenance of implants: an in vitro study of titanium implant

surface modifications subsequent to the application of different prophylaxis procedures. *Clinical Oral Implant Research* 1996; **7**(1): 64-72.

17. Bergendal T, et al. The effects of air abrasive instrument on soft and hard tissues around osseointegrated implants. *Swedish Dental Journal* 1990; **14**: 219-223.

18. Matono Y, et al. Corrosion behaviour of pure titanium and titanium alloys in various concentrations of Acidulated Phosphate Fluoride (APF) solutions. *Dental Materials Journal* 2006; **25**(1): 104-112.

19. Albrektsson T, et al. The long-term efficacy of currently used dental implants: a review and proposed criteria of success. *International Journal of Oral and Maxillofacial Implants* 1986; **1**(1): 11-25.

Third Annual National Research Day for DCPs

Saturday, 3 December 2011

at the Royal College of Surgeons of England

The third annual national research day for Dental Care Professionals will take place on Saturday, 3 December 2011 in Committee Rooms 1 and 2 at the Royal College of Surgeons of England. The day is organised by the Faculty of General Dental Practice (UK) in collaboration with the British Society of Dental Hygiene and Therapy, with co-sponsorship from Proctor and Gamble.

The theme for the day is The Way Forward. Speakers will include a range of DCPs who are currently involved in research and who will share their experiences with the audience. Their topics will include: How dental hygienist research has developed in the Netherlands; a journey towards a PhD; research into the interactions between dental laboratories and dental practices; and interim reports of the results of a dental hygienist and clinical dental technician survey. There will be small discussion groups during both the morning and afternoon sessions.

Due to generous sponsorship there is no fee for the day. Tea, coffee and lunch are provided and those attending may claim 5 hours of verifiable CPD. To register for the day, please e-mail Amrita Narain (anarain@rcseng.ac.uk).

FIRST ASSIST

Remember – all BSDHT members have their Association membership card with the **FirstAssist** telephone number on it. **FirstAssist** is a 24 hour legal help line and is there to advise you or your family on any legal matter including employment problems, motoring queries or matrimonial difficulties.

NO SCRATCHING

NO DEPOSITING

JUST SCALING

WINGROVE
TITANIUM
IMPLANT SCALERS

SWALLOW
DENTAL SUPPLIES LIMITED

8 Ryefield Court, Ryefield Way
Silsden, BD20 0DL
TEL: 01535 656 312

CALL FOR OFFERS

www.swallowdental.co.uk
sales@swallowdental.co.uk