Oral Health Maintenance of Dental Implants

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Continuing Education Units: 2 hours

Disclaimer: Participants must always be aware of the hazards of using limited knowledge in integrating new techniques or procedures into their practice. Only sound evidence-based dentistry should be used in patient therapy.

In recent years, the demand for dental implants has risen greatly. Not only have techniques improved, but the benefits that implants provide patients have increased as well. Dental implants can improve appearance, confidence, and self-esteem; preserve remaining teeth; improve a person's ability to speak and masticate properly; and eliminate the need for full and partial dentures.

Conflict of Interest Disclosure Statement
• The authors report no conflicts of interest associated with this work.

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Overview
In recent years, the demand for dental implants has risen greatly. Osseointegrated dental implants are being placed with increased frequency. It is estimated that approximately 1 million dental implants are placed in the United States annually. Not only have placement techniques improved, but the benefits that
Implants provide for patients have increased as well. Dental implants improve appearance, confidence, and self-esteem. Implants also preserve remaining teeth, improve a person’s ability to speak and masticate properly, and eliminate the need for full and partial dentures. Because dental implants present a significant financial investment and require long-term maintenance by the patient for a healthy peri-implant environment, the direct impact of oral hygiene maintenance by the patient will determine long-term prognosis and success of the dental implant.

The mucoperiosteal-implant seal is the major factor in determining long-term prognosis. Indigenous oral bacteria attaching to dental implant surfaces can lead to the breakdown of the biological seal surrounding the dental implant. Although the junctional epithelium attachment for dental implants is similar to natural dentition, the connective tissue interface with the dental implant has poor mechanical resistance. The peri-implant disease process resembles periodontitis. However, treatment and maintenance are more complex. The tissues around dental implants react to bacteria similarly to the tissues around natural teeth. In fact, plaque develops more rapidly and in larger amounts around titanium implant abutments than around natural teeth. Therefore, close cooperation and teamwork among dental providers and their patients is essential to the success of dental implant procedures. Many of the current home care treatments for periodontal maintenance of natural teeth also can be used with dental implants, but a better understanding of oral health maintenance by the patient is crucial for the health and longevity of dental implants.

Learning Objectives

Upon completion of this course, the dental professional should be able to:

- Understand the importance of oral hygiene maintenance as it applies to the success rate for implants.
- Describe the different uses of auxiliary aids and antimicrobial rinses.
- Explain the correct usage of an oral irrigator around implants.
- List the components of a clinical assessment during recare visits.
- Discuss the usage of metal instruments on the implant surfaces.

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Glossary

*antimicrobial* – Destroying or preventing the development of microorganisms; also, an agent with such activity.

*bacteremia* – Introduction of bacteria to the bloodstream.

*bacteriostasis* – Inhibition of bacterial growth without destruction.

*crevicular* – Pertaining to a crevice, particularly the gingival crevice.

*cytotoxic* – Destructive to cells.

*embrasure* – V-shaped space between the proximal surfaces of adjacent teeth.

*fibroblast* – Cell that develops connective tissue.

*galvanic* – Of or relating to direct-current electricity, especially when produced chemically; also having the effect of an electric shock.

*junctional epithelium* – Cufflike band of stratified squamous epithelium continuous with the sulcular epithelium encircling the tooth providing a seal at the base of the sulcus.

*osteolytic* – Pertaining to the loss of bone.

*osseointegration* – Attachment of healthy bone to an implant.

*pellicle* – Thin coating of salivary materials that are deposited on tooth surfaces.

*peri-* – Prefix: around or surrounding (for example, “peri-oral” means “surrounding the mouth”).
pontic – An artificial tooth.

radiolucent – Allowing radiation to pass through, presenting as a dark area on a radiograph.

substantivity – A property of certain active ingredients that inhibits growth of bacteria on the skin and other body tissues.

Preventive Maintenance
If the titanium oxide layer of the dental implant is disrupted during oral hygiene procedures, the soft tissues may be exposed to titanium metallic ions that can cause potentially cytotoxic reactions compromising the dental implant. Therefore, detailed instructions by the dental professional should be given initially to the patient and reinforced at each recare appointment to prevent trauma or infection to the sulcus around the implant. The removal of early microbial accumulation on the dental implant surfaces and the elimination of at least 85% of plaque biofilm by the patient are crucial for long-term peri-implant success. The preventive maintenance steps for dental implants involve two distinct aspects: (1) patient self care, and (2) clinical maintenance procedures.

Patient Self Care
No single device has been shown to remove plaque from all surfaces of an implant reconstruction. While there are numerous types of brushes, threading systems, flosses, and other oral hygiene devices on the market, the literature substantiates the need to minimize the number of devices prescribed for patient self care. Patient compliance, an essential aspect of any maintenance program, predominantly depends upon the relative simplicity of a procedure, the time required, and a minimum number of devices being employed. Studies indicate when multiple oral hygiene devices are prescribed, patients can become discouraged and as a result, may be less motivated. However, research shows additional plaque inhibition with a combination of toothbrushing, auxiliary aids, and antimicrobial mouthrinses. For this reason, it is important to consider appropriate combinations when making recommendations to individual patients.

Manual and Power Toothbrushing
Various types of toothbrushes may be used to clean implant superstructures. Exposed facial and lingual areas of the dental implant, its fixed and/or removable prosthesis, and surrounding gingival tissues can be cleaned using a soft, multi-tufted, nylon toothbrush. There are many different brush handle angles from which to choose. The dental professional should assist the patient in choosing a handle that allows the patient to successfully access all areas of the oral cavity. The modified Bass technique should be used, or a short, horizontal back-and-forth movement can be employed. In the modified Bass technique, the brush is held at a 45-degree angle where the abutment post meets the gingival tissue (Figures 1 & 2). Patient toothbrushing techniques often miss cleaning the most lingual aspect of the titanium abutment cylinders, so patients must be instructed to give special attention to the lingual aspects.

Rotary, uni-tufted power brushes (Figure 3), oscillating-rotating brushes (Figure 4) and sonic brushes (Figure 5) do not damage polished implant surfaces and also can be safely used to clean the facial, lingual, and interproximal areas of the implant. Many power brushes are equipped with soft interchangeable bristle heads (flattened, rubber-cup-like, short and long pointed in shape). The short and long pointed tips are ideal for reaching proximal areas of the tooth, those areas...
with wide embrasures, and those areas located beneath the pontic portion of a fixed bridge. The hollowed, rubber cup should be used on the facial and lingual aspects of the implant and adjacent teeth. The brush tip should be dipped in a 0.12% solution of chlorhexidine gluconate (i.e., Zila Pharmaceuticals’ Peridex® or Colgate’s PerioGuard®). Research associated with the utilization of this solution shows a reduction in certain bacteria by 54-97% after six months use. The very fine bristles of the Rotadent® simultaneously debride the implant surface and deliver the antimicrobial solution to the crevicular area. One oral hygiene implant study examined the Rotadent® and the Proxabrush Interdental System® (manual interproximal cleaning aids from the Sunstar Americas, Inc.) (Figure 6). Results demonstrated “virtually no change in surface appearance from the original machined implant and its surface irregularities.”

**Auxiliary Aids and Antimicrobial Rinses**

In certain situations, interproximal brushes with small brush heads such as a Sunstar Americas GUM® End-tuft (Figure 7) may be necessary to gain easier access. However, such devices must be plastic-coated because metal can damage or contaminate an implant’s titanium surface.

An interdental brush (Figure 8) can be used to massage the gingival tissue around an implant to increase blood flow and enhance the tone of the surrounding gingiva. The patient should be instructed to insert the tip interdentally in an occlusal direction, pressing the side of the tip against the marginal gingiva and applying a gentle rotary motion.

Oral-B Super Floss® (Figure 9), a wide band of ribbon with one end designed for use as a threading device, can be threaded around
abutments and beneath frameworks. Especially designed for implant care, Super Floss® or Postcare® by Sunstar Americas, Inc. (Figure 10) can be used in conjunction with chlorhexidine gluconate. Used in the manner of a “shoe-shine rag” (i.e., a side-to-side motion), the ribbon polishes the back and sides of the post from top to bottom. This cleansing action produces positive results for plaque control around fixtures and abutment cylinders, as well as the cervical aspect. In areas with smaller interproximal dimension, traditional unwaxed floss may be used with a floss threader (Figure 11).

The oral irrigator is a beneficial adjunct for removing supragingival soft debris around implants. However, caution must be exercised by the patient when using this device. Incorrect use and excessive water pressure can damage the junctional epithelium, leading to bacteremia. To prevent these problems, patients must receive instruction to use the lowest water-pressure setting. Furthermore, patients are educated to place the irrigator tip in the interproximal area horizontal to the implant and along its gingival margin to avoid subgingival spray. An oral rinse containing chlorhexidine gluconate or phenolic compounds (Listerine®, Johnson & Johnson) may be used as an irrigant.

Microbial plaque plays a major role in both adult periodontitis and peri-implantitis. Similar microbial flora are found around the gingival crevices of both adult periodontal disease and failing implants. The regular use of chemotherapeutic agents such as antiseptic mouthrinses may be recommended to the dental implant patient to combat these concerns.

Chlorhexidine gluconate is a safe, nontoxic adjunct to other oral hygiene procedures in the maintenance of dental implants. An American Dental Association-accepted chlorhexidine...
against dental implant surfaces. Some clinical researchers suggest that periodontal probing be performed at infrequent intervals at one site (the same site each time) with light pressure. As with natural dentition, the dental professional must be careful not to contaminate the implant sulcus with bacteria from a diseased periodontal sulcus. It is recommended that the periodontal probe be dipped in chlorhexidine between measurements to avoid contaminating a healthy site with microflora from a diseased site.

Although 3 mm is considered healthy for natural dentition, probing depths for implants can range from 2.5-5 mm depending on soft tissue depth, as the probe goes beyond the sulcus, through the junctional epithelial attachment and connective tissues, placing it closer to the alveolar bone. As a rule, the ideal sulcus depth should be less than 5 mm, as sulcus depths greater than 5-6 mm have a potential for anaerobic bacteria. Increased probing depths have been correlated with failing implants; 58% of failing implants are characterized by pocket depths greater than 6mm. The world-renowned Brånemark Group found that an average marginal bone loss of 1.5 mm occurred during the first year of prosthesis connection and an average of 0.1 mm every year thereafter. Any bone loss exceeding these averages should raise concern.

The major difference between gingival attachment to a natural tooth and a dental implant is that the implant surface lacks cementum with connective tissue fiber inserts. Gingivitis most likely progresses to periodontitis around the implant due to the unreliability of the perimucosal seal and the lack of fiber barriers between the implant and the soft tissue of the sulcus.

When examining the implant, the dental professional must chart the presence of plaque and calculus deposits around the implant surfaces. The bacteria responsible for periodontitis are the same for peri-implantitis. These pathogenic bacteria are gram-negative anaerobic bacteria, including: Bacteroides forsythus, actinobacillus actinomycetemcomitans, porphyromonas gingivalis, and Treponema denticola shown to contribute to failing implant sites. After the soft tissue has been examined, the next step is to evaluate mobility of the implants, transmucosal abutments, and prosthetic
Conventional metal curettes, as well as sonic and ultrasonic scalers, cause considerable changes to the implant surface. Only instruments made of plastic, graphite, nylon, or those with a Teflon®-coating should be in contact with the implant. The use of a dissimilar metal (such as stainless steel) on titanium may lead to corrosion. The use of these dissimilar metals on implant surfaces have been studied in vitro, comparing the number of human gingival fibroblasts attaching to the surface of a commercially pure titanium-alloy curette. Results showed a significant reduction in the number of fibroblasts attaching to titanium implants that had been scaled with the stainless-steel curette when compared to the plastic and titanium scalers.

Ultrasonic instrumentation continues to be contraindicated with dental implants. Ultrasonic scalers may severely disrupt the titanium dioxide surface, leading to a multitude of grooves and a roughened surface, which can lead to further plaque retention and a compromised implant. A study utilizing a modified ultrasonic instrument with a custom-designed delvin plastic tip showed that the standard ultrasonic instrument caused considerable scratching and gouging to the titanium implant. Shallow scratches made with the metal ultrasonic could be polished smooth, but the deeper scratches could not. The modified ultrasonic instrument produced noticeable but minimal changes that when polished did not appear to be microscopically different from the polished control. The modified ultrasonic instrument may be a promising device for maintenance of the dental implant. No definite answer can be made concerning ultrasonic use for implants at this time.

Although air polishing on implant surfaces was controversial in the past, recent studies have shown air polishing to be effective and safe for maintenance procedures. After calculus deposits have been removed, the prosthesis and abutments may be selectively polished with a rubber cup and a nonabrasive fine polishing paste. Rubber cup polishing alone appears to be the least abrasive treatment using a prophylaxis paste, commercial implant pastes, or tin-oxide. However, paste deposits will be left on the implant surfaces. A rubber point may also...
be used. After polishing, the implant surfaces should be gently irrigated with water to avoid any adverse tissue healing. An antimicrobial solution should be applied to the peri-implant tissues.

If a dental implant is displaying increased probing depths, bleeding, or any other indication of the onset of failure, a controlled drug delivery system, such as Arestin® by OraPharma, Inc., can be applied. These systems contain a tetracycline-loaded fiber that is designed to slowly release the antibiotic over a ten-day period. The fibers can be used in single or multiple sites and may provide additional benefits to conventional scaling and root planing.

A strict prophylaxis recare schedule should be established and maintained to monitor the oral health findings in dental implant patients. The patient is often seen for comprehensive oral hygiene instructions and soft-tissue examination within the first week after the prosthesis is placed. A follow-up visit is scheduled for one month later. At this appointment, the clinician reviews the adequacy of self care procedures and re-evaluates the health of the peri-implant tissues. After the one month follow-up, a three-month recare schedule is suggested for a one-year duration. Depending on patient self care and the individual’s periodontal status, the patient may then be placed on a six-month recare schedule after the first year. During the first two years, no more than six months should elapse between recare visits.

**Conclusion**

The dental professional’s role is to determine the dental implant patient’s individual and specific self care needs. Recommendations and instructions to patients are often determined by the prosthesis design, location and angulation of the implants, the length and the position of the transmucosal abutments, and other factors such as patient habits (i.e. smoking,) motivation to perform consistent self care and the patient’s manual dexterity. It is important to recommend individualized auxiliary aids to gain and maintain appropriate self care and compliance. To ensure optimal peri-implant health, the patient must maintain daily biofilm removal and maintain regular professional care. To achieve long-term success, it is important to maintain a prophylaxis recare schedule at which evaluations are performed to assess gingival, bone, and implant health.
**Course Test Preview**

To receive Continuing Education credit for this course, you must complete the online test. Please go to www.dentalcare.com and find this course in the Continuing Education section.

1. _______________ is the major factor in determining long-term prognosis of the dental implant.
   a. The mucoperiosteal-implant seal
   b. Using the high-speed handpiece during the procedure
   c. The frequency of professional recare visits
   d. Using power toothbrushes

2. The peri-implant disease process resembles periodontitis. The dental implant can be compromised if the titanium oxide layer of the implant is disrupted.
   a. Both statements are true.
   b. The first statement is true. The second statement is false.
   c. The first statement is false. The second statement is true.
   d. Both statements are false.

3. Plaque develops more __________ and in __________ amounts around titanium implant abutments than around natural teeth.
   a. slowly / smaller
   b. rapidly / smaller
   c. rapidly / larger
   d. slowly / larger

4. _______________ has been shown to best remove plaque from all surfaces of an implant.
   a. Brushes
   b. Floss
   c. Threading systems
   d. No single technique

5. Studies indicate that when multiple oral hygiene devices are prescribed, at one time, the patient _____________.
   a. may become discouraged and less motivated
   b. may become more motivated and encouraged
   c. overly zealous with home care
   d. overwhelmed and stop self care completely

6. The _______________ technique is the preferred toothbrushing method for dental implants.
   a. Fones
   b. Modified Bass
   c. Modified Stillman
   d. Charter’s

7. When cleaning an implant, oral hygiene auxiliary devices, including scalers and periodontal probes, should be _____________.
   a. metal to remove all debris from implant
   b. made from same material as the implant
   c. plastic coated
   d. titanium
8. The oral irrigator may be utilized with caution on dental implants as incorrect use or excessive water pressure can lead to damage of the junctional epithelium and cause ________________.
   a. bacteremia
   b. bacteriostasis
   c. osteolytic
   d. osseointegration

9. The mouthrinse containing ________________ aids in the fibroblast attachment to implant surfaces.
   a. chlorhexidine gluconate
   b. phenolic compound
   c. plant alkaloids
   d. tetracycline

10. Gingivitis around dental implants most likely progresses to periodontitis due to ________________.
    a. the unreliability of the perimucosal seal
    b. the lack of fiber barriers between the implant and the soft tissue of the sulcus
    c. lack of patient knowledge
    d. A and B

11. As a rule, the ideal sulcus depth around a dental implant should be no more than _______ mm.
    a. 2
    b. 2.5
    c. 5
    d. 6

12. The most important evaluation tool and the most reliable method to determine implant failure is ________________.
    a. mobility
    b. radiographs
    c. probing depths
    d. tissue tone

13. Ultrasonic instrumentation should ________________ be used with dental implants.
    a. never
    b. usually
    c. always
    d. rarely

14. If an implant is displaying increased probing depths, bleeding, or other indications of the onset of failure, the clinician should ________________.
    a. have the patient step up home care maintenance to three times a day
    b. remove the implant before more damage is done
    c. apply a controlled drug delivery system
    d. see the patient on a weekly basis until condition is under control
15. A strict prophylaxis recare schedule should be established and maintained to monitor oral health findings in implant patients, and no more than ________ month(s) should elapse between oral hygiene/recare visits.
   a. one
   b. three
   c. twelve
   d. six

16. An increase of dental implants has risen greatly due to ________________.
   a. improved placement techniques
   b. improved speech and mastication
   c. improved patient confidence and self esteem
   d. All of the above.

17. The ________________ is/are crucial for long-term peri-implant success.
   a. removal of early microbial accumulation
   b. elimination of at least 85% of plaque biofilm
   c. prophylaxis recare schedule to assess gingiva and bone health
   d. All of the above.

18. Treatment of both adult periodontitis and peri-implantitis may begin with effective microbial plaque removal and ________________.
   a. surgical removal of any inflamed tissue
   b. yearly in-office prophylaxis
   c. regular use of chemotherapeutic mouthrinses
   d. regular use of systemic medication

19. A 30 second rinse of 0.12 percent concentration of chlorhexidine can inhibit ______ percent of the cultivable bacteria for approximately ______ hours.
   a. 90 / 5
   b. 80 / 4
   c. 70 / 3
   d. 60 / 2

20. To ensure optimal peri-implant health, the dental professional must determine the patient’s individual and specific self care needs, such as ________________.
   a. habits such as smoking
   b. oral health motivation
   c. manual dexterity
   d. All of the above.
References


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