

Fixed and Removable Provisional Options for Patients Undergoing Implant Treatment

Abstract

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The provisional phase of treatment can be the most challenging aspect of implant dentistry. The techniques available today include removable, tooth-supported, and implant-retained provisional restorations. The selection of the type of provisional prosthesis should be based on esthetic demands, functional requirements, duration, and ease of fabrication. This article includes a review of 118 articles from peer-reviewed journals published in English from January 1986 to February 2007. This review was performed using MEDLINE. The indications, advantages, and disadvantages of the various provisional restorations are discussed.

Learning Objectives

After reading this article, the reader should be able to:

- discuss the advantages and disadvantages of various provisional restorations used during implant restorative treatment.
- explain the recommended uses of removable and fixed provisional restorations for patients undergoing implant therapy.
- describe the currently used provisional restorations, their indications, and contraindications for a patient receiving implants.

Implant restorations have been documented to be a predictable prosthetic treatment with high success rates for restoring patients who are partially and completely edentulous.¹ Brånemark and colleagues recommended a 4- to 6-month period of undisturbed healing with a 2 stage surgical protocol.² However, during this healing period the patient requires a provisional restoration for function, phonetics, and esthetics. The latter is especially critical in the anterior part of the mouth (Figure 1). Ideally, the provisional should also help the patient adapt to the form of the final restoration while protecting the surgical site, by avoiding transmucosal loading.

Several techniques are used today to provisionalize a patient receiving implants. These include removable prostheses ("flipper," Essix provisional)

or fixed partial dentures (resin bonded bridge, fixed prostheses with or without the use of transitional implants). These approaches have been described in the literature.³⁻⁸

However, if support for the removable provisional prosthesis is being provided by the underlying soft tissue, undesired pressure may be applied to the healing surgical site. This may be detrimental to final implant survival if pressure is transmitted to the healing implants, regardless of whether they were placed with a 1 or 2 stage protocol. Moreover, a removable provisional is not readily accepted by most patients because of its nature. Provisionals using fixed partial dentures (FPDs) may be preferred by many patients because they eliminate transmucosal loading and are not removable. However, the adjacent

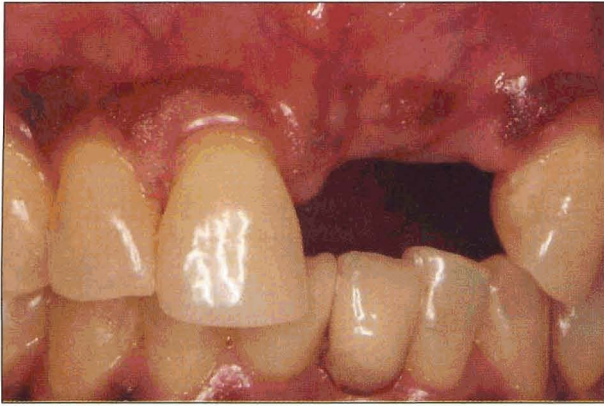


Figure 1—Edentulous space in the esthetic zone.



Figure 2—Tissue-borne provisional removable partial denture



Figure 3—Relieved pontics after ridge augmentation



Figure 4—Essix provisional supported by coverage over the adjacent teeth.



Figure 5—Resin bonded provisional. Compromised esthetic result because of bulk of composite resin and tooth size discrepancy.

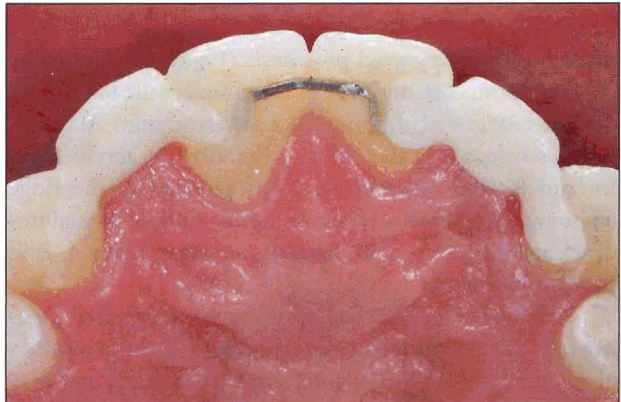


Figure 6—Resin bonded fixed partial denture

teeth must be prepared for partial or full coverage to support the fixed provisional restoration. To address the requirement for undisturbed healing and fixed provisionals, transitional narrow diameter implant-supported provisionals have been used. These implant-supported FPDs provide uninterrupted healing of the implant site and/or bone grafted ridge, and restore function and esthetics during the time the patient is required to wear the provisional.

The purpose of this literature review is to discuss the various provisional restorations currently used during implant therapy and review their indications, contraindications, advantages, and disadvantages.

Materials and Methods

This paper includes a review of 118 articles from peer-reviewed journals published in English from January 1986 to February 2007. The review was performed using MEDLINE. The keywords used were “implant provisionalization” (57 articles), “fixed provisionalization” (19 articles), “transitional implants” (2 articles), and “removable interim prosthesis for implants” (40 articles).

Interim Removable Partial Denture

An interim removable partial denture (RPD) is often used as a provisional restoration during the construction

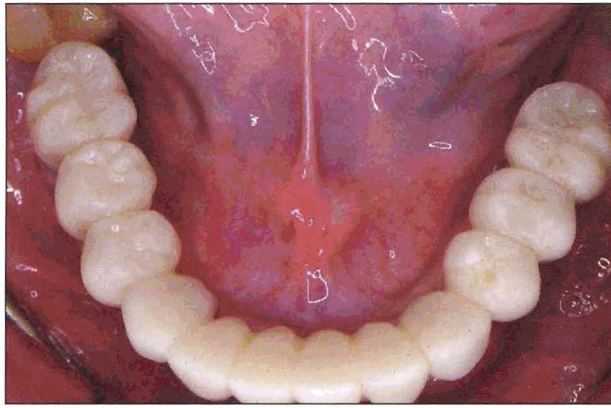


Figure 7—Metal reinforced provisional restoration using adjacent teeth.



Figure 8—Conversion of a removable prosthesis to a transitional implant supported prosthesis.

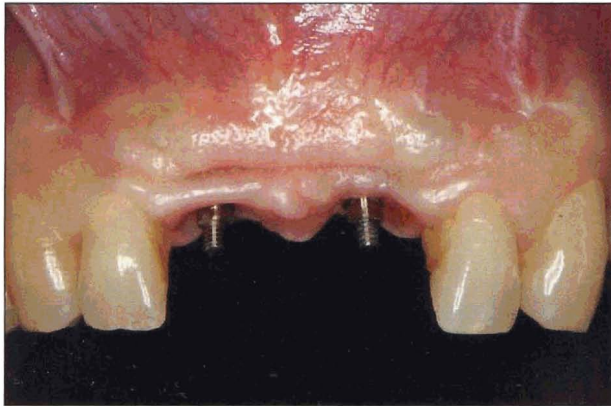


Figure 9—Fixed transitional implant supported provisional provides postoperative soft-tissue contouring.



Figure 10—Transitional implant supported fixed provisional restoration.

of an implant-supported prosthesis (Figure 2). Simplicity of fabrication, cost, and ease of insertion are the most obvious advantages of this provisional restoration. An additional advantage is the ability to modify an acrylic resin interim RPD to accommodate any changes in the ridge anatomy for patients who may require multiple procedures of extraction, soft- and hard-tissue augmentation, and implant placement.

The use of an RPD has been less popular when treating partially edentulous patients because these provisional restorations are bulky, interfere with speech, and may initiate an inflammatory soft-tissue response. Patients with strong gag reflexes are often unable to wear removable prostheses that partially cover the palate. During the initial periods of integration or after soft- and hard-tissue augmentation, removable prostheses should remain passive over the implant site. Accomplishing this may necessitate an unsightly gap between the ridge and neck of the denture teeth (Figure 3).

Another disadvantage of interim RPDs is their inability to facilitate soft-tissue contouring, except as described in a case report where ovate pontics were used with RPDs to accomplish this.⁹ In that report, a denture tooth of the appropriate mold and shade was selected and retrofitted onto the ovate concavity using acrylic resin that was prepared on the cast. The RPD was inserted immediately

after the extraction of the tooth and immediate implant placement. The RPD was adjusted such that it did not contact the healing abutment and also provided immediate support and maintenance of soft-tissue architecture. However, the use of ovate pontics is usually associated with provisional FPDs because they are tooth supported and provide stability during soft-tissue remodeling.

Essix Provisional

The Essix provisional is made either in the laboratory or in the dental office from clear thermoplastic sheets to retain pontics for missing teeth (Figure 4). The pontic is fabricated by applying the vacuum form sheet under high pressure and heat over the denture teeth.⁴ The technique is relatively quick and inexpensive and is therefore convenient to fabricate. Pressure on the surgical sites is easily avoided because the Essix provisional is tooth retained. This prosthesis replaces the missing teeth and avoids transmucosal loading of the healing site after tooth extraction, site development, or implant surgery.

However, Essix provisionals may not be appropriate as long-term provisional restorations because they are esthetically unacceptable to the patient. Moreover, they derive their support by covering the adjacent teeth in the arch and make chewing difficult. In addition, occlusal wear may limit their durability.

Table 1—Advantages, disadvantages, and recommendations for selecting provisional restorations

Type of Provisional	Advantages	Disadvantages	Contraindications	Recommended Use
Flipper	Easy to • Fabricate • Insert • Modify	• Initiate soft-tissue inflammation • Interfere with speech • Cause transmucosal loading	• Guided bone regeneration • Gag reflex	• Patients who require multiple procedures
Essix	• Quick and inexpensive • Free of transmucosal loading	• Lack of durability • Unesthetic	• Long-term provisional	• Short-term provisional
Fixed Provisional Restorations				
Bonded Tooth	• Chairside procedure	• Debonding	• Long-term provisional	• Short-term provisional
Bonded Restoration	• Free of transmucosal loading			
Tooth-Supported Restoration	• Esthetics • Free of transmucosal loading • Contouring of soft tissue	• High laboratory cost • Adjacent teeth preparation	• Adjacent teeth do not need full coverage	• Long-term provisional • Splinting of periodontally compromised teeth • Serial extraction
Transitional Implant Supported	• Esthetics • Free of transmucosal loading • Contouring of soft tissue	• Fracture of implant • Prevent definitive fixtures from integrating	• Single edentulous site	• Long-term provisional

Table 2—Guidelines for selection of provisional restoration

	Flipper	Essix	Bonded tooth	Bonded Bridge	Tooth-Supported Bridge	Transitional Implants
Esthetics	+	-	0	0	+	+
Function	-	-	0	0	+	+
Phonetics	-	-	+	+	+	+
Support	-	-	+	+	+	+
Comfort	-	-	+	+	+	+
Transmucosal Loading	Yes	No	No	No	No	No
Soft-Tissue Contouring	No	Yes	No	Yes	Yes	Yes
Edentulous Span	1-6 Units	1-4 Units	1	1-6 Units	Full Arch	Full Arch
Duration	6 Months	1 Month	1 Month	Until Final Restoration	Until Final Restoration	Until Final Restoration

+, Good; -, Poor; 0, Moderate

Fixed Provisional Prosthesis

Fixed provisional prostheses include bonded extracted natural teeth, denture teeth, and cast metal reinforced resin bonded fixed partial dentures. Denture teeth or extracted natural teeth may be bonded to the adjacent etched tooth surfaces and are usually indicated for short-term use. Esthetic results in some cases may be unacceptable because of the bulk of the composite resin in the proximal spaces needed to retain the pontic (Figure 5). A resin bonded fixed partial denture (RBFDP) is retained and supported by adjacent teeth, and thus remains passive over the surgical site (Figure 6).

Cast metal reinforced RBFDPs were originally developed as a conservative option for definitive tooth replacement, but are frequently used as provisional prostheses for implant patients.⁵ However, optimal esthetics may be a problem with this prosthesis because thin or translucent teeth are often unable to mask the gray color of the palatal metal retainers. In addition RBFDPs are relatively expensive for a short-term prosthesis and may require preparation of adjacent teeth. Moreover, the retention of the prosthesis is unpredictable because it may debond frequently.

In cases where teeth adjacent to surgical sites require complete coverage restorations, FPDs offer a convenient and predictable option without compromising the implant site. Perel also discussed an alteration in the sequence of treatment by retaining periodontally involved hopeless

teeth to support a provisional FPD during the healing phases, which can then be converted to an implant retained prosthesis by relining it intraorally using autopolymerizing resin, without the use of a removable transitional prosthesis (serial extraction).¹⁰⁻¹¹ Provisional restorations can present a challenge because they often must be used for an extended period of time. Hence, different techniques for strengthening provisional restorations by adding metal reinforcing structures have been described (Figure 7).¹²⁻¹³ These prostheses, like other tooth-borne provisional restorations, can function without pressure on the gingival tissues. Minimal effort is required to remove the acrylic prosthesis when alterations are necessary, and these FPDs also help contour the soft tissues. Unfortunately, they may fracture or loosen, causing root sensitivity or resulting in recurrent caries.

Transitional Implants

The healing phase of hard- and soft-tissue augmentation procedures requires that no pressure be placed on the grafted and/or regenerated ridge tissues or the implants themselves. To address this problem, several authors have presented a technique to avoid any transmucosal loading by using immediately loaded transitional implants (TIs) to support fixed provisional restorations.⁶⁻⁸ These implants permit the patient to use a provisional fixed restoration with form and function similar to

those of the definitive prosthesis. Provisional prostheses supported by TIs have high acceptability and are completely implant supported (Figure 8).

Transitional implants can be placed in the potential implant sites before the ridge augmentation procedures or adjacent to the sites of the definitive implants. These implants are immediately loaded after a chairside relin of the interim removable partial dentures or polycarbonate crowns using autopolymerizing resin. Research in both animals and humans has demonstrated that early loading may lead to successful integration and at the same time increase the quantity of bone in direct contact with the implant surface. Increased areas of bone within threads as well as around the apices of immediately loaded implants also has been reported.¹⁴⁻¹⁵ Use of TIs allows uninterrupted healing at the implant and/or grafted site, eliminates the need for removable prostheses, and also allows soft-tissue contouring for better final outcome (Figures 9 and 10).

Although these implants have been used with great success, excessive loading on TIs may result in their fracture. Moreover, placement of TIs too close to the definitive fixtures may prevent complete integration of the implant and the surrounding hard tissues.¹⁶

Conclusions

The provisional phase of treatment can be the most challenging aspect of implant dentistry. The techniques available today include removable, tooth-supported, and implant-retained provisional restorations. The selection of the type of provisional prosthesis should be based on esthetic demands, functional requirements, financial considerations, duration required, and ease of fabrication. Distinct advantages and disadvantages (Table 1) of each approach should be evaluated in light of the specific needs of each patient (Table 2).

The results of this review concluded that:

1. **Tooth-supported and TI-supported fixed prostheses** showed better patient acceptance, function, esthetics, phonetics, support, comfort, and soft tissue contouring than removable provisional prostheses.
2. The use of TI-supported provisional prostheses may be a more conservative approach than tooth-supported FPDs with the advantage of not having to prepare the adjacent teeth.
3. The type of provisional should be determined by a

consideration of the advantages and disadvantages of each approach, the local conditions present at the edentulous site, the prosthetic requirements of the teeth adjacent to the edentulous site, and the patient's desires and requirements.

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Quiz 2

- During the healing period, implant patients require a provisional restoration for which of the following reasons?
- function
 - phonetics
 - esthetics
 - all of the above
- If support for the removable provisional prosthesis is provided by underlying soft tissue, which of the following may occur?
 - pressure on the surgical site during healing
 - additional treatment time
 - interference with speech
 - difficulty chewing
 - What are the advantages of interim removable partial dentures (RPDs) used as provisional restorations during implant therapy?
 - no interference with speech
 - no transmucosal loading.
 - simplicity of fabrication, cost, and ease of insertion and modification
 - appropriate for patients with a strong gag reflex
 - What is a disadvantage of interim RPDs?
 - bulky restoration that interferes with speech
 - inability to facilitate soft-tissue contouring
 - bulky restoration that may initiate inflammatory soft-tissue response
 - all of the above
 - Essix provisionals may not be appropriate as long-term provisional restorations because they:
 - are esthetically unacceptable to patients.
 - require transmucosal loading.
 - place pressure on the surgical site.
 - are time consuming and expensive.
 - Fixed provisional prostheses used for implant therapy patients include which of the following?
 - interim RPDs
 - Essix prostheses
 - bonded extracted teeth, denture teeth, cast metal reinforced resin-bonded fixed partial dentures (RBFDPs)
 - interim RPDs and Essix prostheses
 - RBFDPs are relatively expensive for a short-term prosthesis and may require:
 - preparation of adjacent teeth.
 - the use of autopolymerizing resin.
 - pressure on the surgical site.
 - transmucosal loading.
 - Transitional implants:
 - can be placed only after ridge augmentation.
 - can be placed before ridge augmentation.
 - cannot be immediately placed after a chair-side relin.
 - cannot be placed adjacent to definitive implant sites.
 - Excessive loading on TIs:
 - may result in their fracture.
 - is recommended.
 - may result in bone fracture.
 - may cause infection.
 - The selection of the provisional restoration should be based on:
 - conditions present at the edentulous site.
 - the prosthetic requirements of the teeth adjacent to the edentulous site.
 - the patient's desires and requirements.
 - all of the above

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