Use of Patient’s Own Natural Teeth as Part of the Interim Prosthesis on Immediately Placed Single Implants in a Staged Surgical Approach: A Clinical Report

Sarah A. Bukhari, BDS1*
Abdulaziz AlHelal, BDS, MS2
Periklis Proussaefs, DDS, MS3
Antoanela Garbacea, DDS, MSD1,3
Mathew T. Kattadiyil, BDS, MDS, MS1

A technique is described where the tooth’s natural crown is used as part of the interim implant supported prosthesis in clinical situations where a tooth with poor prognosis is extracted and an implant is placed immediately after tooth extraction. A preliminary impression is made before tooth extraction, and the exact tooth positioning is assessed in the laboratory as part of the treatment plan. An acrylic resin repositioning jig is fabricated that will guide the clinician in seating and orienting the crown intraorally after implant placement is completed. After the natural tooth is extracted and an implant is immediately placed via guided approach, the extracted natural crown is hollowed and placed on top of an interim abutment. The natural crown is positioned intraorally by using the acrylic resin repositioning jig. The crown is then internally relined and placed as part of the interim implant supported prosthesis. After osseointegration has been confirmed, a definitive prosthesis is placed.

Key Words: IIPP, IPP, immediate placement and provisionalization, immediate provisionals, natural teeth provisional, provisionals

INTRODUCTION

Demands for harmony between the peri-implant gingiva and adjacent dentition especially in the esthetic zone are increasing.1 In situations where an immediate implant is immediately loaded, it is essential to provide the patient with an adequate provisional crown.2–17 Gingival recession has been associated with immediate implant placement and temporization (IIPPT).3,7,13,15 that can be attributed, among other factors, to compression of the peri-implant soft tissue caused by an over-contoured restoration at the cervical area.17,18

A duplication of the exact contours of the extracted tooth, especially at the cervical part of the interim prosthesis, is expected to preserve the soft tissue morphology and allow the creation of a naturally looking emergence profile. A near-natural dimensioned seal of the gingival soft tissue collar may initiate a tissue-maintaining healing process.19–21 Most authors has suggested fabricating an interim implant supported crown made of autopolymerized acrylic resin after implant surgery1 or using a prefabricated interim crown that can be relined with autopolymerized acrylic resin chair side after implant surgery has been completed.3,7,8 However, the use of patient’s natural tooth as part of the interim prosthesis can simulate a replantation in the dentogingival complex.21 Natural tooth also represents a biocompatible structure, which is favored over the surface topography of any long-term interim crown material due to the potential for development of a good soft tissue attachment.21 The use of the patient’s natural crown as part of the interim prosthesis has been described by fabricating an interim abutment and modifying the natural crown to fit the abutment.21

The purpose of the presented technique is to demonstrate the application of IIPPT protocol for restoring single implants in the aesthetic zone by using the patient’s natural dental crown and focusing on the maintenance of the hard and soft tissues in the region in a staged surgical approach. A guide was developed to reposition the natural tooth crown after implant surgery so that the interim prosthesis is fabricated as a duplicate of the diagnostic treatment plan.

CLINICAL REPORT

A 65-year-old female presented at the Center for Prosthodontics and Implant Dentistry at Loma Linda University School of Dentistry for prosthodontic evaluation and treatment. Upon
clinical examination, the 4 maxillary anterior teeth exhibited grade II tooth mobility (Figure 1a). Radiographic examination revealed very short roots (Figure 1b). After discussing different treatment options with the patient, a decision was made to extract the 4 maxillary incisors and immediately place 2 root form dental implants at the area of maxillary lateral incisors. The restorative plan included restoring the 2 implants with implant-supported fixed partial denture (ISFPD).

The presurgical data collection consisted of clinical diagnostic examination, impressions, occlusal records, and radiographic examination (cone beam computerized tomography [CBCT]). Upon CBCT evaluation the case was deemed suitable for immediate implant placement and provisionalization (Figure 2a and b). A decision was made to stage teeth extraction.

In the first stage of the treatment, the 2 maxillary lateral incisors were extracted and 2 root form dental implants were placed. Implant surgery was digitally simulated to ensure adequacy of bone around the dental implants and to fabricate a tooth-supported surgical guide (Invivo 5; Anatomage, San Jose, Calif).

In the laboratory, the maxillary cast was modified in order to fabricate an acrylic resin jig to position the provisional restorations after the placement of the implants. Existing maxillary right lateral incisor was proclined (Figure 3a). An orthodontic setup was made to move the right maxillary lateral incisor palatally so it is properly aligned within the dental arch (Figure 3b and c). Correcting the position of the right maxillary lateral incisor to match the left lateral incisor was done to improve the esthetic outcome. An orientation jig was fabricated on the new maxillary cast using pattern resin (Pattern resin; GC America Inc, Alsip, Ill) to register this relation (Figure 3d).

On the day of surgery, extractions of the maxillary lateral incisors were performed with minimal trauma preserving the facial and the interproximal bone (Figure 4a). After teeth extraction, both sockets were curetted and irrigated with saline solution and the levels of the crestal bone were re-evaluated. The tooth supported surgical guide was then placed and the osteotomies were prepared (Figure 4b). A 3.3 bone level root form implants (BLT Roxolid SLActive, Straumann, Andover, Mass) were placed at the area of the maxillary lateral incisors and the gap between the implant and the extraction socket was filled with xenograft bone graft material (Bio-Oss small particle; Geistlich, Princeton, NJ) (Figure 5).

Primary implant stability was achieved with a minimal insertion torque of 35N-cm. Immediate restorations using the patient’s existing natural teeth were prepared. Engaging titanium temporary abutments (NC temporary abutment for...
crown, Straumann) were hand tightened into each implant (Figure 6). The appropriate height of both temporary abutment was marked and the temporary abutments were then removed and adjusted extra-orally. The temporary abutments were then reseated into the implants, hand tightened, and the screw accesses were blocked. The natural teeth were then modified. The natural teeth (Figure 7a) were trimmed leaving only the facial surface from the cemento-enamel junction (CEJ) to the incisal edge (Figure 7b and c). The teeth were then placed into the acrylic resin jig that was previously fabricated. The jig was seated in the patient’s mouth (Figure 7d) and light polymerized composite resin (Filtek Supreme Ultra, 3M ESPE, St Paul, Minn) was used to attach the tooth to the temporary abutment. The provisional restoration was then removed and modified extra-orally. The provisional crowns were replaced into the implants, hand tightened, and the access holes were blocked with polytetrafluoroethylene tape. A darker shade composite resin (Filtek Supreme Ultra, 3M ESPE) was used to seal the screw.

**Figures 3 and 4.** Figure 3. (a) Frontal view of maxillary cast, showing proclined tooth #7. (b) Frontal view of tooth #7 after orthodontic arrangement. (c) Occlusal view of maxillary cast after orthodontic arrangement. (d) Acrylic resin orientation jig used for fabricating provisional crowns Figure 4. (a) Intraoral occlusal view of maxillary arch after extracting teeth #s 7 and 10. (b) Intraoral occlusal view of maxillary arch with surgical guide.
access holes and occlusion was adjusted as needed (Figure 8a through d).

The second-stage surgery was performed after 3 months of healing (Figure 9). A definitive impression was made using custom open tray impression copings. Heavy and light body poly(vinyl siloxane) (PVS) impression material (Aquasil, Dentsply, York, Pa) was used along with a custom tray made of light polymerized acrylic resin (Tru Tray Sheet, Dentsply). The definitive cast was poured in type IV dental stone (Resin Rock; Whip Mix Corp, Louisville, Ky) with a simulated soft tissue material (GI-Mask; Coltene, Cuyahoga Falls, Ohio). The cast was used to fabricate an interim fixed partial denture.

On the day of the second stage surgery, the maxillary central incisors were extracted, both sockets were curetted, irrigated with saline solution and then grafted with xenograft bone graft material (Bio-Oss small particle; Geistlich). An interim
ISFPD was seated and hand tightened into implants previously place at the area of the maxillary lateral incisors. Interproximal contact points were evaluated with the use of a shim stock 10 microns in thickness (Shim stock, Artus Co, Englewood, NJ). The shim stock should be able to slide through the mesial and distal contact points without getting torn. The occlusion was also evaluated with the use of shim stock. Four layers of shim stock were used and should be able to slide between the ISFPD and the opposing dentition when the patient was in maximum intercuspation position.

Following a 6-month healing period, a definitive impression was made. The definitive prosthesis was fabricated and seated intraorally (Figure 10a through c). Occlusion was adjusted as needed.

**DISCUSSION**

The significance of the presented technique is that it offers some guidelines in utilizing the patient’s own natural crown as part of the interim implant-supported prosthesis. Implant placement and interim crown fabrication were both completed under a guided protocol that might enhance the accuracy of the clinical outcome. The intended crown position that was assessed in the laboratory preoperatively was reproduced clinically after implant surgery with the use of an orientation jig.

The clinical protocol for immediate implant placement and provisionalization IIPP has been associated with the use of an interim prosthesis made of autopolymerized acrylic resin. More recently, use of a milled interim implant-supported prosthesis has been introduced in the literature in an attempt to overcome potential problems associated with the intraoral use and polymerization of autopolymerized acrylic resin. Regardless of the technique, it has been assumed that connective tissue healing is compromised when resin materials are used. A seal between the soft tissue and the restorative material may not develop.

Some authors have advocated the use of prefabricated interim resin crowns that can be relined intraorally around a prefabricated metal abutment. The rationale of using a prefabricated resin shell is the enhanced mechanical properties associated with prefabricated interim crowns. However, the exact shape and contours of these crowns cannot be customized. Either an overcontoured or undercontoured
interim restoration will result in soft tissue contours that will not be compatible with the definitive prosthesis.

Trimpou et al\textsuperscript{21} published a description of a technique where the natural tooth was used as part of the interim prosthesis. The authors suggested potential superiority of this protocol that was attributed to the near ideal seal a natural tooth can offer as compared to a resin crown. The described technique offers a guided protocol for positioning the crown intraorally. The positioning of the crown is based on the position that was assessed in the laboratory during treatment planning. Positioning the crown manually after implant surgery may be associated with limited reproducibility and operator’s error.

The healing process of the extraction socket has been studied in animals.\textsuperscript{28,29} The process of osseous and soft tissue healing after an extraction initiates immediately after the extraction.\textsuperscript{28} The sharp coronal osseous edges that are present after a tooth has been extracted round off by osseous resorption, which results in reduction of the alveolar bony height. While the extraction socket will eventually ossify, the vertical height of the alveolar socket is reduced during the healing process.

On the other hand, the healing of the extraction socket during a replantation process follows a different pattern.\textsuperscript{19} The assumption is that when the natural tooth is placed back in the extraction socket, an ideal sealing may occur between the replanted tooth and the surrounding tissue. Twenty-four hours after tooth extraction the gingiva demonstrates no sign of trauma.\textsuperscript{19,23} Soft and hard tissue remains intact around the extracted tooth.\textsuperscript{19} It is inferred that a nearly ideal seal between the external surface of an extracted tooth and the surrounding tissue may result in osseous and soft tissue stability around the area of the extraction socket. The assumption can be made that using the natural crown as an interim prosthesis during the IAPT protocol may result in a similar healing process with near ideal sealing around the interim prosthesis that might result in enhanced preservation of the surrounding tissues. An animal study with histologic analysis is needed to validate this hypothesis.

The clinician needs to be knowledgeable about the controversies regarding the IAPT protocol. While some authors have advocated that placing and temporizing an implant immediately after tooth extraction may offer results similar to the conventional two stage protocol,\textsuperscript{3,6,11,14,16} some other authors have reported that following the 2-stage protocol by allowing the extraction socket to heal before placing an implant may offer superior implant success or survival rate.\textsuperscript{5,12} Patients need to be well informed on potential risks and benefits when this procedure is contemplated.

A disadvantage of the described technique is the additional time needed in the laboratory to reposition the natural crowns and prepare the acrylic resin jig that would guide the operator in positioning the natural teeth after implant surgery. In addition, the described technique is based on the assumption that the esthetics and contours of the existing natural teeth are ideal. Presence of extensive carious lesions on the extracted teeth may preclude the use of the described technique.

In conclusion, utilizing the patient’s natural tooth as part of the interim implant-supported prosthesis may offer advantages. A clinical study is needed to validate the application of this protocol on regular clinical practice.

**Summary**

A technique was developed to provide guided positioning of natural teeth when they are used as part of an interim implant-supported prosthesis in a staged surgical treatment plan. Clinical studies are needed to validate the use of the described technique on a routine basis.

**Abbreviations**

CBCT: cone beam computerized tomography  
CEJ: cemento-enamel junction  
IAPT: immediate implant placement and temporization  
ISFPD: implant-supported fixed partial denture  
PVS: poly(vinyl siloxane)

**References**


