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Practice Limited to Implant Surgery & Prosthodontics



| Immediate Loading of Dental Implants |

With potential advantages of shortened treatment time, patient convenience and better esthetics during and following treatment, immediate implant loading has gained wide acceptance by the profession and by our patients. This issue of Prosthodontics Newsletter takes a look at the state of the art and the current research on immediate loading.

Immediate Loading of Short Implants in the Posterior Mandible

The primary risk factors for single-crown implant failure, insufficient bone quantity and low bone density, are frequently found in the posterior mandible. The use of short (<8 mm) dental implants has been suggested to combat these risk factors. What remains unresolved is whether these short implants can perform well when part of an immediately loaded protocol. Weerapong et al from Chiang Mai University, Thailand, conducted a prospective randomized clinical trial that compared results at 4 months and 1 year of immediately loaded short (6 mm) and standard (10 mm) implants replacing single mandibular molar teeth.

Forty-six patients were equally divided, with half receiving a 6-mm implant and half a 10-mm implant. Surgical procedures were identical, with placement of titanium abutments and provisional hybrid ceramic crowns fabricated using a CAD/CAM milling machine. During the first 3 months in service, 2 short implants and 1 standard implant failed; all of these were replaced with standard implants after a healing period of 2 months. Marginal bone level changes were equivalent between the groups at 4 months and 1 year, as were implant stability quotients.

Comment

At 1 year, the survival rate of the short implants was >91%, a figure comparable with the outcome of standard-length implants and similar to those found in other studies. The authors of the study

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Immediate Loading of Short Implants in the Posterior Mandible

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highlighted the need for expertise in placing short implants before immediate loading, stressing that decisions in these circumstances must be based on primary implant stability, on which the level of insertion torque can have a serious impact, and an accurate evaluation of bone quality. Within these guidelines, immediate loading of short implants can be a successful strategy to restore posterior mandibular molar teeth.

Weerapong K, Sirimongkolwattana S, Sastraruji T, Khongkhunthian P. Comparative study of immediate loading on short dental implants and conventional dental implants in the posterior mandible: a randomized clinical trial. *Int J Oral Maxillofac Implants* 2019;34:141-149.

Radiographic Bone Level Changes with Implant-retained Overdentures

The use of implant-retained overdentures in the edentulous mandible has been the first choice of practitioners and patients, but long-term evidence on radiographic bone level changes subsequent to immediate loading has been lacking. Salman et al from the West Virginia University School of Dentistry compared outcomes at 60 months between immediate and delayed loading in patients receiving mandibular

Table 1. Radiographic bone level changes from baseline.

	Immediate loading group	Delayed loading group
12-month follow-up	0.10 mm	0.59 mm
60-month follow-up	0.18 mm	0.89 mm

overdentures supported by 2 unsplinted implants.

The original randomized controlled clinical trial included 30 patients, each wearing a stable, mandibular complete denture for ≥ 4 months. After receiving 2 implants supporting a mandibular overdenture at a graduate periodontology clinic, patients were randomized into 2 groups. Dentures were connected immediately in the immediate loading group and after 12 weeks in the delayed loading group. Patients were recalled at 6 and 12 months.

Twenty-three patients agreed to participate in a 60-month follow-up. All implants remained functional; although more than half the implants in each group presented with peri-implant mucositis, only 1 implant (in the delayed loading group) presented with peri-implantitis. Between the groups, no significant difference was found in plaque score, bleeding on probing, probing pocket depth or keratinized tissue width. However, the immediate loading group showed significantly less radiographic bone level change from baseline to 12 months, from 12 months to 60 months, and from baseline to 60 months (Table 1).

Comment

Only the amount of bone loss differed between the 2 groups, with a significantly better outcome in the

immediately loaded group. This may have resulted from the early functional stimuli of mechanical loading or because the immediately loaded group did not require a second-stage surgery to remove cover screws and place implant abutments. Given the advantages patients experience with them, this study suggests that immediately loaded implant-retained overdentures may be the preferred choice.

Salman A, Thacker S, Rubin S, et al. Immediate versus delayed loading of mandibular implant-retained overdentures: a 60-month follow-up of a randomized clinical trial. *J Clin Periodontol* 2019; 46:863-871.

Long-term Outcomes for Immediately Loaded Overdentures

For nearly 20 years, the 2-implant mandibular overdenture has been recognized as an easy, economical and reliable treatment for edentulous patients. Multiple studies have shown that the procedure, using either ball or bar attachments loaded onto implants 3 months after placement, results in improved patient satisfaction and

oral health-related quality of life (OHQoL) compared with conventional complete dentures. Now, with a follow-up report on patient outcomes 10 years later, Rignon-Bret et al from Paris Descartes University, France, have revisited the results of their previous study of immediately loaded 2-implant mandibular overdentures.

The original year-long study enrolled 43 completely edentulous patients ranging in age from 28 to 80 years who had worn complete, high-quality mandibular dentures for ≥ 3 months. An oral surgeon placed two 10- to 15-mm long implants in the anterior mandible of each patient, then immediately screwed on 2.25-mm diameter ball abutments; within 12 hours, overdentures were delivered by a prosthodontist and mounted.

Implant stability and radiographic bone level changes were measured at 3-, 6- and 12-month follow-ups. Three implants failed in the first 3 months and were replaced;

all other implants demonstrated acceptable stability. Mean bone loss was <0.5 mm at 1 year. Patients reported a significantly higher level of satisfaction in 9 of 10 realms (Table 2).

The original plan ended the study after 12 months, with patients advised to consult annually with their usual practitioners. However, the researchers recalled the patients 10 years after implant placement to evaluate long-term outcomes. All but 5 patients returned for the 10-year follow-up (4 had died; 1 had moved out of the area); 2 of the missing patients had accounted for the 3 failed implants in the original study. The criteria for success at 10 years was an absence of implant mobility and a mean radiographic bone loss of <3 mm. All implants remained functional; mean radiographic bone loss was <1 mm, similar to that reported in studies of conventionally loaded implants.

Comment

The greatest strength of this study was that patients were not recalled for 9 years, which more accurately reflects real-life experience; the greatest limitation of the study was the inclusion criterion that patients possess a stable, well-fitting mandibular denture. Within this limitation, the study demonstrated the clinical viability of an overdenture mounted on 2 immediately loaded unsplinted mandibular implants.

Rignon-Bret C, Wulfman C, Hadida A, et al. Immediate loading of two unsplinted implants in edentulous patients with mandibular overdentures: a 10-year retrospective review of patients from a previously conducted 1-year cohort study. *Int J Oral Maxillofac Implants* 2019;34:169-178.

Quality-of-Life Improvements Following Different Restoration Protocols

Although many studies have looked at the clinical success of implant therapy for missing teeth, relatively few have analyzed how different therapeutic protocols affect oral health-related quality of life (OHQoL). To determine which (if any) protocol led to the greatest improvement in OHQoL, Montero et al from the University of Salamanca, Spain, interviewed patients who had undergone restoration using 3 different clinical protocols.

A consecutive sample of 104 patients with sufficient bone dimensions to place implants (≥ 3.7 mm diameter and ≥ 10 mm length) received 399 implants. Based on clinical indicators and patient preference, patients were assigned to 1 of 3 groups:

- conventional surgery (without guiding templates) and conventional loading 3 months after surgery (CGCL)
- guided surgery using templates and conventional loading 3 months after surgery (GSCL)
- guided surgery using templates and immediate loading (GSIL)

Patients offered GSCL and GSIL treatment had to have multiple missing teeth in one saddle of the same jaw and available good-

Table 2. Patient satisfaction with implant-retained mandibular overdentures.

	Significant improvement
General satisfaction	Yes
Cleaning difficulties	No
Speaking abilities	Yes
Comfort	Yes
Esthetics	Yes
Stability	Yes
Chewing abilities	Yes
Function	Yes
Oral condition	Yes



quality bone width of ≥ 5 mm and height of ≥ 12 mm. Using the Oral Impacts on Daily Performances questionnaire and a self-reported measure of oral health satisfaction, OHQoL was measured before surgery and 3 months after prosthesis placement.

Four implants failed in 4 patients distributed among the 3 groups. At baseline, the GSIL group had significantly worse OHQoL scores than the other 2 groups; the CGCL group had significantly better scores than the GSCL group. At final evaluation, all groups reported similar levels of OHQoL.

Comment

Implant therapy significantly improved OHQoL for all groups, but the change was most dramatic for the immediately loaded group. Despite having the lowest OHQoL at baseline, their satisfaction with their oral health equaled that of the other groups by the end of the study.

Montero J, Dolz J, Silvestre F-J, et al. Changes in oral health-related quality of life after three different strategies of implant therapy: a clinical trial. *Odontology* 2019;107:383-392.

Comparative Success of Immediately Loaded Implants

Today, practitioners give serious consideration to placing a provisional or definitive prosthesis immediately after implant surgery. The question still remains

whether immediate and early loading protocols lead to results as good as those obtained with the original, delayed protocol. Chen et al from Sun Yat-Sen University, China, undertook a systematic review and meta-analysis of published studies that address this issue.

The authors found 39 separate studies published since 2003 that compared outcomes in fixed restorations placed ≥ 8 weeks after implant surgery (conventional) with outcomes in restorations placed 1 to 8 weeks after surgery (early loading) and/or restorations placed at the same time as surgery. The pooled data included 1785 patients (3486 implants) who were followed for periods ranging from 10 days to 180 months. In addition to evaluating implant survival, included studies evaluated implant stability and changes in crestal bone level, along with measures of peri-implant gingiva, gingival inflammation, probing depth and plaque.

The meta-analysis of implant survival on a per-implant basis showed a significant difference favoring the conventional protocol over the immediate-loading protocol; however, no significant difference was found when implant survival was evaluated on a per-patient basis. Both comparisons showed a higher failure rate in patients undergoing immediate loading who had several missing teeth or who received multiple prostheses, which may have been the result of micromotion influencing stabilization. However, the meta-analysis eliminated all studies that reported a 100% survival rate for all protocols used, which

may have skewed the results, given the high overall rate of success, regardless of protocol. Marginal bone level change was similar for all groups.

Comment

Both early and immediately loaded implants showed comparable results for survival. While the success rate was higher with conventional loading in studies that had ≥ 1 implant failure, the pooled results showed an identical 96% success rate, regardless of protocol. This study indicated that, in conjunction with strict inclusion criteria of patients selected by experienced operators, immediate and early loading are viable options for the restoration of implants, especially for single-crown restorations.

Chen J, Cai M, Yang J, et al. Immediate versus early or conventional loading dental implants with fixed prostheses: a systematic review and meta-analysis of randomized controlled clinical trials. *J Prosthet Dent* 2019;122:516-536.

In the Next Issue

Complications in implant therapy

Our next report features a discussion of this issue 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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