

Consensus Statements and Recommended Clinical Procedures Regarding Loading Protocols

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INTRODUCTORY REMARKS

Treatment with dental implants has proven to be a predictable modality for replacing missing or failing teeth with various types of fixed or removable dental prostheses. A large body of scientific evidence of varying quality has demonstrated that successful outcomes can be achieved with different clinical treatment protocols for a wide range of indications. While it was traditionally thought that healing periods of 3 to 6 months combined with submersion of implants under the oral mucosa was critical for predictable osseointegration of dental implants, modified surgical and loading protocols have demonstrated similar outcomes over time.

Loading protocols for dental implants have been a central focus of discussion in the field since the origin of osseointegration. Several consensus conferences have been held on the topic, and recommendations have been published based on the evidence available at the time.

Multiple factors have been found to influence and/or alter the quality and predictability of various loading protocols for completely and partially edentulous arches. These factors include the health of the patient; oral conditions such as periodontal status, occlusion, and function/parafunction; characteristics of the proposed implant site; implant size and shape; implant material and surface properties; and timing and methodology of implant placement, including primary implant stability, loading procedures, and long-term maintenance. These factors remain relevant, and because implants as well as associated materials and procedures have evolved, continued evaluation remains important. The predictable optimization of treatment outcomes through more efficient treatment methods based on sound science remains a valid goal for both clinician and patient.

This group was asked to critically discuss and evaluate the current evidence relating to loading protocols for dental implants. Four position papers had been prepared by group members to facilitate the deliberations. These individuals had been invited by the Consensus Conference Committee well ahead of the conference to prepare their reviews. The papers were distributed to all group members for individual study and preparation prior to the meeting. The reviewers were asked to present a summation of the quality and quantity of existing literature relating to loading protocols for dental implants in edentulous arches, the posterior maxilla, the posterior mandible, and the anterior maxilla (esthetic zone). Further, each reviewer presented conclusions, from which group discussion could be initiated. At the conference, each position paper was openly discussed and critically evaluated.

At the outset of the first session, the group revisited the conclusions and consensus statements from the previous ITI Consensus Conference, held in Gstaad, Switzerland, in 2003, and published by Cochran and coworkers,¹ as well as the various definitions for loading protocols from other organizations.²⁻⁴

Disclosure

All the group members were asked to reveal any conflicts of interest potentially influencing the outcomes of the consensus work. No such conflicts were identified.

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Definitions of Loading Protocols

Loading protocols were considered during a consensus meeting held at a congress in Barcelona, Spain, in 2002. The following definitions for implant loading were agreed upon by Aparicio and coworkers²:

- *Immediate loading*: The prosthesis is attached to the implants on the same day the implants are placed.
- *Early loading*: The prosthesis is attached in a second procedure, earlier than the conventional healing period of 3 to 6 months. The time of loading should be stated in days/weeks.
- *Conventional loading*: The prosthesis is attached to the implants in a second procedure 3 to 6 months after the implants are placed.
- *Delayed loading*: The prosthesis is attached in a second procedure later than the conventional healing period of 3 to 6 months.

The Third ITI Consensus Conference, held in 2003 in Gstaad, Switzerland, modified the definitions as follows (Cochran et al, 2004)¹:

- *Immediate loading*: A restoration is placed in occlusion with the opposing dentition within 48 hours of implant placement.
- *Early loading*: A restoration in contact with the opposing dentition and placed at least 48 hours after implant placement but not later than 3 months afterward.
- *Conventional loading*: The prosthesis is attached in a second procedure after a healing period of 3 to 6 months.
- *Delayed loading*: The prosthesis is attached in a second procedure that takes place some time later than the conventional healing period of 3 to 6 months.
- *Immediate restoration*: A restoration inserted within 48 hours of implant placement but not in occlusion with the opposing dentition.

For a Consensus Conference of the European Association for Osseointegration (EAO), held in Zurich, Switzerland, in 2006, a review was presented by Nkenke and Fenner.³ The group accepted the following definitions:

- *Immediate loading*: A situation in which the superstructure is attached to the implants in occlusion with the opposing dentition within 72 hours.
- *Conventional loading*: A situation in which the prosthesis is attached to the implants after an unloaded healing period of at least 3 months in the mandible and 6 months in the maxilla.

- *Nonfunctional immediate loading* and *immediate restoration* are used when a prosthesis is fixed to the implants within 72 hours without achieving full occlusal contact with the opposing dentition.

Cochrane reviews are recognized as a gold standard in evidence-based health care. Recently, Esposito and coworkers published an updated version of their systematic review regarding different times for loading dental implants, and based it on the following definitions⁴:

- *Immediate loading* was defined as implants in function within 1 week after their placement. No distinction was made between occlusal and non-occlusal loading.
- *Early loading* was defined as putting implants in function between 1 week and 2 months after placement.
- *Conventional loading* was defined as putting implants in function after 2 months.

For the purpose of the literature reviews, conclusions, and consensus statements for the 2008 ITI Consensus Conference, our group agreed to use the definitions of the 2003 ITI Consensus (Cochran and coworkers, 2004).¹

Following agreement on the definitions to adopt, the group then assessed if each review paper adequately addressed the respective topic of interest and whether the supporting literature selected by the reviewers was complete. Where missing, additional publications were made available for inclusion. The group then divided into smaller working units for detailed consideration of each treatment indication. A focus of discussion within the working units, and then within the group as a whole, related to the quality or level of evidence found for each indication, and what constituted adequate support for the group to make consensus statements and clinical recommendations.

The group's consensus statements and recommendations were presented to the plenary sessions, where they were considered and discussed by all participants attending the conference. Subsequent to these discussions, final consensus statements and clinical recommendations were prepared. The final consensus statements and clinical recommendations follow.

CONSENSUS STATEMENTS AND CLINICAL RECOMMENDATIONS

The group found consensus in making the following general and indication-specific (edentulous patients;

partially edentulous patients) consensus statements and clinical recommendations:

General Statements

1. The literature base associated with loading protocols for dental implants remains limited, particularly with regard to studies of high scientific quality, such as randomized controlled trials (RCTs) or systematic reviews.
2. While placing a priority on publications considered to represent a higher level of evidence, the group acknowledged the potential value of other studies (cohort studies, etc) identified in the searches.
3. In agreement with the 2007 Cochrane Report,⁴ the group recommends that for future evaluations the ITI definitions for dental implant loading be modified from the 2004 ITI Consensus Report¹ to state that:
 - Conventional loading of dental implants is defined as being greater than 2 months subsequent to implant placement.
 - Early loading of dental implants is defined as being between 1 week and 2 months subsequent to implant placement.
 - Immediate loading of dental implants is defined as being earlier than 1 week subsequent to implant placement.
 - A separate definition for delayed loading is no longer required.

Edentulous Patients

Mandible and Maxilla. For the edentulous mandible and maxilla, existing literature supports loading of microroughened implants between 6 and 8 weeks subsequent to implant placement with fixed or removable prostheses in the mandible, and fixed prostheses in the maxilla. Therefore, for the majority of patients, loading of dental implants for these indications and within this time frame should be considered routine.

- A lower level of evidence exists to support loading of dental implants with maxillary overdentures for this time frame (6 to 8 weeks).
- There is no evidence available at this time to support loading of dental implants in the edentulous arches between 2 and 6 weeks after implant placement.
- For the edentulous mandible, the literature supports immediate loading of microroughened implants with fixed prostheses or overdentures.
- This consensus statement is made with the understanding that the treatment is complex.

- Treatment within this time frame, for the above indications, can be considered a valid treatment option for clinicians with the appropriate education, experience, and skill.

Conventional loading (greater than 2 months subsequent to placement) is recommended under specific conditions in the edentulous maxilla and mandible. These conditions include, but are not limited to, alveolar ridge augmentation, sinus floor elevation, and the presence of parafunction, maxillary overdentures, and compromised host status.

Maxilla. For the edentulous maxilla, the literature supports immediate loading of microroughened implants with fixed prostheses. This consensus statement is made with the understanding that the treatment is complex and can be considered a valid treatment option for clinicians with the appropriate education, experience, and skill.

Insufficient data exist to support immediate loading of dental implants with overdenture prostheses in the edentulous maxilla.

Partially Edentulous Patients

Posterior Mandible and Maxilla. For the partially edentulous posterior mandible and maxilla, in the absence of modifying factors such as fresh extraction sockets, augmentation, and short implants, existing literature supports loading of microroughened implants between 6 and 8 weeks subsequent to implant placement. Therefore, for the majority of patients, loading of dental implants for these indications and within this time frame should be considered routine.

Conventional loading (greater than 2 months subsequent to implant placement) should be the procedure of choice for partially edentulous posterior sites (maxilla and mandible) when:

- Stability is considered inadequate for early or immediate loading
- Specific clinical conditions exist, such as compromised host and/or implant site, presence of parafunction or other dental complications, need for extensive or concurrent augmentation procedures, sinus floor elevation

Posterior Mandible. For the partially edentulous posterior mandible, immediate loading of microroughened implants can be considered a viable treatment option. Caution is recommended in interpreting published outcomes for this indication, as inclusion and exclusion criteria are inconsistent, and many confounding factors are evident. Treatment within this time frame, for this indication, is complex and can be

considered a valid treatment option for clinicians with the appropriate education, experience, and skill.

Insufficient evidence exists to support immediate loading of dental implants in the partially edentulous posterior maxilla.

Esthetic Zone. While implant survival in partially edentulous sites in the esthetic zone does not appear to be affected by loading protocols, success criteria and patient-centered outcomes may be. As no data exist evaluating these aspects, clinical trials are recommended. For partially edentulous sites in the esthetic zone, loading of microroughened implants between 6 and 8 weeks after implant placement can be considered routine.

Immediate loading of microroughened dental implants can be considered a viable treatment option for partially edentulous sites in the esthetic zone. Treatment within this time frame, however, is complex and can be considered a valid treatment option for clinicians with the appropriate education, experience, and skill.

Conventional loading (greater than 2 months subsequent to implant placement) remains the procedure of choice for partially edentulous sites in the esthetic zone when:

- Stability is considered inadequate for early or immediate loading
- Specific clinical conditions exist, such as compromised host and/or implant site, presence of parafunction or other dental complications, need for extensive or concurrent augmentation procedures, sinus floor elevation

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