



## IMMEDIATE LOADING IMPLANTS: WHEN, WHERE AND HOW?

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**ABSTRACT**

In the present times implant dentistry has evolved as new horizon for treatment of edentulous patients. Immediate loading of implants is important and most popular treatment strategy utilized for restoration in partial or completely edentulous patients. The micro movement is considered as major risk factor for implant osseointegration. The main assessment criterion for primary stability of implant is implant insertion torque. The bone density should be appropriate at the implant insertion site for achievement of adequate insertion torque. The success of immediately loading of implants depend upon various factors such as selection of patient, quantity and quality of bone, length and design of implant, primary stability of implant, loading of implant occlusally and operators clinical ability.

**KEYWORDS :** Immediate loading implants, Implant stability, Osseointegration.

**INTRODUCTION:**

The concept of osseointegration has evolved the implantology as new horizon for dental practitioners for rehabilitation of their patient's in routine practice.<sup>1</sup> The principle of osseointegration plays vital role in healing phenomenon after placement of implant which incorporates time period of healing in months which is based on direct implant and bone contact as justified by histological analysis.<sup>2,3,4</sup> The Branemark introduced classic 2 stage protocol in 1977 regarding loading of implant according to which in stage 1 the implant is placed below the crestal bone without prior loading for allowing stress free healing and soft tissue is covered over the implant to maintain the implant to bone integrity for 3 to 6 months and after this period implant is loaded in the second stage which requires second stage surgical procedure to uncover implant and place the prosthetic component.<sup>5,6</sup> The limitation of this 2 stage procedure is the prolonged time of treatment and Brånemark's recommended 2 stage loading was mainly based upon the theoretical data and yet never scientifically and experimentally justified.<sup>7,8</sup> The distress, anxiety and inconvenience resulted from prolonged treatment period is another challenge for operator and patients.<sup>9</sup> The previous studies have suggested that root form implant can osseointegrate even when implant portion remains projected through soft tissue while early phase of bone remodeling.<sup>10,11,12</sup> This approach followed recently by majority of operators is termed as 1 stage or non-submerged procedure as it eliminates the requirement of second surgical procedure to uncover the embedded implant and this concept resulted in the introduction of immediate loading of implant for overcoming the limitation of traditional Branemark protocol.<sup>13</sup> In immediate loading of an implant the implant carries the superstructure or prosthetic component which makes occlusal contact within 1 to 2 days after placement of implant.<sup>10</sup> The conditions when occlusion is established within period of 2 weeks is termed as an early loading of implant but when it is prolonged for few weeks more is termed as delayed loading of implant however the surgical procedure followed may be 1 stage or 2 stage procedure.<sup>14</sup> The experimental studies conducted by Chiapasco et al<sup>15</sup>, Schintman et al<sup>16</sup> and Tarnow et al<sup>17</sup> suggested that critical factor for osseointegration is not early loading but absence of excessive micromotion, hence implant can be immediately loaded provided micromotion is managed by case selection, cross arch stabilization, preventing overload, wider distribution of implants and minimal cantilevered portions.<sup>18</sup>

**Protocols for implant loading:**

Esposito et al<sup>19</sup> suggested 3 protocols for loading timing of implants: 1. Immediate loading implants, within 1 week from placement; 2. Early loading, between 1 week and 2 months; 3.

Conventional loading implants, after 2 months from the time of insertion of an implant.

The two further sub divisions regarding implant loading modality includes: 1. Occlusal-loading or non-occlusal-loading; 2. Direct-loading or progressive-loading.

The meta-analyses performed by Enríquez-Sa-cristán et al<sup>20</sup> to reveal that immediate loading, early loading and conventional loading implants share equal success and survival chances.

The latest meta-analyses study performed by Sanz-Sánchez et al<sup>21</sup> along with study conducted by Zhu et al<sup>22</sup> reveals that there is higher chances of failure of implant following immediate loading procedure in comparison to those in which conventional loading protocol were followed, however survival rate for both these procedures were found to be higher.

**Principle of Immediate loading:**

On the application of controlled load by an implant the subsequently bone reacts to such load by phenomenon of bone remodeling by changing its architecture according to amount and direction of application of load. As per the Frost mechanostat principle which reveals that bone adjusts by various biologic processes such as physiological, trivial and pathological overload. The remodeling can be defined as continuous procedure of resorption and generation of bone which restores already existing bone and is initiated by reduced mechanical usage in trival loading zone or micro damage in pathological loading zone. The main aim of immediate loading of implant with prosthesis is to lower the occlusal overload and hence leading to rise in remodeling rate of bone. The 2-types of bone formed at bone – implant junction are woven and lamellar bone. The different studies suggest that woven bone is less dense and formed at the rate of more than 60 microns per day while more mineralized lamellar-bone formed at the rate of 5 microns per day.<sup>10</sup> The higher rate or woven bone formation at implant bone junction results in higher chances of implant failure.<sup>23</sup>

**Indications for immediate loading implants (Table 1.):**

Sr. No.	Indications <sup>6,10</sup>
1.	Conditions where partially edentulous jaws are present
2.	In case of completely edentulous patients
3.	In case of patients who demand fixed prosthesis
4.	In patients where there is requirement of long span fixed partial dentures

5.	Immediate loading protocol should be decided by the operator in such patients who have more to achieve and less to lose such as patients who cannot wear removable prostheses due to their social and psychological reasons
6.	Immediate loading protocol should be followed for those patients who cannot undergo prolonged treatment procedures as in case of conventional loading
7.	In patients with poor muscular control who need to be rehabilitated earlier and in patients who cannot psychologically accept removable prostheses

**Contraindications for immediate loading implants (Table 2.):**

Sr. No.	Contraindications <sup>6,10</sup>
1.	In situations where inadequate bone volume is present
2.	In case of patients with habits such as chronic smoking
3.	In case of poor density of bone present i.e. D4 bone
4.	Patients with parafunctional habits such as bruxism, tongue thrust and clenching

**Principles for Immediate Loading Implants suggested by Tarnow et al<sup>17</sup>:**

1. The length of implant selected for immediate loading should be 10 mm.
2. The phenomenon of cross-arch stability should be followed when implants are immediately loaded.
3. The proper diagnostic wax up should be fabricated for temporary restorations.
4. Screw retained temporary restorations should be preferred.
5. The cemented restorations should not be removed for 5 to 6 months.
6. The primary stability evaluation of all the placed implants should be carried out with periotest and implants with least mobility should be immediately loaded.
7. The inter implant distance should be raised to avoid longer cantilevers.

**Implant length and positioning:**

To achieve full mouth rehabilitation with immediate loading implants many studies consider 6 implants to be minimum placed to support the overlying prostheses.<sup>24,25</sup> The study conducted by Malo et al<sup>26</sup> however suggested that only 4 implants are sufficient for supporting the prostheses in when immediate loading protocol is followed.

The implant length as per the studies conducted by different authors should be selected of minimum 8 mm whereas implants with 13 mm and 15 mm are most commonly used for loading immediately, however tilting of implants should be done in the posterior jaw region.<sup>27</sup>

**Selection of patient for immediate loading implants:**

The success of implants in case of immediate loading is dependent upon the patient selection. The criteria for selection of patient for this protocol as suggested by different authors include: patient with good overall health, patients with edentulous spans with adequate quantity and quality of bone present, absence of infection and achievement of implant primary-stability. The patients which should be excluded for immediate loading implants include: patients undergoing systemic diseases, immunodeficient, on radiation therapy of head and neck region, drug abusers, pregnancy and patient with other oral pathologies.<sup>27,28</sup>

**Complications of immediate loading implants:**

The different studies conducted previously suggested various complications associated with immediate loading of implants which include mainly fracture and loosening of screw, fracture of prostheses and veneering material, continuous bone loss marginally below the first implant thread, fracture of implant and even implant loss.<sup>29,30</sup>

To avoid complications following procedures based on bio-mechanical principles such as passive-fit prostheses, lowering of length in case of cantilever restorations, narrow bucco-lingual and mesio-distal prosthesis and implant interface to maintain load of implant within physiological limits prevent implant failure and furnish long-term implant stability.<sup>31</sup>

**CONCLUSION:**

Implant dentistry has today evolved vastly as a prime discipline for rehabilitation of edentulous patients. The present scientific knowledge supports the feasibility of immediately loading dental implants, provided that careful selection of patient, treatment planning and proper restorative protocol is followed by the operator. The various benefits of immediate implant implants to patient include shortened treatment period, avoiding of removable prosthesis phase and minimum visits of patients to the dental office. However more researches needed to be conducted in coming future to evaluate long-term success of immediately loaded implants especially in clinical situations where poor quality of bone is present and prolonged ridge augmentation surgical procedures should be avoided.

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