

# Bone Adherence of Immediate Loaded Dental Implants- A Clinico-Radiographic Study

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## Abstract

**Background:** The purpose of this study was to evaluate the the bone adherence of immediate loaded dental implants, clinically and radiographically. **Subjects and Methods:** 20 implants in the form of single crowns or 2- 4 unit bridges were placed in 10 patients. The implants were loaded immediately. The patients were followed up at 2/3 months, 6 months, 12 months, 24 months of post implant insertion. Post-operative evaluation included: Implant mobility;; Peri-implant Radiolucency; & Bone loss. **Results:** All the clinical parameters were comparable & statistically non- significant. the overall success rate for these immediate loaded dental implants was recorded as 100%. **Conclusion:** Within the limitations of this study, immediate loading of dental implants is a suitable treatment option in both mandible & maxilla.

**Keywords:** Dental implant, immediate loading, bone adherence.

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## Introduction

The concept of osseointegration which was given by Prof. Branemark in 1952, plays an vital role in implant dentistry & is the ultimate goal for the implantologists to achieve. "osseointegration" is a direct structural and functional connection between the ordered living bone & surface of a load-carrying implant and consists of direct histological bone-implant contact (BIC), without an intervening layer of fibrous tissue. Branemark's original 2-stage Surgical Protocol 2 highlights the importance of a stress-free healing period for controlled implant integration, which requires.<sup>[1]</sup> Submerging the implant below the crestal bone & maintaining unloaded implant environment for 3-4 months in mandible, 6-8 months in maxilla; &.<sup>[2]</sup> Uncovering these implants & placing a prosthetic abutment after 3-6 months & then placing the permanent prosthesis. This undue waiting period was always a source of inconvenience, both to the patient and to the clinician, and many a time, the reason for opting against implant therapy.<sup>[3]</sup> During recent years, the loading protocols have been revised, particularly for decreasing or even eliminating the healing periods before loading the inserted implants.<sup>[4]</sup> With better understanding of biomaterials, improvements in implant design and surgical protocols, prosthetic loading protocols via either immediate implant loading or early implant loading have gradually become available during later years as additional concepts. Primary implant stability is

considered an important parameter for determining the loading protocol.<sup>[5]</sup> Although there is no gold standard for measuring implant stability, several methods,<sup>[6,7]</sup> have been proposed: (1). Clinical assessment by exerting lateral forces with 2 opposing mirror handles, (2). Percussion test, (3). Periotest device, (4). Resonance Frequency Analysis (RFA), (5). Insertion torque.(6). Histologic analysis.(7). Reverse torque test, (8). Radiographic analysis.

## Subjects and Methods

Patients attending the Post Graduate Department of Oral Maxillofacial Surgery, Govt. Dental College & Hospital Srinagar (J&K), who were willing to replace their missing teeth by implants were screened and enrolled, they were prepared under all aseptic conditions and the whole procedure was explained to them. The advantages and disadvantages of the surgical procedure were explained in detail. A written informed consent was taken from the patient or the attendant. This was a prospective study in which patients of both the sexes were included. Each patient was having one or more missing teeth in mandible or maxilla. A total of 20 implants were placed in these patients. Pre-operatively fabricated surgical stent was placed at the proposed site & Implant osteotomy was performed. The implants were loaded with implant prosthesis immediately . All the implants were placed by a single experienced Oral & Maxillofacial Surgeon to

eliminate operator bias.

Implant Mobility was measured in a method similar to that used to assess tooth mobility. With two rigid instruments, a force of approximately 500gms was applied in the labio-lingual direction. The amplitude of implant mobility was scored 0 - 4, The radiographic evaluation of bone level / loss was measured on a panoramic or a periapical radiograph. Bone loss was measured on the mesial and distal aspects of each implant. The distance between the implant platform and the most coronal level of the bone deemed to be in contact with the implant surface was evaluated. The measurements of the bone level at implant placement were considered as baseline. Radiographic Bone Level (RBL) change was calculated as the difference between the reading at 6 or 12 or 24 months and the baseline value.

We have adopted the method described by Carl E. Misch (2008) to determine the height of the crestal bone, i.e., pitch of implant's thread in the measurement of the marginal bone levels. The measurements were classified into groups of 0.5mm

## Results

The mean age of the patients was 28 years (range, 20- 66 years) at the beginning of the study. [Male patients = 31 years & Female patients = 30 years; Maximum insertion torque value (ITV) was 45 Ncm and the minimum was 30 Ncm. 80 % implants (n=16) were placed with an optimum ITV of 35 Ncm. None of the implants showed any peri-implant radiolucency at follow-up visits. At 6 month, 12 months & 24 months follow-ups, no implant showed any mobility (i.e., 100% success rate). At 12- month follow-up, 25 % implants demonstrated bone loss of 0.6 – 1.1 mm 12-month / 24- month clinical recording and radiographic assessment showed all values within the success criteria. Hence, 100% success rate was recorded. Healing, in general, was uneventful with no discomfort or the patients & slight pain & discomfort to the patients in. All the sites maintained excellent peri-implant soft and hard tissue conditions. No implants were lost in any group over a 12-month / 24-month period. Based on clinical findings, all the loaded implants were successful at 6-month, 1- year & 2-year follow-ups. (TABLE 1) (FIG. 1-3).



Figure 1: Implant placed



Figure 2: Postop Iopar



Figure 3: Final prosthesis

## Discussion

A successfully bone adhered oral implant is anchored directly to the bone. However, in the presence of movement, a soft tissue interface may encapsulate the implant causing its failure.<sup>[8]</sup> To minimize the risk of soft tissue encapsulation, it was recommended by Branemark that implants should be kept load-free during the initial healing period, i.e., 3-4 months in mandible & 6-8 months in maxilla.<sup>[3]</sup> For edentulous patients, shortening this long

time interval between implant insertion and delayed prosthetic loading is advantageous for esthetic, economical, and psychological reasons.<sup>[9]</sup> immediate loading of implants seems to be a valuable treatment option for clinicians and can be recommended under clearly defined clinical conditions. 10 We have conducted a prospective clinico-radiographic study with the purpose of evaluating the treatment outcomes of 20 immediate loaded implants We have selected and included these patients in our study, based on certain inclusion and exclusion criteria. We excluded patients if they provided a positive history of presence of any medically compromising conditions which prohibit implant surgery, or history of chronic smoking, alcoholism / drug abuse, bruxism, or progressive periodontitis. These criteria of patient selection were in accordance with the studies performed by many investigators.<sup>[10,11,12]</sup> We have placed our implants in adequately healed & remodelled ridges immediately in accordance with the study conducted by many authors.<sup>[14,15]</sup> as immediate loading of endosseous implants in healed ridges offers select benefits to both the clinicians & the patients. The insertion torques values (ITV) used in our study varied from 30 to 45 Ncm. In all our cases, the restorations were cemented as per the immediate loading concept. abutments were placed, impressions made and prostheses fabricated and cemented to the abutments.<sup>[16]</sup> In our study, the temporary crowns were placed in infra-occlusion in an attempt to reduce the rotational forces & the effect of micromotion.<sup>[17]</sup>

However, passive forces from lips, chin and active forces during chewing of food can probably not be avoided. The clinical parameters we have taken into consideration were:- absence of infection around the implant; absence of pain, paresthesia, or neuropathy; absence of implant mobility , absence of peri-implant radiolucency & absence of marginal bone loss. The success criteria were in accordance with most of published data,<sup>[18]</sup> Implant mobility is a direct indicator of the extent of bone adherence. The presence or absence of mobility was graded as per the grading system given by Carl Misch (2008). Radiographic bone level change (RBL) was the main response variable that was evaluated in this study. Crestal bone level is a significant indicator of implant health. Under ideal conditions, an implant should loose minimum bone.

IOPAR is the most reliable method to monitor implant condition (Esposito et al – 1998). The use of standardized radiographs is a significantly more sensitive, direct method to detect changes in bone levels adjacent to implants. In our study, the average marginal bone loss after 1-year was 0.27 mm As per most of the published data the average crestal bone loss should not exceed 1.5 mm by the end of 1-year, & 2.0 mm by the end of 2 years. All dental implants inserted in our study were considered clinically and radiographically successful according to the implant quality health scale established by Carl Misch et al (2003),<sup>[19]</sup> as there was no pain, paresthesia or tenderness upon function, no exudates or clinical mobility, no peri-implant radiolucency and the radiographic bone loss from initial surgery was less than 2mm. The present study demonstrated an overall implant

survival / success rate of 100 % in the partially edentulous maxilla & mandible. This is in agreement with the findings of other studies, which have prospectively evaluated immediately loaded implants & have shown the overall survival / success rate of more than 95 %<sup>20</sup>.

**Table 1: Clinical Implant Mobility Scale**

SCORE	INFERENCE
0	Absence of clinical mobility with 500gms in any direction
1	Slight detectable horizontal movement
2	Moderate visible horizontal mobility upto 0.5mm
3	Severe horizontal mobility greater than 0.5mm
4	Visible moderate to severe horizontal &/or vertical movement

## Conclusion

Immediate loading of dental implants in mandible & maxilla is a highly predictable modality for replacing missing teeth. However, it should be noted that patient selection plays an important role in the success of immediate loaded dental implants.

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