



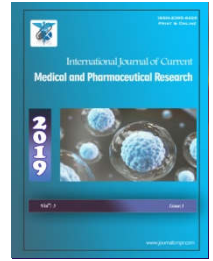
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RESEARCH Article

IMMEDIATE LOADING OF DENTAL IMPLANTS- AN OVERVIEW

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ABSTRACT

There is a growing trend in implant dentistry to decrease the treatment times associated with implant therapy. This can be achieved with immediate occlusal loading protocol. Immediate loading (IL) of dental implants is an eminent and acknowledged treatment strategy which is extensively being used for the rehabilitation of missing teeth. IL may be described as functional loading (with occlusal contacts) immediately after implantation (or within 3–4 days after surgery) without waiting for the healing period. IL has gained popularity nowadays as it includes less possible trauma to the tissues, overall treatment time is decreased, reduced patient's discomfort and anxiety, better patient acceptance and good function and aesthetics.

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INTRODUCTION

In the last few decades, implant dentistry has emerged as a fully accepted discipline in dentistry. Immediate loading of implants at present is gaining a lot of importance due to various reasons.¹ In the last two decades, it became clear that clinical implantology had advanced to the point that this treatment represented a predictable approach to the replacement of lost teeth. As initially introduced a complete surgical protocol was required, with the implants submerged in the soft tissue and alveolar bone, to allow for healing without loading followed by surgical uncovering of restoration 3 to 6 months later. Per-Ingvar Branemark, a Swedish physician developed this 2-stage protocol based on meticulous research conducted over a 20-year period. Branemark estimated that implants placed with this protocol had "an expected function time of several decades – perhaps 50 years".

Later, evidence was beginning to suggest that a one stage protocol might offer patients the prospect of expected dental rehabilitation. The idea of immediate functional loading of dental implants is not a new one. By the late 1800's, dentists on both sides of the Atlantic were experimenting with numerous designs and materials for early implant prototypes, many of which were immediately loaded, and some of which survived for pretreated periods. Failure was also widespread, however, due to the lack of scientific data to support these early efforts.

Branemark's work forever changed the landscape of implantology.² His scientific research and subsequent clinical studies in the department of Anatomy at Gothenburg University led him to conclude that a number of elements were conical to achieving long-term survival of endosseous implants. As little trauma as possible should be inflicted upon the bone at the implant-receptor site, Branemark believed, and osteotomies should be created in which the implants fit singly rather than adjoining any voids.

Branemark also believed that, once placed, implants needed to be protected from motion that might loosen them and cause the formation of fibrous encapsulation. Such encapsulation would interfere with the in-growth of bone into the implants titanium surface, a phenomenon for which Branemark coined the term "Osseointegration".

Since then, no one has cast any doubt upon the efficacy of Branemark's two stage implant placement protocol as means of ensuring osseointegration. What has happened, however, is that a number of researches (including Branemark himself) have turned their attention to the question of whether osseointegration might also be achievable in the wake of immediate loading? In the late 1970's, Ledermann began placing titanium plasma-sprayed implants and the same day splinting and immediately loading them with mandibular overdentures. In 1984, he reported a 91.2% survival rate for

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476 implants placed in 138 patients. Schroeder *et al* (1983) and Babbush *et al* (1986), following the same protocol, reported success rates of 98% and 96.1% respectively. Since then over a dozen other studies have demonstrated the effectiveness of immediate loading of endosseous implants.³

About 25 years ago, Branemark *et al.* (1977) published the first long-term follow-up on oral implant, providing the scientific foundation of modern dental implantology. The predictability of implant integration according to Branemark and collaborators was obtained by adherence to a strict surgical and prosthodontic protocol. One of the most emphasized requirements was a stress-free healing period of 3-6 months, making implant treatment lengthy.

Presently however, early and immediate loading protocols are reported by an enhancing number of clinical (Chiapasco *et al* 1997, Schnitman *et al* 1997, Taarnow *et al* 1997) and experimental publications.⁴

Guidelines For Immediate Loading:⁵

1. Immediate loading should be attempted in dentulous arches only, to create cross-arch stability
2. The implants should be at least 10mm long.
3. A diagnostic wax-up should be used for the template and the provisional restoration fabrication.
4. A rigid metal casting should be used on the lingual aspect of the provisional restoration.
5. A screw retained provisional restoration should be used where possible.
6. If cemented, the provisional restoration should not be removed during the 4-6 month healing period.
7. All implants should be evaluated with Periotest at Stage I, and the implants that show the least mobility should be selected for the immediate loading.
8. The widest possible anterior-posterior distribution of the implants should be used.

Indications and Contraindications

INDICATIONS	CONTRA-INDICATIONS
Single tooth replacement	Bruxers
Partial edentulism	Reduced bone quality and quantity
Full edentulism	Short implant lengths

Advantages and Disadvantages

ADVANTAGES	DISADVANTAGES
Immediate full function of the new tooth	More chances of failure
Beautiful, natural cosmetic appearance	Peri-implant bone reaction is highest after surgical traum
Less invasive	High chances of post-operative complications
Long term edentulism can be eliminated	More patient co-operation is needed
No additional appointments are required	More bone loss compared to delayed loading

Occlusal Overload in Immediate Loading

Occlusal overload have been found to cause implant/implant prosthesis failure and peri-implant bone loss and/or loss of osseointegration. The main principles of implant occlusion have been derived from occlusal principles in tooth restoration.⁹ Three occlusal concepts (balanced, group function and mutually protected occlusion) have been successfully accepted nowadays with certain modifications for implant-supported prostheses. All of the concepts may have maximum intercuspation (MIP) during habitual and/or centric occlusion.

Possible Overloading Factors

Overextended cantilever

1. 415mm in the mandible (Shackleton *et al.* 1994)
2. 410–12mm in the maxilla (Rangert *et al.* 1989; Taylor 1991)

Parafunctional habits/Heavy bite force

Excessive premature contacts

1. 4180 mm in monkey studies (Miyata *et al.* 2000)
2. 4100 mm in human (Falk *et al.* 1990)

Large occlusal table

Steep cusp inclination

Poor bone density/quality

Inadequate number of implants

Basic Principles of Implant Occlusion May Include

1. Occlusion - Bilateral stable
2. Occlusal contacts and force – evenly distributed
3. There should be no interferences between centric relation and habitual position.
4. Smooth, even, lateral excursive movements without any interferences

Failures Associated with Immediate Loading

1. Connecting screw loosening
2. Connecting screw fracture
3. Gingival bleeding or enlargement
4. Purulent exudates from large pocket
5. Pain (though not very common)
6. Fracture of prosthetic component
7. Angular bone loss noted on IOPA
8. Long standing infection and soft tissue sloughing during the healing period.

Factors that Decrease Risk of Failures in Immediate Loading

1. **Bone micro strains**
2. **Increased Surface area**
 - a) Implant size
 - b) Implant body design
 - c) Implant surface condition
3. **Decrease force conditions**
 - a) Patient factors
 - b) Implant position

CONCLUSION

The last decade has seen a profound shift in implant dentistry from the lengthy healing original protocols to immediate loading has demanded a cognitive revolution. Immediate loading of a dental implant consists of a nonsubmerged 1-stage surgery in which loading of the implant is done with a provisional restoration at the same appointment or shortly thereafter. Immediate loading of dental implants are proven to reduce the treatment time and thus increase patient acceptance.⁷ Future studies should be conducted to evaluate long-term data of immediate restorations on implants and possible applications of this technique in situations where problems of poor bone quality, multiple implants or augmentation procedures must be overcome.⁵

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