

Maintenance protocol for implant supported restorations: An overview

Himanshu Aeran^{1,*}, Varun Kumar², Mudita Sood³, Lakshya Vishnoi⁴

¹Director Principal and Head, ²Professor, ³PG 3rd Year, ⁴Intern, Dept. of Prosthodontics & Oral Implantology, Seema Dental College & Hospital, Rishikesh, Uttarakhand, India

***Corresponding Author: Himanshu Aeran**

Email: drhimanu@yahoo.com

Abstract

In the recent years, implants have emerged as a very successful treatment modality to replace missing teeth. The success of implant therapy depends upon adequate diagnosis and treatment planning. There is a direct relationship between the success of implant therapy and oral hygiene maintenance of dental implants. A clear directive must be established by every clinician for the implant maintenance protocol with routine clinical evaluation of implants. Clinicians must be well versed with the means to assess and maintain implants along with the techniques and instruments to be used. The patients must be made aware to set up an adequate home care ritual for long term success of dental implants. This article explains implant assessment, monitoring, and home & in office maintenance protocol.

Keywords: Implants, Monitoring, Maintenance, Prosthesis.

Introduction

“Over the past 30 years, research has validated the success of osseointegrated implants as a viable alternative to fixed or removable prosthetic restorations.”¹ It is well-documented fact that the success rate for single tooth endosteal implant restorations is up to 97% after more than 10 years.^{2,3} Patient selection for implant therapy is based on a number of factors, including medical history, oral health, and hygiene status.

In the presence of a tooth, tensile force is transmitted to the surrounding bone through the periodontal ligament, which stimulates and helps in maintaining it. Implants also stimulate the bone and help to maintain it by transferring compressive forces, if the forces are directed axially. There is an increase in bone density even in the absence of a natural tooth and the periodontal ligament, due to osseoperception of the forces transferred to the bone via the implant, which in turn can help in preserving the facial structure. The key benefits of implants are the restoration of function and esthetics and preservation of the remaining oral structures.⁴

Peri-Implantitis is Different from Periodontitis

Peri-implantitis and periodontitis are similar in the respect that they both involve alveolar bone loss. However, there are some differences. Since there is no periodontal ligament, so the inflammatory lesion in peri-implantitis always extends closer to the bone surface. Therefore, it progresses faster and it is potentially a more aggressive disease and is very hard to treat.⁵

Nevertheless, tissue degradation may be a slow process in peri-implantitis, and a loading time of more than 5 years may be required to detect peri-implant complications. One must aim to take the steps necessary to salvage the implant before an irreversible

damage has occurred. These include providing safe implant maintenance, and monitoring the tissue and the bone level surrounding the implant. In-office maintenance protocols and home-care regime are both crucial for the success of implants. This requires the clinician to be well versed with the protocols for assessment of implants at maintenance appointments, safe instrumentation of peri-implant tissues, and the products that can be safely recommended for home care.⁶

The signs and symptoms of failing implants must be recognized as early as possible during the evaluation phase of maintenance therapy. Once implants have been successfully placed, the patient must follow a proper home-care regime which should be re evaluated each time the patient presents for implant maintenance therapy.

Implant Home Care Following Surgery

A daily meticulous home-care routine is essential for the maintenance of implants and demands proper compliance from the patient. A customized home-care regime must be developed for each patient that considers the type of implant prosthesis and the patient's dexterity. It should be effective and simple to understand and follow. Post-surgically, good oral hygiene is necessary to maintain a healthy field and adequate healing. The patient should follow these points post surgically:

1. Drink only clear liquids for the rest of the day
2. Take antibiotics and analgesics as prescribed
3. Eat soft foods for the first few days of healing
4. Avoid wearing a removable temporary prosthesis or denture to let the gingival tissue heal (if the implant was not immediately loaded)
5. Use an extra soft toothbrush to clean the dentition, preexisting implants and the gingiva (and do not brush the incision area)

6. Use warm saline rinses or an antiseptic rinse as prescribed

Home Care for Implants

Oral care for single-tooth implants involves a number of steps. The patient should be instructed to brush the implant(s) twice a day with a low-abrasive dentifrice. Using a low-abrasive dentifrice ensures that it will not scratch the surface or irritate the tissue cuff surrounding the implant.⁷ An ultra soft toothbrush should be used – options include a manual brush, electric or sonic brush, end tuft brush, or proxi-brush. There is a slim sonic brush that can fit under the bar or ball attachments used with overdentures. The interdental brushes that have coated wires are also recommended to clean around single implants or under a Hader bar. The end-tuft brushes clean the difficult-to-reach areas around implants. Instruct the patient to floss once a day on the mesial and distal aspects. For implants, it is also recommended to floss implants on the facial and lingual aspects. This is accomplished by wrapping the floss around the tooth or looping the floss to remove all plaque on the implant surface. The biological differences between an implant and a natural tooth make the implant more susceptible to inflammation and bone loss from bacterial plaque, making meticulous oral hygiene a prerequisite for success.⁸

Generally a single-tooth implant can be flossed with the regular waxed floss. Alternatively, implant floss can be used. For bar-retained prostheses or wider interproximal spaces, thicker floss or one with a built-in threader is recommended. Antimicrobial rinses may be recommended, especially if inflammation is present or the patient has dexterity problems with an area that is difficult to clean. If the patient is prone to inflammation, the use of chlorhexidine gluconate or another antimicrobial rinse, in conjunction with a rubber tip stimulator, is recommended.⁹ Water irrigation units can be beneficial if used twice daily (following proper instruction to ensure that the perimucosal seal is not damaged). The water must be directed only interproximally and horizontally on a low speed to avoid damaging the perimucosal seal.

Implant Maintenance

After successful placement, osseointegration and loading of implants, the patient is largely responsible for its long term success and needs to understand the importance of proper on-time clinical appointments for maintenance therapy. A re-evaluation after every three months is mandatory for the first year as it is helpful in preventing infection or failure of the implant.¹⁰ After one year the bone surrounding the implant maintains a mature level of bone¹¹ and the interval between maintenance visits should be based on the patient's general health, assessment of the implant, and home care.

The Implant Maintenance Appointment

The implant maintenance appointment consists of:

1. Review of the patient's medical history and general health
2. Assessment of the implant(s)
3. Proper instrumentation and polishing of the implant(s)
4. Reinforcement of home-care routine and specific recommendations

Step 1: Review of the Patient's Medical History and General Health:

The patient's medical history should be documented from the beginning of the treatment and updated and reviewed at every routine oral evaluation and implant maintenance appointment. The clinician must check if there has been any change in the patient's health status that could impact the implants or treatment. If the patient has uncontrolled diabetes, it increases the risk of implant failure. It will be necessary to consult with the patient's physician and control the blood sugar at the earliest.¹² Overall good general health is an important factor determining the success of implant(s) and may affect the length of time between implant maintenance visits.¹³

Step 2: Assessment of Implants: Implant assessment starts with a visual soft tissue examination of the perimucosal seal. Any signs of inflammation or bleeding upon probing, including peri-mucositis (no bone loss) or peri-implantitis (inflammation with bone loss) should be recorded. Presence of any clinical symptoms such as pain or mobility must be noted. These assessments must be performed at every maintenance appointment. Accurate radiographs are necessary to monitor the crestal bone level.

Visual Soft Tissue Assessment

The soft tissue should be visually examined for color, texture, form, bleeding, and inflammation keeping the normal appearance in mind. The overall periodontal assessment and any tissue changes should be recorded in the patient's records as well as with photography. These photographs can be used to help in educating the patient about his/her own oral hygiene status. The patient can be motivated for better compliance as images can be an excellent visual tool to reinforce the importance of good home care.

Protocol for Proper Probing around the Implant

There are a number of considerations and guidelines that should be followed when probing the tissue surrounding an implant. A plastic-coated probe should be used to reduce the risk of scratching the implant surface. A plastic probe is more flexible, enabling the clinician to follow the anatomy more closely for an accurate reading. The perimucosal seal is fragile and more susceptible to trauma and penetration during probing than the periodontal ligament around teeth. It can allow the penetration of pathogens more

easily than the periodontal ligament and jeopardize the success of the implant.¹⁴ Some clinicians may not recommend probing in the perimucosal seal in the first three months following abutment attachment to avoid disrupting the biologic seal. A probe baseline measurement at a specific location should be recorded, to establish a clinical parameter for re-evaluation on later appointments. This baseline should be recorded in the patient's notes at the first maintenance appointment after three months.¹⁵ The measurement should ideally read 2.5 mm to 5.0 mm or less, depending on soft tissue depth, and there should be no signs of inflammation.¹⁶ Measurements at appointments should be compared to baseline, and if the probe depths change, this must be noted in the patient's chart.

Protocol for Radiographic Monitoring

Bone level: A radiograph is taken to accurately monitor crestal bone level around the implant(s) and to verify the accurate seating of the prosthetic components. Subsequent radiographs at the maintenance appointment are used to determine any change in the prosthetic components. Changes in the crestal bone around the implant can also be monitored. Periapical or vertical bitewing radiographs for one to four implants, and a panoramic radiograph for five or more implants is recommended to enable accurate determination of the crestal bone level.¹⁷ 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.¹⁸ If more than 1 mm of horizontal or vertical bone loss is detected in the first year, a referral to a periodontist may be required. After carefully assessing the implant and recording the findings, evaluate for the presence of calculus on the implant or abutments. Minimal or no instrumentation is necessary for an implant with a healthy gingival attachment. If an implant fails, it is generally due to bacterial infection, occlusal overload or a poorly- designed prosthesis.¹⁹ The cause of the failing implant and a treatment plan to accommodate the failure must be determined by the dentist.

Step 3: Proper Instrumentation: Instruments must effectively remove all plaque and calculus deposits without scratching the surface of the implant. Calculus deposits on implants are generally softer than on teeth and are more often found supragingivally than subgingivally. Generally, proper hand instrumentation is sufficient to restore the periodontal health of implants. Excessive pressure or trauma to the perimucosal seal during instrumentation is contraindicated to prevent pathogenic infiltration and scratching the surface of the implant or the abutment. Stainless steel-tipped instruments, as well as metallic sonic and ultrasonic scalers, have been found to gouge titanium and are contraindicated for implant instrumentation. The scratching or roughening of the

implant surface can cause bacteria to adhere more easily, causing an increased risk of inflammation. The surface of the ball, bar or locator attachments must be protected from scratching, to avoid increased plaque formation and retention. Metal tipped subgingival irrigators are also contraindicated.²⁰

The appropriate instruments for implant maintenance are plastic, graphite, or solid titanium scalers and curettes. These have been proven to be safe and effective for the removal of plaque and other deposits on titanium implants. If ultrasonic or sonic scalers need to be used, caution is required to avoid damaging the perimucosal seal. They must have a nonmetal tip or plastic sleeve to prevent scratching of the implant surface during use.²¹ Several manufacturers have developed implant power scaler tips and silicone covers to be placed on the ultrasonic scaler tips, to prevent possible scratching of the implant surface.

Hand implant scalers and curettes are available in polycarbonate plastic and graphite. These can be sharpened and autoclaved. Implant scalers are also available with a sturdy handle and single-use plastic disposable tips. Solid titanium scalers and curettes are also now available that can be used to scale on "like metal" titanium implants, are thinner than plastic or graphite instruments and provide more strength to dislodge calculus.²²

Protocol for Polishing

Coronal polishing around implants is done using a soft rubber tip, not brush, with a nonabrasive paste. Aluminum oxide, tin oxide, APF-free prophylactic paste, and low-abrasive dentifrice are all considered acceptable polishing abrasives for implants. Coarse abrasive polishing pastes and airpolishing are contraindicated.²¹ It should be noted that acidulated phosphate fluoride (APF) products are also contraindicated, as they may etch the surface of implants. It may be helpful to polish first around implants to remove any plaque or debris present and then to determine deposits that need instrumentation.

Conclusion

The professional implant maintenance and patient home care are two critical factors for the long-term success of dental implants. This further involves assessment of the patient's general and oral health. The use of specified maintenance protocol and materials by the clinician, are essential in today's scenario of high patient expectations regarding the longevity of the implant restorations. All clinicians must educate their patients regarding implant home care regime and insist on regular maintenance appointments after successful implant restorations.

References

1. Committee of the American Academy of Periodontology. *J Periodontol.* 2000;71:1934-1942.
2. Misch CE. Contemporary Implant Dentistry. 3rd ed. St. Louis: Mosby; 2008. Chap 1 pg:7.
3. Fugazzotto PA. Success and failure rates of osseointegrated implants in function in regenerated bone for 72 to 133 months. *Int J Oral Maxillofac Imp.* 2005;20:77-83.
4. Babbush CA. Master planning the implant case: Sequential analysis. In: Babbush CA (ed.): Dental implants: The Art and Science. Philadelphia, W.B. Saunders, 2001, chap 1. Pg 3-18.
5. Gualini F, Berglundh T. (2003) Immuno histochemical characteristics of inflammatory lesions at implants. *J Clin Perio.* 2003;30:14-18.
6. Misch CE. Contemporary Implant Dentistry. 3rd ed. 2008. Root form Implants. Chap 21. Page 457.
7. Yukna R. Optimizing clinical successes with implants: maintenance and care. *Compend Contin Educ Dent.* 1993;15:554-561.
8. Berglundh T, Lindhe J, Ericsson I, et al. The soft tissue barrier at implants and teeth. *Clin Oral Impl Res.* 1991;2(2):81-90.
9. Esposito M, Worthington HV, Thomsen P, Coulthard P. Interventions for replacing missing teeth: maintaining health around dental implants. *Cochrane Database Syst Rev.* 2004;3:CD003069.
10. Palmer RM, Pleasance C. Maintenance of osseointegrated implant prosthesis. *Dent Update.* 2006;33:84-86.
11. Albrektsson T, Zarb G, Worthington P, Erikson AR. The long term efficacy of currently used dental implants: a review and proposed criteria of success. *Int J Oral Maxillofac Implants.* 1986:11-25.
12. Fiorellini JP, Chen PK, Nevins M, Nevins ML. A retrospective study of dental implants in diabetic patients. *Int J Periodontics Restorative Dent.* 2000;20:366-373.
13. Berglundh T, Lindhe J, Lang NP. Clinical Periodontology and Implant Dentistry. 4th ed. 2003. Mucositis and periimplantitis. Chap 42. Page 1015-1016.
14. Bauman GR, Mills M, Rapley J, et al. Clinical parameters of the evaluation during implant maintenance. *Int J Oral Maxillofac Implants.* 1992;7:220-227.
15. Mombelli A, Muhle T, Bragger U. Comparison of periodontal and peri-implant probing by depth-force pattern analysis. *Clin Oral Implant Res.* 1997;8:448-454.
16. Misch CE. Contemporary Implant Dentistry. 3rd ed. 2008. Diagnostic Evaluation. Chap 6. Page 116.
17. Lekholm U, van Steenberghe D, Hermann I. Osseointegrated implants in the treatment of partially edentulous jaws; a prospective 5-year multicenter study. *Int J Oral Maxillofac Implants.* 1994;9:627- 635.
18. Misch CE. Contemporary Implant Dentistry. 3rd ed. 2008. Maintenance of Dental Implants. Chap 33. Page 741-742.
19. Paquette DW, Brodala N, Williams RC. Risk factors for endosseous dental implant failure. *Dent Clin North Am.* 2006;50:361-374.
20. Goldstein R.E. and Nimmons K.J. Maintenance of esthetic restorations. *Contemp Esthet Restorative Prac.* 2005;(2)25.
21. D. Thomson-Neal, G.H. Evans, and R.M. Meffert. Effects of various prophylactic treatments on titanium, sapphire, and hydroxyapatite-coated implants: an SEM study. *Int J Periodontics and Restorative Dent.* 1989;9(4)301-311.
22. Walsh L.J. Implant Hygiene: Clues, Caveats and Cautions. *Australasian Dent Prac.* 2007;18(2)54-55.