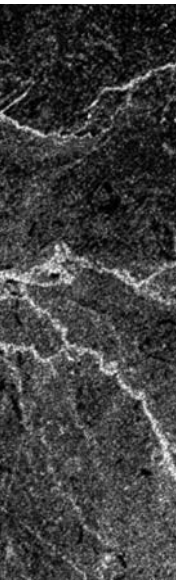

Critical Appraisal

IMMEDIATE LOADING OF IMPLANTS IN THE ESTHETIC ZONE

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The predictability of dental implants using the traditional Branemark protocol has been well documented. Since its inception, this protocol has been progressively challenged to decrease treatment time, minimize the number of surgical procedures, and maximize esthetic outcomes. Today, in specific clinical situations, implants may be placed and immediately loaded with provisional restorations. Immediate loading in the edentulous mandible has been well documented. There are also good data to show that immediate loading of the edentulous maxilla is also feasible if bone quality is suitable. The focus now has shifted toward immediate loading of implants placed in the esthetic zone. Clinicians have recognized that the challenge of providing anterior tooth replacements is in preserving the hard and soft tissue components that exist around natural teeth. The advantages of immediate restoration are obvious; however, the application of immediate or early load may pose an increased risk of implant failure in single-tooth situations. The prerequisites for achieving and maintaining acceptable results are not fully known. This review examines some of the literature concerning the reliability of early or immediate loading of implants placed in the esthetic zone.

SINGLE-TOOTH IMPLANTS IN THE MAXILLARY INCISOR REGION WITH IMMEDIATE PROVISIONALIZATION: 2-YEAR PROSPECTIVE STUDY

M. Groisman, W.M. Frossard, H.M. Ferreira, L.M. Filho, B. Touati
Practical Procedures and Aesthetic Dentistry 2003 (15:115–122)

ABSTRACT

Objective: The purpose of this study was to evaluate the survival rate of 92 tapered implants placed in the maxillary anterior region. These implants were placed immediately after atraumatic extraction, followed by simultaneous placement of provisional prostheses on the implants. Complications of this treatment modality also were evaluated.

Materials and Methods: Maxillary incisors that were lost as a result of resorption or root fracture were included. Adequate gingival contour was necessary around the teeth to be replaced.

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Patients presented with sufficient bone or minimal atrophy. Surgical guides were fabricated for all implants placed, and extractions were done atraumatically. Titanium implants (Nobel Biocare, Yorba Linda, CA, USA) with diameters of 3.5, 4.3, 5, and 6 mm and lengths of 13 and 16 mm were selected based on the size of the tooth socket and mesiodistal diameter of the tooth to be replaced. Implant placement respected the 2 mm space between the tooth and the implant. Implants were positioned lingually, and an autogenous bone graft obtained from the drills was used to fill space discrepancies in the cervical area. Implant stability was provided using a manual torque wrench. Following placement, each implant received a 15° or straight abutment and provisional restorations were fabricated. The provisional restoration was contoured to be out of occlusion and was then cemented. Patients were asked to limit their diet to soft food and were routinely examined once a week for 3 weeks and then once a month for 6 months. Periapical radiographs were used to evaluate the implant-bone interface as well as the level of the marginal bone in relation to the top of the implant.

Results: Of the 92 implants placed, 6 were lost, resulting in an implant survival rate of 93.5%. One of the failures occurred in a patient who suffered trauma, 2 losses were due to overloading in patients with an overbite, and there was no specific determination for the loss of the other 3. The pre- and postoperative radiographs compared with the follow-up radiographs showed a maximum bone loss of 2 mm around the remaining implants. The shape of the papilla was completely preserved in 82 of the 86 surviving implants.

Conclusion: This study showed that immediately provisionalized, single, tapered implants did not demonstrate adverse effects with regard to osseointegration. A 93.5% success rate was reported. Favorable esthetic outcomes were achieved in 82 of 92 (89%) of the implants placed.

COMMENTARY

This study provides favorable data regarding immediate placement and provisionalization of implants placed in the esthetic zone. However, several points need to be clarified on appraisal of the article. Although the study reports a 2-year prospective study of 92 implants, only 10 were actually followed up for the full 24-month period. An objective evaluation of what constitutes adequate primary stability was not performed.

In terms of standardization, this study did not explain how the periapical radiographs were standardized with regard to determination of bone levels. Papillae were maintained in 82 of 86 implants that survived. Without an adequate control, this papilla maintenance cannot be attributed to immediate placement and provisionalization. A papilla is maintained if it is supported by adequate hard tissue. There was minimal information on the 6 failures that occurred and how these cases were managed. One relative contraindication that does seem apparent from the study is in patients with deep overbites. An explanation of management of failures also was absent, which becomes particularly important if grafting procedures are required following the failure to maintain an esthetic result.

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IMMEDIATE PROVISIONAL FOR SINGLE TOOTH IMPLANT REPLACMENT WITH BRANEMARK SYSTEM: PRELIMINARY REPORT

E. Hui, J. Chow, D. Li, P. Wat, H. Law
Clinical Implant Dentistry and Related Research 2001 (3[2]:79–86)

ABSTRACT

Objective: The purpose of this study was to provide a protocol for immediate provisionalization of a single missing tooth in the esthetic zone.

Materials and Methods: Two groups of patients were studied to compare the results between immediate placement of implants in 11 healed extraction sites and immediate placement and restoration in 13 extraction sites in the maxillary anterior region. Heavy smokers and bruxers were excluded. Machined-surface Branemark implants 13 to 18 mm long were placed with torque values of 40 to 50 Ncm, attempting to achieve bicortical anchorage. Provisional restorations were placed at the day of surgery with a protected occlusion, that is, in which they were out of occlusion in all excursive movements.

Results: No implants were lost and no complications were encountered. The follow-up period was between 1 and 15 months. Patients were satisfied with the esthetic outcomes of the restorations.

Conclusion: The implant placement and restoration protocol used in this study showed promising initial results for both the immediate implant and healed extraction site groups.

COMMENTARY

The follow-up period of between 1 and 15 months is somewhat misleading as a closer look at the data shows that only four implants were followed up for 13 to 15 months. Factors contributing to the success of this procedure include the placement of long implants and insertion torques of over 40 Ncm. Relative contraindications appear to be heavy smokers and bruxers. Esthetic outcomes are related more to the presenting anatomy than to the ability of the clinician to manage state-of-the-art procedures. The authors did not report data on soft tissue stability but noted that the esthetic results in their immediately restored sites were superior to those achieved with a staged approach because of gingival architecture preservation.

The provisional restoration was placed out of occlusion, so the term *immediate loading* would not be a precise description. However, when a bolus of food enters the mouth, loading of the implant restoration seems unavoidable. The results of the study are encouraging but require further long-term evaluation to determine the efficiency of this technique.

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IMMEDIATE LOADING OF SINGLE-TOOTH ITI IMPLANTS IN THE ANTERIOR MAXILLA: A PROSPECTIVE 5-YEAR PILOT STUDY

E. Andersen, H.R. Haanaes, B.M. Knutsen
Clinical Oral Implants Research 2002 (13:281–287)

ABSTRACT

Objective: The purpose of this 5-year prospective pilot study was to evaluate the success rate of eight immediately loaded single-tooth restorations, using ITI solid plasma-sprayed (TPS) dental implants, in the anterior maxilla.

Materials and Methods: Eight healthy patients with a mean age of 21 years were included in this study. Patients were missing either

one central or one lateral incisor. None of the patients required site-development procedures. Healthy adjacent teeth were an additional requirement. Two of the patients were smokers, but none were bruxers. All patients received 12 or 14 mm long implants with a diameter of 4.1 mm for seven implants and 3.3 mm for one implant. Implant stability was confirmed by Periotest (Siemens AG, Bensheim, Germany). The teeth were provisionalized 1 week after implant placement. Care was taken to avoid any incisal contact, and a soft diet was advocated. After a 6-month follow-up period, a screw-retained ceramic restoration was provided for all patients. The radiographs were recorded in a standardized manner. The first thread of the implants was used as a reference point for measurement of bone loss or gain.

Results: None of the implants were lost during the 5-year observation period. The mean marginal bone level increased on average by 0.53 mm from placement to the final examination. Only one implant showed bone loss, and it was in a patient who had mucositis without calculus.

Conclusions: Despite the small number of patients in this study, the results indicate that immediate loading in the anterior maxilla can be predictable.

COMMENTARY

It is often very demanding to follow up patients prospectively for 5 years, and such a follow-up increases the impact of this study. However, the number of patients who received implants was relatively low, and there was no control group for comparison. Therefore, the results of this study should be interpreted with caution. One cannot simply conclude that immediate loading in the esthetic zone is completely safe. There are many variables involved, and the prudent clinician will assess each case based on its own merits.

Andersen and colleagues mentioned that the provisional restorations were not in incisal contact. Strictly speaking, if there is no contact between the opposing teeth and the implant restoration, the term *immediate provisionalization* might be more appropriate than *immediate loading*. On the other hand, it must be noted that during the chewing process, the implant may become loaded. The patients were reportedly not bruxers. But many patients with bruxism are unaware of their own grinding or clenching habits and may exert unfavorable forces on their provisional restorations in unusual excursion or postural movements.

Periotest has been the subject of controversy when assessing primary stability of dental implants. Resonance frequency analysis, however, has been proposed to be a sensitive tool for measuring stability of implants, particularly in immediate-load situations.

No measure of esthetic success and acceptability was discussed in this article. This is a particularly important point as the article is dealing with immediate loading in the esthetic zone, and one of the main advantages of doing this procedure is to provide better soft tissue control and esthetics.

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IMMEDIATE FUNCTIONAL LOADING OF BRANEMARK SINGLE TOOTH IMPLANTS. AN 18 MONTHS' CLINICAL PILOT FOLLOW-UP STUDY

I. Ericsson, H. Nilson, T. Lindh, K. Nilner, K. Randow

Clinical Oral Implants Research 2000 (11:26–33)

ABSTRACT

Objective: The purpose of this study was to evaluate the treatment outcome of immediately loaded single-tooth replacements using dental implants in accordance with a one-stage surgical procedure and comparing it to the original two-stage concept.

Materials and Methods: The patients (N = 22) were divided into two groups. Fourteen patients were in the experimental group, and eight were in the control group. All patients had tooth loss anterior to the molars, and each received one dental implant. Eleven of the 14 immediately loaded implants were in the maxillary anterior region, which can be regarded as the esthetic zone. The rest of the implants in this group were in the mandibular anterior region. The inclusion criteria required that the implants be of adequate length and in a healthy patient without excessive occlusal forces directed at the implant restoration. In the experimental group, the implant was loaded with a cemented provisional restoration within 24 hours after implant placement. The provisional restoration was replaced with a definitive restoration at 6 months.

At follow-up intervals, the following parameters were evaluated:

- Fixture survival and implant stability
- Marginal bone changes
- Plaque accumulation and soft tissue condition
- Occlusion
- Patient's opinion regarding esthetics

The implants in the control group were not immediately loaded but were followed up in the same manner as the experimental group.

Results: Two implants were lost in the experimental group at 5 months and were subsequently removed. Both failures occurred in the maxillary anterior region. None of the implants in the control group failed. During the observation period of 6 to 18 months, the average marginal bone loss in the experimental group was 0.14 mm and in the control group was 0.07 mm. Two of the 12 patients in the experimental group had plaque accumulation and mucositis, as opposed to 2 of 8 in the control group. All patients were satisfied with the esthetics of their restorations.

Conclusions: It appears that immediate loading in the esthetic zone is an acceptable treatment modality. Further controlled multicenter studies have to be performed to confirm the results of this pilot study.

COMMENTARY

In the experimental group, 2 of 11 immediately loaded implants in the maxillary anterior region failed. This is an 18.2% failure rate and is significantly higher than the 0% achieved in the control group. Ericsson and colleagues suggest that immediate loading and provisionalization enhance soft tissue management. However, the clinician should be aware of higher failure rates with implants that are immediately loaded in the esthetic zone. A failed implant in the esthetic zone can lead to a significant rise in treatment time, cost, and patient and dentist dissatisfaction. Studies that are currently available do not outline clear criteria for immediate loading in the esthetic zone. Therefore, clinicians should be cautious until such data are available.

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THE BOTTOM LINE: IMMEDIATE LOADING OF IMPLANTS IN THE ESTHETIC ZONE

Sufficient data are available to support the concept that immediately restored and loaded implants in single-tooth situations in the esthetic zone can achieve integration using many implant systems and protocols. When placing implants in the esthetic zone, stability of the soft tissue becomes paramount. Many authors have concluded that esthetic results in immediately restored sites are superior to those achieved with a staged approach because of gingival architecture preservation. In general, the literature indicates that once immediately loaded implants integrate, they appear to have bone and soft tissue stability that is comparable to those of conventionally loaded implants.

Most studies and case reports have been carried out by highly trained clinicians working under strict protocols. These protocols respect certain parameters. Factors that have been highlighted to improve success rates include the absence of parafunctional habits, use of a roughened implant surface, use of a threaded implant, and, most importantly, primary stability. Removing occlusal contacts and enforcing a soft diet also have been proposed.

One also needs to raise the question of how the patient will benefit from an immediate-load protocol. There is an associated risk with immediate or early loading, and this risk must be explained to the patient. Many studies do not address the consequences of failure from either a biologic or financial perspective. It is prudent to ask the following questions for all patients who are considered for this protocol:

- Is immediate loading in the esthetic zone really worth the risk?
- Does delaying the delivery of the restoration disadvantage the patient?

Immediate loading in the esthetic zone is becoming ever more accepted. Clinicians will have a better chance of success with adequate treatment planning, incorporating as much clinical data as possible, and under standing the limitations imposed. Patient selection and risk-benefit analysis for each patient will lead to more predictable and desirable outcomes.

Editor's Note: We welcome readers' suggestions for topics and contributors to Critical Appraisal. Please address your suggestions to the section editor:

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