Full-Arch Metal-Resin Cement- and Screw-Retained Provisional Restoration for Immediately Loaded Implants

Mirza Rustum Baig, MDS, MRD
Gunaseelan Rajan, FDS, RCS

This article describes the clinical and laboratory procedures involved in the fabrication of laboratory-processed, provisional, screw-retained, implant-supported maxillary and mandibular fixed complete dentures incorporating a cast metal reinforcement for immediate loading of implants. Precise fit is achieved by intraoral luting of the cast frame to milled abutments. Effective splinting of all implants is attained by the metal substructure and retrievability is provided by the screw-retention of the prosthesis.

Key Words: metal-resin fixed denture, cement- and screw-retention, hybrid prosthesis, implant provisional restoration, immediate loading, full-arch implant-supported prosthesis, passive fit, provisional implant prosthesis design

Introduction

High clinical success rates have been documented by various authors with the use of immediate and early loaded implants supporting full-arch fixed restorations in the maxilla and mandible. For the clinical success of immediately loaded implants, passive fit of the prosthesis and rigid provisional splinting of the implants are some of the important requirements, among others, that need to be fulfilled. Splinting implants by means of a metal substructure minimizes the deleterious mechanical stresses that cause potential micromovement of early loaded implants. Most reports of immediately loaded implants for completely edentulous arches have used a pre-existing denture modified immediately after implant placement, the prefabricated prosthesis being retrofitted to provisional implant components. These restorations were more often fabricated with acrylic resin, with some reinforced with metal frameworks. Other studies have reported use of metal-reinforced provisional restorations fabricated post-implant placement employing various techniques. The objective of this article is to describe and illustrate an alternative technique for the fabrication of a laboratory-processed, provisional, complete-arch, metal-acrylic resin implant-supported fixed denture, with both cement- and screw-retention.

Clinical Note

The provisional prosthesis fabrication is initiated immediately after the placement.
of implants (Nobel Biocare Replace Select Tapered TiU; Branemark system Zygoma TiUnite, Nobel Biocare AB, Sweden). Standard abutments (multiunit abutments; 17° zygoma multiunit abutments, Nobel Biocare AB) are torqued to the implants (Figure 1) and open-tray maxillary and mandibular impressions are made with polyether impression material (Impregum, 3M ESPE AG) using suitable impression copings (NobRpl, NobelBiocare AB). The impression copings are coated with manufacturer recommended polyether adhesive and splinted with bite registration polyether (Ramitec, 3M ESPE AG), prior to impression making. Definitive working casts (Type IV dental stone, Ultra-rock) are poured using the impressions, with implant replicas (NobRpl, Nobel Biocare AB). Arch-shaped record bases are then fabricated on the working casts with shellac base plates and modeling wax, supported by temporary cylinders (NobRpl, Nobel Biocare AB) splinted and reinforced with pattern resin (GC pattern resin, GC Corp) to stabilize the record bases during try-in. Jaw-relation and centric relation recording is done intraorally and transferred to the semiadjustable articulator (Artex, Amann Girrbach) for teeth arrangement.

An appropriate mold and shade of acrylic resin teeth (Ivoclar Vivadent AG) is selected and the teeth arranged onto the record bases. Intraoral verification of esthetics, phonetics, and occlusion is done with the wax trial dentures (Figure 2). The setup (trial dentures) is removed and placed back on to the working casts (Figure 3).

Silicone indices are fabricated to record the facial positions of the artificial teeth and soft tissue, replicating the teeth positions of the maxillary and mandibular trial dentures in relation to the working casts. The trial dentures are removed and screw-retained titanium cylinders (Nobel Biocare AB) are attached to the implant analogs on the working cast. The titanium abutments are

**Figures 1-3.** Figure 1. Occlusal view of the maxilla with multi-unit abutments placed. **Figure 2.** Maxillary and mandibular teeth try-in. **Figure 3.** Maxillary and mandibular trial dentures fitted on the working casts.
milled to a 2° degree taper with a milling bur (F200 2H 23) attached to a milling machine (Bredent BF 1). The silicone index is then placed on the working cast to evaluate the available space for the acrylic resin pattern for the fabrication of cast metal substructure. The pattern for the substructure is fabricated with autopolymerizing acrylic resin, on the milled abutments. A spacer thickness of 50 to 75 microns is provided and an implant screwdriver positioned to maintain the abutment screw-access channels open without being covered. The height of the milled titanium cylinders is adjusted as indicated. The pattern is cast with cobalt-chrome alloy (d.SIGN 30, Ivoclar Vivadent AG). The cast framework fit is checked on the abutments, and adjustments, if any, are made. The prosthetic teeth and heat-cure acrylic resin are then processed to the cast framework on the master cast with silicone putty index as the guide, using conventional compression moulding technique, taking care to keep the occlusal screw-access channels open.

Once the finished metal-resin prosthesis is ready, an acrylic index is prepared on the milled abutments to aid in the intraoral transfer of abutments with the same spatial abutment/implant and interabutment positions, as on the working casts. The abutments are transferred from the working cast to the implants. The fit of the finished metal-resin prosthesis is then checked on the abutments to assess the complete seating of the prosthesis and to verify aesthetics and occlusion. The metal resin dentures are then cemented intraorally to the milled abutments in the maxillary and mandibular arch with dual-cure composite adhesive cement (DTK adhesive, Bredent) (Figure 4a and b). During luting of the metal-acrylic denture to the milled abutments, a rubber dam is secured over the abutments to prevent the adhesive from contacting the surgical sites. Once the cement has set, the abutment screws are untorqued and the prosthesis removed. The implant engaging part of the abutments is protected and the excess cement is removed from the provisional prosthesis. The abutment screws are torqued after rechecking the metal-resin prostheses for occlusion, aesthetics, and function (Figure 5). The screw-access channels are filled with gutta percha and the openings sealed with light-cure composite. The patient is instructed on the use and maintenance of the prostheses (Figure 6).

**DISCUSSION**

The method described in this clinical report relies on accurate recording of the implant positions immediately after placement, to initiate the fabrication of the provisional restoration. Prosthetic procedures performed postfabrication of working casts, such as occlusal registration, establishment of vertical dimension of occlusion and wax trial denture try-in, are done in a rapid, uncomplicated manner with minimum patient discomfort. The record bases are connected to the implants using temporary cylinders, ensuring stability of the bases during the procedures and avoiding any trauma to the surgical sites.

This technique aims to improve the passive fit by attempting to overcome the potential errors in the final impression, master cast fabrication, and prosthesis fabrication through intraoral luting of the metal-resin framework to the milled abutments. The resulting restoration is strong and durable with a precisely fabricated metal framework and can be used for an extended interim period before providing the definitive prosthesis.

The provisional restoration can be finalized and inserted within 1 or more days after surgery. The time taken will depend upon the patient’s requirements and also on the capabilities of the dentist and the laboratory support. The patient should be made aware of the time needed, steps involved and the
advantages and disadvantages of providing the restoration, soon after implant placement.

A limitation of this technique is the difficulty in milling, aligning abutments for the insertion of cast metal framework in cases of severely tilted implants. Cast abutments or angled multiunit abutments may be used to correct the path of insertion to some extent. With this technique, numbering or other methods of matching the correct abutment and orientation with the correct implant fixture is imperative during the fabrication stage.

**SUMMARY**

This report describes a technique for the fabrication of a metal-resin, laboratory-processed full-arch provisional restoration. The prosthesis is fitted intraorally by luting the finished cast metal framework to the milled abutments, in an effort to maximize passive fit. This method may be an alternate option for those considering the immediate and early loading of implants. The technique offers advantages compared with a prefabricated provisional prosthesis: it is accurate and reliable.

**REFERENCES**


6. Jaffin RA, Kumar A, Berman CL. Immediate loading of implants in completely edentulous maxilla:


