IMMEDIATELY PLACED AND FUNCTIONALLY LOADED IMPLANTS SUPPORTED A FIXED PROSTHESIS IN A MANDIBULAR EDENTULOUS ARCH: A CASE REPORT

ABSTRACT
Immediate loading of implant-retained fixed partial dentures with conventional implant placement is well documented. However, there is limited information on immediate loading of implant-retained fixed partial dentures with immediate implant placement. This case report describes immediate loading of dental implants placed immediately after teeth extraction for the treatment of a mandibular edentulous patient.

Keywords: Immediate Loading, Immediate Placement, Implant
ALT DIŞSIZ ÇENEDE İMMEĐİAT YERLEŞTİRİLMİŞ VE YÜKLENMİŞ DENTAL İMPLANT DESTEKLİ SABİT PROTEZLER: VAKA RAPORU

ÖZ

Konvansiyonel yöntemler ile yerleştirilen implantlar üzerine yapılan sabit protezlerin immediat yüklenmesi literatürde geniş yer bulmuştur. Buna rağmen, dental implantların immediat yerleştirilmesi ve ardından immediat yüklenmesi konusu literatürde yeterince tartışmamıştır. Bu vaka raporunda, alt çene dişsiz hastada, diş çekimi sonrası immediat yerleştirilen implantların, immediat yüklenmesi sunulmuştur.

Anahtar Kelimeler: İmmediat Yüklenme, İmmediat Yerleştirme, Dental İmplant
INTRODUCTION

For many years, the most popular treatment option for edentulous patients has been conventional reconstruction with complete dentures. However, many patients are willing to use a more retentive prosthesis due to their advantages. Dental implant treatment has been well documented and is an excellent option to restore edentulous jaws. For patients who have minimal alveolar bone resorption and sufficient bone and interarch space, implant-supported fixed full arch dentures is the best treatment option. However, implant-supported fixed prostheses can be either a single-unit full-arch fixed prosthesis supported by four implants or a multi-unit fixed prosthesis supported by six to eight implants. Over the past decade, traditional loading protocol has been challenged. Immediate implant placement and loading has become the focus of dental implant treatment. For the edentulous mandible, the literature supports immediate loading of micro-roughened implants with a fixed prosthesis and overdentures.

Immediate loading of dental implants has some advantages, such as reducing the number of surgical procedures and the amount of time required to insert definitive implant supported prostheses. Moreover, successful loading protocols should not decrease the success rates associated with implant treatment with unloaded healing protocol. A key element of the successful immediate occlusal loading protocols involves elimination of micro-movement between the implant and the osteotomy site. Osseointegration with immediate implant loading via screw-retained fixed provisional restorations can be successfully achieved in the edentulous mandible. In addition, placement of the implant in fresh extraction sockets allows it to be placed in the same visit directly following tooth extraction. This placement option not only saves time but also preserves the bone in the residual alveolar ridge. The aim of this present case report was to evaluate the 2-year clinical and radiographic outcomes of dental implants that were immediately placed and loaded into fresh extraction sockets.

CASE REPORT

A 72-year-old male patient was referred to the Hacettepe University Department of Prosthodontics. Comprehensive clinical and radiographic evaluations were performed (Figure 1). Although the prognosis for the maxillary dentition was good, the remaining mandibular teeth had a poor or hopeless prognosis.

After a general discussion about the patient’s chief complaints, desires, and expectations, he was presented with various options. A treatment plan was formulated to include immediate placement of six dental implants in the mandibular arch and immediate loading with a screw-retained implant-supported fixed prosthesis.

Impressions of the maxilla and mandible were made with an irreversible hydrocolloid impression material (Kromopan, Lascod SpA Florence, Italy). Quick mouth facebow recordings were obtained and the maxillomandibular jaw relationships were recorded using a semiajustable articulator (Whip Mix Corp, Louisville, Kentucky, USA). After mounting the diagnostic casts in an articulator, diagnostic tooth arrangement was carried out by adjusting the prosthetic acrylic resin teeth to the cast without waxing the labial and buccal flange in order to establish an appropriate emergence profile of the lower anterior teeth (Figure 2). Patient’s approval of the aesthetic appearance was obtained before continuing with the treatment. The diagnostic denture was duplicated two times for immediate restoration and analog stent. (Figures 3a and 3b). Before surgery, cone-beam computed tomography (CBCT) (DVT 9000, New Tom Company, Verona, Italy) images were used to plan implant positioning.

Six tissue-level dental implants (Straumann SP, Institut Straumann AG, Basel, Switzerland) were placed (Figure 4). Three of them were inserted in extraction sites, the others in non-extraction sites (molars and premolar). The preparation axes were controlled with paralleling gauges, and a surgical guide was used between drill changes. After healing caps were connected to each implant, partial-thickness flaps were coronally positioned and the wound was closed using interrupted sutures. On the same day, the patient was
transferred to the prosthetic clinic for the adaptation of the provisional template. Perforations were made on the provisional restoration using a low-viscosity silicone to match implant positions for provisional restoration. After removal of the healing caps, screw-retained provisional abutments (PEEK/titanium alloy, Institut Straumann AG, Basel, Switzerland) were connected to each implant. The perforations on the provisional restoration were widened to avoid any contact with the provisional abutment. Then the provisional restoration was brought into centric occlusion with the maxillary arch and the heights of the abutments were checked. Before fixing the restoration to the abutments, the rubber dam was cut and fit around the abutments to protect the surrounding soft tissue (Figure 5). The connection between the provisional restoration and the coronal part of the abutments was fabricated using a self-curing provisional material. After the provisional restoration-abutment complex was unscrewed and the connection area was checked, finishing procedures were completed in the laboratory. During this procedure, gaps detected between the abutment and the provisional restoration, were filled with acrylic resin. The abutment screws were hand-tightened manually by the prosthodontist at the time of provisional prosthesis insertion, which was screwed in place manually (Figure 6). Only centric contacts were present on the provisional prosthesis and there were no lateral forces on the implants due to the lack of eccentric contacts. Implant stability was assessed via resonance frequency analysis (RFA) (Osstell/Integration Diagnostics, Göteborg, Sweden) in implant stability quotient (ISQ) units at implant
insertion and at the 3-month visit when the fixed screw-retained provisional restoration was removed.

Three months after implant placement, the provisional prostheses and abutments were removed. Impression was obtained with a polyether material (Impregum; ESPE, Seefeld, Germany) using an individual impression tray (Figure 7). The cast was transferred to the semiadjustable articulator and abutments were selected. Definitive metal-ceramic restorations were manufactured with a laser-sintering technique using the PM 100 system (Phenix Systems, Clermont-Ferrand, France) and cemented onto the definitive abutments 2 months after implant placement (Figure 8a and 8b). The patient was subjected to a strict oral hygiene program.
Follow-up visits were performed at baseline (insertion of the immediate provisional prosthesis) and at 3, 6, 12, and 24 months after implant placement. The mean ISQ unit value was 75.625 (range 66.5 to 78.0) and 79.45 (range of 77.0 to 83.75) at implant surgery and at insertion of the final prosthesis, respectively. The following clinical parameters were checked: pain, occlusion, screw loosening, and prosthesis mobility. Success criteria for implant survival were implant stability and the absence of radiolucency around the implants, mucosal suppuration, and pain. Parallel periapical and panoramic radiographs were evaluated at the insertion of the immediate provisional prosthesis and the definitive prosthesis at the first and second years (Figure 9). No implants had been lost at the 2-year follow-up examination.

**DISCUSSION**

The goal of this prosthetic treatment is to retain as much natural dentition as possible, to replace some of the missing teeth immediately following extraction, and to achieve fixed implant-retained dentures with minimal micromotion of the implants during osseointegration. These goals were reached with the mandible using six dental implants placed in the predetermined positions based on the surgical guide. In this case, a multi-unit fixed prosthesis supported by six implants was chosen as a treatment option instead of a single-unit full-arch fixed prosthesis supported by four implants due to decreased resorption of the posterior alveolar ridge. No prosthesis mobility, pain, or screw loosening and radiolucency on periapical radiographs was detected.

Dental implant rehabilitation is the most popular treatment for edentulous patients. Timing of the placement of dental implants may vary. One option involves the placement of the dental implant at the time of tooth extraction, termed immediate implant placement. A second option is delayed implant placement, in which 2–3 weeks is given after tooth extraction to allow soft tissue to heal. The last one, late (conventional) implantation, involves waiting 3 or more months for socket fill. In their Cochrane systematic review, Esposito et al. concluded that there is insufficient evidence on the advantages of different placement protocols. They also mentioned an unsupported opinion of higher risk of implant failure and complications with immediate-delayed implants than with delayed ones. However, immediate implants seem to yield more aesthetic outcomes than the conventional placement protocols. Immediate implantation and delayed implantation were performed in this case without a primer stabilization problem.

Several options exist on loading time of the dental implants, which refers to the time allowed between implant insertion and prosthesis in function: immediate loading (prosthesis is made as soon as possible within 7 days), early loading (prosthesis is made within 6–8 weeks), or delayed loading (3 months later). Esposito et al. found similar success rates for all loading protocols, and the most important factor was high insertion torque (about 35 Ncm). This case report is interesting as 3 of the implants were inserted in fresh extraction sockets and 3 in healed sockets and all implants were immediately loaded.

Before implant treatment, the diagnostic phase should be the first and most important part of the evaluation to achieve the desired final outcome. During the diagnostic phase, careful attention should be given to the patient’s expectations, aesthetic considerations, and the clinical and surgical situation. The patient in this case report desired a more stable prosthesis as soon as possible. Therefore, immediate implantation plus immediate loading was selected.

The current literature supports immediate loading in partially edentulous mandibles as a viable treatment option. This case report shows similar success rates for placement and loading protocols, which may increase the popularity of immediate loading as a treatment option. The main advantages of immediate loading are reduced time and cost. Other advantages include evading the need for removable dentures and soft relining procedures, as well as reducing the number of visits. Thus, immediate functional loading seems to be a viable option for implant-retained fixed partial dentures on an edentulous mandible.

**Figure 9.** Panoramic radiograph of the patient at 2 year follow-up.
REFERENCES


