

IMMEDIATE VERSUS DELAYED LOADING IMPLANTS: RATIONALE AND CONTROVERSIES

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Loading implants immediately after their position in alveolar bone crest is a procedure that has become popular in the last decade. The aim of this study is to evaluate the survival rate of 811 immediate loaded implants (ILIs). In the period between January 2008 and December 2013, 877 patients (498 females and 379 males) were operated at the BDD private Practice Clinic (Milan, Italy). The mean post-surgical follow-up was 30±17 months (max – min, 84 – 1). One thousand three hundred and eighty-six fixtures (EDIERRE Implant System SpA, Genoa, Italy) were evaluated in the present study, 811 immediately loaded and 575 loaded after 3 months. All patients underwent the same surgical protocol and agreed to participate in a post-operative check-up program. SPSS program was used for statistical analysis. Survival rate (SVR) was 97.3% since only 38 fixtures were lost from a total of 1,348 implants. Cross-tabulation between failures demonstrated slight but significant worse results for ILIs (p= 0.037). There were 28 failures out of 811 ILIs whereas only 10 fixtures were lost out of 565 implants loaded after 3 months. Immediate loading performed in selected cases is a reliable tool for oral rehabilitation.

Implant rehabilitation delivered in accordance with the traditional protocol has proven to be highly predictable. This protocol requires a 12-month healing period following tooth extraction with an additional undisturbed healing period of 6 and 3 months following implant placement, respectively for the upper and lower jaw (1). The application of these time intervals in implant rehabilitation for maxillary anterior areas presents patients with aesthetic and functional limitations. In order to shorten the overall duration of treatment and to provide satisfactory aesthetic and functional results, researchers and clinicians have focused on reducing the time elapsed between tooth extraction, implant placement and prosthetic restoration delivery. For these reasons, immediate implant insertion into extraction sockets

has become a common practice (2).

The main advantages are obvious: a reduction in waiting time and of number of necessary surgeries, patient satisfaction and possibility of exploiting the residual crestal bone (3, 4). These benefits may come at a cost: increased risk of infection, the need for bone augmentation procedures to solve the discrepancy between implant surface and alveolar bone, and significant risk of aesthetic complications (5). The main reasons for development of the mucosal recession is the presence of a thin gingival biotype, the lack of a facial bone wall to support the facial soft tissues and a facial malposition of the implant (6).

Immediate loading is a treatment option only under certain conditions. One of the major prerequisites

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for treatment success is high primary stability of the implant, which requires a high insertion torque (7) between 35 and 45 Ncm. This torque can be reliably generated by choosing patients with sufficient bone quality and quantity, adequately sized implants and surfaces, and using a minimally traumatic surgical technique (7). However, successful immediate loading may be jeopardized by masticatory overloading and infection (7-12).

Periodontal evaluation before extraction is of fundamental importance and should include the following clinical details: the smile type (low, medium, and high), periodontal biotype (fine, medium, and thick), presence of inter-proximal negro triangles, any asymmetric gingival contour, any periodontal bags, mal-positioned teeth, average line deviation, relative positions of the anterior or superior teeth to the lower lip, and the aesthetic goals (13).

As aesthetic demands are increasing day by day, demand of immediate restoration or replacement of teeth is also increasing. Because of this, immediate implant placement, along with immediate loading of implant, is a favourite treatment option for patients (14).

Since immediate loading has become a widely used procedure for rehabilitation of edentulous patients, we decided to perform a retrospective study on 811 immediately loaded implants and 575 fixtures (EDIERRE Implant System SpA, Genova, Italy) loaded after 3 months.

MATERIALS AND METHODS

Patients

In the period between January 2008 and December 2013, 877 patients (498 females and 379 males) were operated at the BDD private Practice Clinic (Milan, Italy). The mean post-surgical follow-up was 30±17 months (max – min, 84 – 1). One thousand three hundred and eighty-six fixtures were evaluated in the present study, 811 immediately loaded and 575 loaded after 3 months. All patients underwent the same surgical protocol and agreed to participate in a post-operative check-up program.

Subjects were screened according to the following inclusion criteria: controlled oral hygiene, absence of any lesions in the oral cavity, sufficient residual bone volume in order to receive implants of at least 3.3 mm in diameter and 9.0 mm in length.

The exclusion criteria were as follows: insufficient

bone volume, a high degree of bruxism, smoking more than 20 cigarettes/day and excessive consumption of alcohol, localized radiation therapy of the oral cavity, antitumor chemotherapy, liver, blood and kidney diseases, immunosuppression, treatment with corticosteroids, pregnancy, inflammatory and autoimmune diseases of the oral cavity, poor oral hygiene.

Data collection

Before surgery, radiographic examinations were carried out with the use of orthopantomograph and CT scan.

The implant survival rate (SVR) was evaluated according to the following criteria: (i) absence of persisting pain or dysesthesia; (ii) absence of peri-implant infection with suppuration; (iii) absence of mobility; and (iv) absence of persisting peri-implant bone resorption greater than 1.5 mm during the first year of loading and 0.2 mm/years during the following years.

Surgical protocol

All patients followed the same surgical protocol. The anaesthesia of the jaw was obtained by the injection of articaine and post-surgical analgesic treatment was performed with 100 mg of ketoprofene 3 times a day, if necessary. An antimicrobial prophylaxis was administered with 500 mg Amoxicillin twice daily for 5 days starting 1 hour before surgery. Three surgeons (U.D.D., W.B. and G.C.) inserted all implants. Patients agree to follow a strict oral hygiene protocol and recall (Fig. 1 to Fig. 3).

Implants

A total of 1,386 fixtures were inserted: 411 (29.7%) in the mandible and 975 (70.3%) in the maxilla. There were 72, 700, 387, 169 and 58 implants with 3.3, 3.75, 4.2, 4.5 and 5.0 mm wide, respectively. There were 72, 357, 442 and 515 implants 9, 11, 13 and 15 mm long, respectively. Eight hundred and eleven were immediate loaded whereas 575 were loaded after 3 months. Implants were inserted to replace 248 incisors (17.9%), 153 cuspids (11.0%), 488 premolars (35.2%) and 497 molars (35.9%). One thousand three hundred and two fixtures were inserted with 35 N torques whereas the remaining 84 with a lower torque.

Statistical analysis

SPSS statistical program was used. Cross tabulation between variables and failures was performed and Pearson *Chi*-square test was used to detect those variables potentially associated with lost implants.

RESULTS

Survival rate (SVR) was 97.3% since only 38

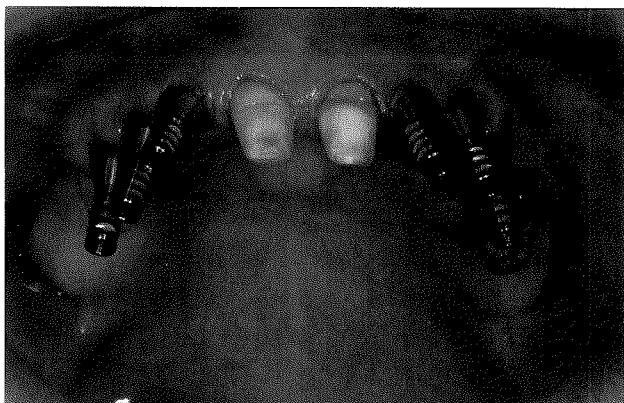


Fig. 1. *Implants inserted in upper jaw.*

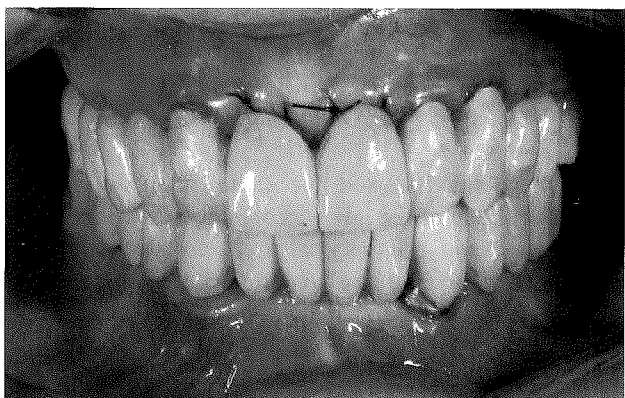


Fig. 2. *Immediate provisional restoration.*

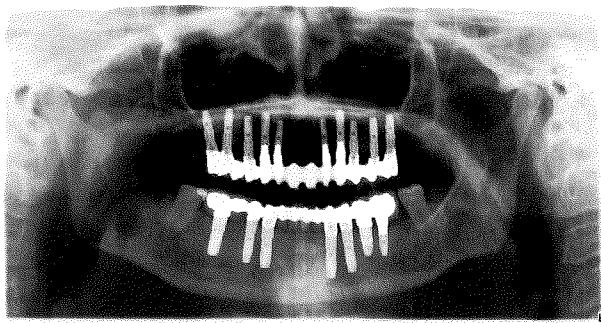


Fig. 3. *Radiograph after 1 year.*

fixtures were lost from a total of 1,386 implants. Cross-tabulation between failures demonstrated a slight but significant worse results for ILIs ($p=0.037$). There were 28 failures out of 811 ILIs whereas only 10 fixtures were lost out of 565 implants loaded after 3 months.

DISCUSSION

Oral rehabilitation of edentulous patients using implant supported fixed prosthesis immediately loaded is a safe procedure with high predictability (13, 15-18). Such treatment has the advantages of immediate restoration of function and aesthetics and emotional comfort to patients. Moreover, few clinical sessions are required in view of the absence of the second surgical intervention for exposing the implants (19-23). According to Romanos et al. (24), loading seems to initiate bone remodelling and to form new bone around immediately loaded implants, with a better healing of the hard and soft tissues. In addition, the implant-supported fixed complete prostheses are favoured by biomechanical aspects of arrangement and polyhedral rigid framework connection uniting the implants, which improve the distribution of occlusal loads (25).

Numerous factors, such as the surgical, host-related, occlusal factors, and implant design and characteristics, play a role in the success of implant placement. Of the factors related to the surgical technique, the establishment of primary stability has been described as the single most important variable for success of immediately loaded implants (26-29). The transmission of micro-motion to an implant body after placement can result in crestal bone loss and failure of osseointegration. It has been shown that micro-motion must be limited to <100 nm to achieve implant-to-bone contact (30, 31).

Although the osseointegration of immediate post-extraction implants is widely reported in literature, the aesthetic outcome regarding soft tissues is not well documented (32). Several aids are considered valid in determining marginal peri-implant mucosa stability and, consequently, in increasing the aesthetic valence of the post-extraction implants. Among these, the possibility of the insertion of the implant fixture both on the bucco-palatal and apical-coronal plane is included (33).

Immediately loaded implants, in fresh extraction sockets by insertion of a provisional restoration on the titanium abutment without any later manipulation, helped to protect the initially forming blood clot and presented a template for soft tissue contouring that resulted in significant reduction of marginal bone resorption and maintenance of soft

tissue architecture (33).

Our results demonstrate that immediate loading is a safe and reliable technique although special care should be given to selecting cases. In fact, IL has a slightly but statistically significant lower survival rate than delayed loading. In addition, the devices from EDIERRE Implant System SpA, Genova, Italy are reliable for oral rehabilitation.

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