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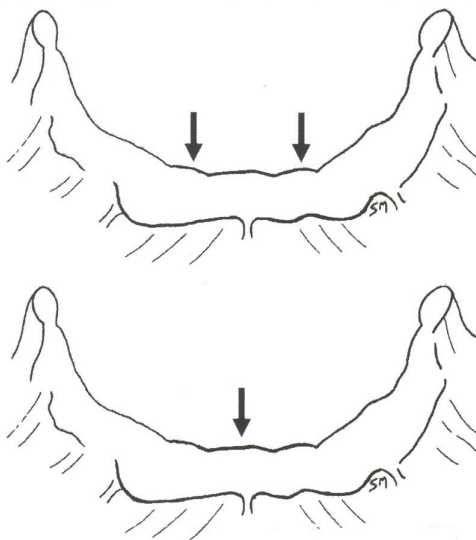
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A clinical study evaluated the outcome of mandibular overdentures retained by 2 implants (top illustration, arrows) and those retained by a single central implant (bottom illustration, arrow). See **MANDIBULAR OVERDENTURES RETAINED BY ONE OR TWO IMPLANTS**.

Mandibular Overdentures Retained by One Or Two Implants

Approximately 37 million individuals in North America are totally edentulous, a number that is not likely to decrease over the next 3 decades. While many patients with complete dentures are quite satisfied with their prostheses, some patients have difficulty adapting, especially to mandibular dentures.

Most clinical studies have shown that mandibular overdentures retained by ≥ 2 implants provide superior function and patient satisfaction compared

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Clinical Studies in Implant Dentistry

Implant dentistry is rapidly advancing as innovative techniques and materials become available to the prosthodontist. Although new methods and materials can appear promising based on the results of in vitro studies and anecdotal case reports, controlled clinical studies are necessary to fully comprehend the in vivo outcomes. This issue of *Prosthodontics Newsletter* is devoted to a series of clinical studies related to implant dentistry.

Inside this Issue

- Platform Switching and Bone Level Response
- Plaque Accumulation on Exposed Titanium Surfaces
- Immediate Loading of Implants



Mandibular Overdentures Retained by One or Two Implants

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with conventional mandibular dentures. The cost of implant treatment is a major impediment for many patients; thus, any measure to reduce costs would be welcome to patients and dentists alike.

Walton et al from the University of British Columbia evaluated overdentures retained by 2 implants and a single midline implant (see cover illustration). Eighty-six patients with conventional complete dentures were enrolled in the study and were screened to ensure that their existing dentures were satisfactory.

Patients were stratified according to gender and severity of ridge resorption and were randomly assigned to 2 groups. The control group had 2 implants placed, while the experimental group received 1 implant (Solid Screw; SLA surface, Straumann Canada).

After the implants and healing abutments had been placed, each denture received a soft liner. About 6 weeks later, ball-shaped stud attachments (Straumann ITI spherical stud, Retentive Anchor; Straumann) were placed on the implants. The prosthodontist then completed a processed reline that incorporated the retentive components into the denture.

Variables included patient satisfaction, component costs, treatment time and maintenance time. With the use of a visual analogue scale (VAS), patient satisfaction was measured at baseline (before im-

plant treatment), 2 months and 1 year after the dentures were retained by the implants.

Of the 86 patients, all but 1 completed the full 1-year follow-up. Median VAS baseline scores were 28.5 for the single-implant group (on a scale of 0–100) and 50.5 for the double-implant group. These median scores increased dramatically 2 months after implant retention was provided (95 for both groups), and satisfaction remained high after 1 year (93 for the single-implant group and 94 for the double-implant group).

Component costs, surgical time and total prosthodontic chair time were significantly less for the single-implant group. Repairs included

- 5 broken dentures, 4 loose matrices and 2 cracked dentures for the single-implant group
- 4 loose matrices, 2 broken dentures, 2 cracked dentures and replacement of 2 defective matrices for the 2-implant group

Comment

Study results suggest that an overdenture retained with a single, midline implant can produce short-term benefits, compared with one retained by 2 implants. Although patients were not charged for the services, costs were significantly lower for the single-implant group.

Long-term results are unknown. Five dentures retained with 1 implant fractured during the year-long study, compared with only 2 in the 2-implant group. Perhaps the single implant had less potential to protect against ridge resorption. With bone loss from ridge re-

sorption, this implant could serve as a fulcrum point, or stress concentrator, predisposing the denture to fracture. It would be interesting to see the differences in prosthetic maintenance over a longer follow-up time.

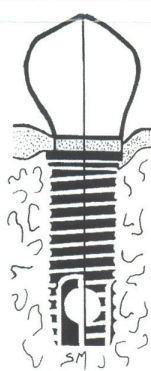
Walton JN, Glick N, MacEntee MI. A randomized clinical trial comparing patient satisfaction and prosthetic outcomes with mandibular overdentures retained by one or two implants. *Int J Prosthodont* 2009; 22:331-339.

Platform Switching And Bone Level Response

In the microgap between the platform of a root form implant and the attached abutment, bacteria reside, and bacterial by-products can irritate bone and soft tissue, potentially resulting in bone loss. If an abutment with a diameter narrower than the platform is placed on the implant (platform switching), the microgap is moved inward, away from the bone. Keeping bacterial by-products away from the bone could potentially reduce bone loss.

A short-term clinical study by Canullo et al from the University of Bonn, Germany, compared bone levels around immediately placed and restored implants that incorporated platform switching with those conventionally restored with matching-diameter abutments and implant platforms. Twenty-two patients were included in the study; each received a single implant and crown. All participants received implants with a 5.5-mm platform (Global Implants; Sweden and Martina). If the dis-

Figure 1. Less bone loss occurred with platform switching. Dense fibrous soft tissue adapts circumferentially to the exposed portion of the platform with platform switching (left side of illustration). When the diameter of the abutment matches the diameter of the implant (right side of illustration), this overlying soft tissue does not exist.



tance between the implant and the facial wall of bone was >1 mm, the gap was filled with a mixture of collagen bovine bone matrix (Bio-Oss Collagen; Osteohealth, N.Y.) and blood.

The patients were randomly divided into 2 groups. Eleven implants received a 3.8-mm diameter abutment (experimental group), and 11 received a 5.5-mm diameter abutment (control group). Provisional crowns were placed and adjusted to eliminate functional occlusal contacts. Two months later, definitive crowns were placed.

Assessments were made at implant placement (baseline), at insertion of the definitive crown and every 6 months thereafter. Assessments for each implant and for the adjacent teeth included standardized periapical radiographs, probing pocket

depths, bleeding on probing and a modified plaque index. Mean follow-up time for the study was 25 months (range, 24–27 months).

At the conclusion of the study, mean overall bone loss for implants with platform switching was 0.30 mm (SD = 0.157 mm). Mean overall bone loss for the control group was 1.19 mm (SD = 0.384 mm). There were no bone level changes on the adjacent teeth.

Comment

Results of this trial suggest that a dense soft-tissue barrier circumferentially covering the exposed portion of the platform can serve as a barrier to bacterial by-products associated with the microgap (Figure 1). This soft-tissue barrier has been compared with the “biologic width” surrounding natural teeth. More studies are needed because long-term results are unknown.

Canullo L, Goglia G, Iurlaro G, Iannello G. Short-term bone level observations associated with platform switching in immediately placed and restored single maxillary implants: a preliminary report. Int J Prosthodont 2009;22:277-282.

Plaque Accumulation On Exposed Titanium Surfaces

Originally, implant surfaces were machined, but today modified surfaces are available from a number of manufacturers. While a surface with microroughness can enhance bone formation and osseointegration, bone loss and tissue recession could result in exposure of a rough, plaque-re-

tentive surface, which has the potential to further accelerate bone loss and soft-tissue recession.

Baldi et al from Genoa University, Italy, evaluated plaque accumulation, along with hard- and soft-tissue responses adjacent to machined titanium implant surfaces and surfaces roughened with dual acid-etching (DAE). The control implant had a DAE surface with the exception of the coronal 3 mm, which was machined (Osseotite; Biomet 3i, Fla.). The experimental implant had a DAE surface for its entire length (Full Osseotite; Biomet 3i).

Ten sets of implants were placed in each of the 8 patients selected for the study, alternating between Osseotite and Full Osseotite implants in each quadrant. Conventional machined healing abutments were placed on the controls, and DAE-treated healing abutments were placed on the Full Osseotite implants.

Variables included plaque index (PI) and bleeding on probing (BOP). Standardized radiographs evaluated bone levels immediately after implant placement (baseline), then at 3 and 6 months and 1 year postoperatively. The investigators also conducted a histologic and microbiologic evaluation of the peri-implant tissues and a scanning electron microscopic (SEM) analysis of the healing abutments 5 months after surgery.

PI and SEM analysis indicated significantly more plaque around DAE-treated healing abutments compared with the controls; subjectively, this plaque was more difficult to remove. BOP did not differ significantly between the groups, and histologic abnormalities were



not observed. Although the experimental sites displayed more plaque, there was no microbiologic difference between the 2 groups.

Between the 2 types of implants, radiographs detected a significant difference in bone loss:

- Mean bone loss for the controls was 1.47 mm at 1 year.
- Resorption for Full Osseotite implants was 0.61 mm.

Comment

Although more plaque accumulated around these implants, there was no evidence of any unfavorable biologic responses. This study was conducted under rigidly controlled conditions and was only 1 year in duration.

All patients in the study received oral hygiene instructions, and it appears that good oral hygiene was maintained for all patients. Long-term results and results in patients with poor oral hygiene might be different.

Baldi D, Menini M, Pera F, et al. Plaque accumulation on exposed titanium surfaces and peri-implant tissue behavior. A preliminary 1-year clinical study. Int J Prosthodont 2009;22:447-455.

Immediate Loading Of Implants

Early literature on implants stated that, prior to occlusal loading, a 3- to 6-month healing period after implant placement was necessary. More recently, however, shorter healing times have been recommended, including immediate loading.

Alfadda et al from the University of Toronto, Ontario, conducted a clinical

trial of immediately loaded implants supporting mandibular overdentures. Thirty-five patients received new complete dentures and were allowed to use them for at least 2 months. Four implants (2 as back-ups) were placed in the bone (2 Brånemark and 2 TiUnite; Nobel Biocare, Switzerland).

The 2 TiUnite implants were immediately loaded after healing abutments were placed. The existing dentures were hollowed out around the healing abutments and relined with a temporary soft liner (COE-Soft Liner; GC America, Ill.). An ovoid bar (Cendres Métaux, Switzerland) was fabricated and retrofitted to the denture 10 days after immediate loading.

The control group consisted of 42 previously treated patients who had had a 4-month healing period prior to implant loading. Clinical- and patient-based outcomes in the immediate group were recorded at baseline (before implant treatment), then at 1 and 5 years after implant treatment.

More than 98% of the implants were successful in both groups. When baseline results were compared with 1- and 5-year results, the immediate-loading group showed a statistically significant improvement in the patients' total, mandibular and functional satisfaction. There were no significant differences between 1- and 5-year satisfaction scores.

Comment

This study suggests that immediately loaded implants supporting a mandibular overdenture can be successful and can result in im-

proved patient satisfaction. However, because this treatment requires chairside retrofitting of a previously fabricated denture to a bar retainer, it is more technique sensitive, compared with conventional methods to fabricate an overdenture supported by an implant-retained bar.

Alfadda SA, Attard NJ, David LA. Five-year clinical results of immediately loaded dental implants using mandibular overdentures. Int J Prosthodont 2009;22:368-373.

In the Next Issue

- Clinical evaluation of all-ceramic posterior fixed partial dentures
- Subsurface cracking of ceramic materials
- Fracture loads of all-ceramic crowns

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.
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