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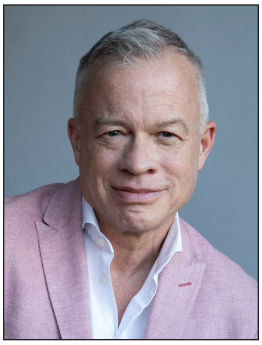

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Prosthodontics Newsletter™

Focusing on Dental Implants

The Art and Science of Optimal Hygiene for Dental Implants

While careful treatment planning, skilled surgical placement and accurate fabrication and delivery of dental implant restorations are critical to successful outcomes, personal and professional maintenance, including meticulous hygiene, is equally important. Given the propensity for biofilm formation on implants and implant components, regular and effective debris and bacterial removal is essential. This issue of Prosthodontics Newsletter visits recently published evidence on a variety of factors that contribute to effective maintenance and hygiene for our implant patients.

Supportive Treatment for Implant Patients

One key factor in peri-implant health is supportive periodontal treatment. Lin et al from Chang Gung University, Taiwan, conducted a systematic review and meta-analysis to evaluate the impact of supportive periodontal treatment after implant placement on implant survival and the development of peri-implant diseases.

The authors searched 3 major electronic databases and reviewed previous systematic reviews for articles that reported clinical studies with a follow-up of ≥1 year comparing groups of patients who did or did not receive supportive periodontal treatment after implant placement. They found 9 studies, all clinically controlled trials, that met their inclusion criteria; the studies included >2000 patients. Most maintenance care programs focused on oral hygiene reinforcement and mechanical debridement, along with coronal prophylaxis. Average follow-up ranged from 1 year to 10 years.

Compared with patients who did not receive supportive periodontal treatment, those who received treatment had a significantly higher implant survival rate. Survival rate was particularly strong among patients with chronic periodontitis. Rates of peri-implant mucositis and peri-implantitis were lower in the treatment groups. The use of chemical agents during the maintenance period had no significant effect on implant survival or rate of disease. Several studies reported statistically higher levels of bone loss, bleeding and plaque accumulation in patients

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- Power vs Manual Toothbrushes

Supportive Treatment for Implant Patients

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who did not receive supportive periodontal treatment.

While no standardized supportive periodontal treatment protocol exists, certain components were shared by every program included in the study. Those were

- a review of dental and medical history
- full mouth examination
- instruction in oral hygiene procedures
- plaque removal
- mechanical instrumentation

Comment

The authors suggested a recall schedule of at least once a year to maintain optimal peri-implant health.

Lin C-Y, Chen Z, Pan W-L, Wang H-L. The effect of supportive care in preventing peri-implant diseases and implant loss: a systematic review and meta-analysis. Clin Oral Implants Res 2019;30:714-724.

Adequate Access For Peri-implant Hygiene

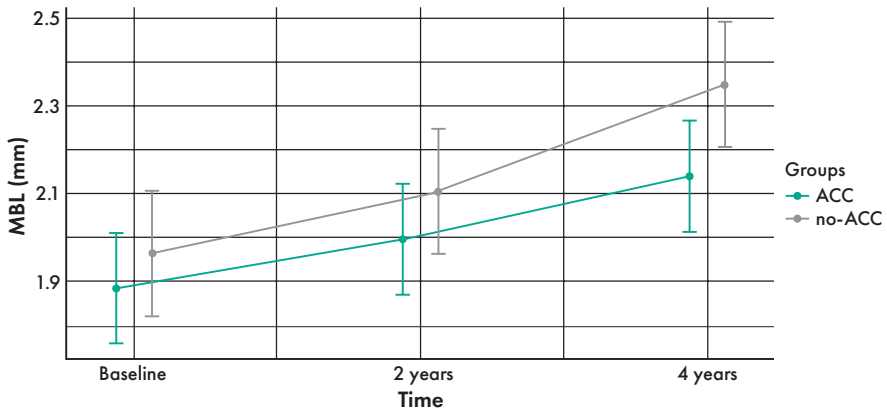
Controlling plaque is a key factor for successfully maintaining healthy peri-implant tissue, but most patients find it difficult to achieve an adequate level of plaque control. A large cross-sectional study of implants in function for 9 years reported that proper access during patient-performed oral hygiene could not be achieved. Because the long-term effect of inadequate access for peri-implant hygiene on marginal bone loss needs to be identified, Tormena et al from the State University of Maringá, Brazil, undertook a 4-year prospective cohort study to find an answer to this question.

The study group included partially edentulous patients who had received external hexagon implants restored with fixed, screw-retained prostheses at a university clinic. All implants had been in function for ≥1 year, and all patients had received regular maintenance from their dentists. Patients with periodontitis, peri-implantitis or uncontrolled diabetes mellitus, as well as those taking immunosuppressive or anti-inflammatory drugs, were excluded. At baseline, implant sites were evaluated for plaque index, probing depth and bleeding on probing; the entire dentition was evaluated for the full mouth plaque index.

After patients received individual instruction on correct performance of peri-implant hygiene, they were instructed to clean their teeth, under the supervision of a dentist, using a toothbrush, an interproximal brush and dental floss. Once this was completed, the presence of bacterial plaque was determined using a periodontal probe around the peri-implant mucosal margin. If an implant site was free of plaque, it was judged to have adequate access to peri-implant hygiene; sites with any remaining plaque on ≥1 implant surface were judged to have inadequate access to peri-implant hygiene. At 2- and 4-year recall, marginal bone levels were measured, along with the presence or absence of peri-implant signs of soft tissue inflammation.

At the 4-year follow-up, 41 patients—18 with adequate access, 16 without adequate access and 7 with at least 1 implant with and 1 without adequate access—were evaluated. Mean marginal bone loss at 2 years was similar between

Figure 1. Mean marginal bone level (MBL) progression over time around implants with adequate access (ACC) and inadequate access (no-ACC) to peri-implant hygiene. Points represent the estimated means; bars the confidence intervals.



the groups; however, at 4 years those without adequate access had significantly greater bone loss (Figure 1). The number of patients with bleeding on probing was greater in the group without adequate access throughout the entire study.

Comment

This study suggested that lack of adequate access that would enable patients to achieve peri-implant hygiene has a negative effect on marginal bone loss over a 4-year period. Practitioners need to consider this possibility when planning implant treatment.

Tormena M, Matarazzo F, de Oliveira BM, et al. The effect of inadequate access to peri-implant hygiene on marginal bone level: a 4-year cohort prospective study. Clin Oral Implant Res 2020;31:836-845.

Bar- vs Stud-retained Overdentures

Several alternatives exist for restoring the edentulous maxilla using 4 implants. Bar attachments have demonstrated excellent implant survival rates, but stud attachments have several advantages, including self-alignment ability, adjustable vertical heights and retentive forces, and ease of maintenance. Lian et al from the Shanghai Jiao Tong University School of Medicine, China, conducted a study with a mean follow-up of 77 months that analyzed outcomes in 4-implant–supported maxillary overdentures with stud and bar attachments.

Table 1. Prosthetic maintenance requirements for both groups.

Prosthetic complication or maintenance requirement	Stud-retained	Bar-retained	Total
Abutment screw loosening	4	2	6
Change in stud denture cap	17	0	17
Loss of stud male attachment	4	0	4
Reactivation of the clip	0	21	21
Bar fracture	0	1	1
Prosthesis tooth fracture of chipping	2	2	4
Overdenture relining or marginal adaptation	9	6	15
Total	36	32	68

All patients received 4 maxillary implants at a university clinic. After a 3- to 6-month healing period, the maxilla was restored with either stud- or bar-retained overdentures, based primarily on maxillary anatomy and patient preference. Patients returned for annual follow-ups, at which time peri-implant parameters, gingival index, probing depth and modified plaque and sulcus bleeding indices were recorded, as were prosthodontic complications and patient-reported satisfaction. Implant survival and implant-related complications were noted. Marginal bone loss was measured on radiographs.

Of the 132 implants placed in 33 patients (18 with stud attachments, 15 with bar attachments), 7 implants in 5 patients failed (5 in the stud-retained group, 2 in the bar-retained group); the difference was not significant. The only clinical parameter that differed between the groups was the modified plaque index, which was significantly higher in the bar-attachment group. Maintenance requirements were similar in the 2 groups, with change of the denture caps or activation of the bar clips the most frequent complications (Table 1). Patient satisfaction was high regardless of the restoration used.

Comment

This study found no significant differences between implant-supported maxillary overdentures retained with stud or bar attachments. Given their ease of cleaning and repair, stud-retained overdentures can be an excellent treatment option, especially for elderly patients.

Lian M, Zhao K, Wang F, et al. Stud vs bar attachments for maxillary four-implant–supported overdentures: 3- to 9-year results from a retrospective study. Int J Oral Maxillofac Implants 2019;34:936-946.

Biofilm Formation On Implant Materials

Biofilm formation is a major cause of peri-implant disease, but evidence concerning whether biofilm is more likely to form on zirconia, conventional titanium or titanium–zirconium (TiZr) alloy implants remains

contradictory. Recently developed polyetherketoneketone (PEKK) abutment materials have shown promise as alternative materials for dental implants, but little information exists about biofilm formation on this material.

Zeller et al from the University of Basel, Switzerland, conducted an in vivo study of biofilm formation on discs of PEKK, zirconia, gold-based noble metal alloy, silver-based noble metal alloy and TiZr. One disc of each material was mounted on a disc holder; 3 of these loaded disc holders, along with 1 disc holder with 3 TiZr discs, were mounted on an oral splint. Each of 16 healthy volunteers wore one of the oral splints for 24 hours (with a maximum of six 30-minute breaks to allow for eating and oral hygiene). After removal, discs were incubated using 2 different methods and evaluated for biofilm formation.

Silver-based noble alloy showed the smallest amount of biofilm mass, followed in order by gold-based noble alloy, PEKK, TiZr and zirconia; the differences were significant. The number of colony-forming units per milliliter (CFU/mL) was also smallest for silver-based noble alloy, followed by gold-based noble alloy, zirconia, PEKK and TiZr. Scanning electronic microscopy analysis found biofilm on all material surfaces. Few bacteria were seen on the 2 noble alloys; more were found on the PEKK surface, while both zirconia and TiZr had thick, compact aggregates of bacteria.

Comment

The strength of this study lay in the exposure of the materials to saliva in the human mouth. The lack of biofilm formation on silver- and gold-based noble alloys suggested a potential clinical use as a material for implant components.

Zeller B, Stöckli S, Zaugg LK, et al. Biofilm formation on metal alloys, zirconia and polyetherketoneketone as implant materials in vivo. Clin Oral Implants Res 2020; 31:1078-1086.

Power vs Manual Toothbrushes

Dental plaque is detrimental to oral health. Regular plaque removal via toothbrushing is fundamental to maintaining oral health and preventing periodontal disease. To better understand the efficacy of using power toothbrushes vs manual toothbrushes, Wang et al from Tianjin 4th Central Hospital, China, undertook a systematic review and meta-analysis with precise selection parameters.

The authors searched 4 major databases and a manual search of several journals for articles reporting on randomized controlled trials (RCTs) that compared dental plaque, gingivitis and bleeding in healthy participants who used either manual or power toothbrushes. They found 21 RCTs published between 1992 and 2017, with 2296 participants, that met their inclusion criteria. Six studies used sonic toothbrushes, and 16 used oscillating–rotating toothbrushes (1 study included both). All the studies reported plaque index, while 9 studies reported gingival index and 8 studies reported bleeding index.

The meta-analysis showed that power toothbrushes were significantly more effective than manual toothbrushes in reducing plaque index, gingival index and bleeding index. However, no significant difference in plaque index was found between participants using oscillating–rotating toothbrushes and those using manual toothbrushes; much of that effect was due to 2 studies from 1992 that found manual toothbrushes were more effective. Eliminating those older studies has a major impact on the results.

Comment

Clearly, power toothbrushes are a superior choice for maintaining oral health and preventing periodontal disease.

Wang P, Xu Y, Zhang J, et al. Comparison of the effectiveness between power toothbrushes and manual toothbrushes for oral health: a systematic review and meta-analysis. Acta Odontol Scand 2020;78: 265-274.

In the Next Issue

Titanium base abutments for fixed implant restorations

Our next report features a discussion of these issues and the studies that analyze them, as well as other articles exploring topics of vital interest to you as a practitioner.

Do you or your staff have any questions or comments about Prosthodontics Newsletter? Please write or call our office. We would be happy to hear from you.