Implant-Assisted Unilateral Removable Partial Dentures

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INTRODUCTION

A unilateral edentulous space (Kennedy Classifications II and III), in my opinion, is one of the most difficult situations to restore with a removable partial denture (RPD). The traditional RPD design to solve this unilateral space is actually bilateral (Figure 1); rests and clasps placed opposite the edentulous side are necessary, and a major connector is used to connect the 2 sides. In the maxilla, the major connector will contact and cross the palate and in the mandible, cross behind the lower anterior teeth. While these designs offer good support, stability, and retention (the 3 keys to removable partial denture design), many of my patients have been less than happy. The negatives of such a traditional partial include bulkiness, palatal coverage, speech issues, metal clasps that show, and movement (instability). Patients often ask: “If I’m only missing teeth on my left, why does the partial need to go over to my right side?"

This article will review alternatives to the traditional bilateral RPD. Three cases will be presented that describe unilateral implant-assisted RPD (IARPD) solutions.

ALTERNATIVE OPTIONS TO THE TRADITIONAL BILATERAL METAL REMOVABLE PARTIAL DENTURE

Fixed Implant Prosthesis Option

Restoration of unilateral missing posterior teeth with a fixed implant-supported prosthesis is the most current ideal option (Figures 2 to 4). The advantages of a fixed implant restoration are numerous with patients often perceiving them as actual body parts.

However, possible contraindications include anatomical challenges, such as proximity to vital structures and lack of bone. While many of these challenges can be overcome, not all patients are willing to undergo the additional surgeries and the time necessary to grow bone. Other disadvantages include financial limitations and bioengineering challenges, such as excess interocclusal space.

Metal “Nesbit” Unilateral Removable Partial Denture

The “Nesbit” partial is another option. This small, removable prosthesis is used to replace one to 3 teeth on one side of the arch. Historically, this has been used only for a Kennedy Class III edentulous arch (a unilateral posterior space with anterior and posterior teeth) (Figure 5). The traditional Nesbit RPD has metal rest seats and clasps that fit around the teeth on each side of the space.
Patients may feel this has the benefit of being single-sided and less bulky. Unfortunately, a serious risk of aspiration and swallowing exists due to its small size and limited retention (Figure 6). This danger can produce laceration, infection, and requires hospitalization and surgical intervention.1-3

Flexible Nesbit Unilateral Removable Partial Denture
This is very similar to the metal Nesbit, except new flexible nylon materials are used (Figure 7). Several material choices exist (such as Valplast, Flexite, and TCS). The esthetics are improved, but unfortunately, this is essentially a tissue-borne prosthesis. The nylon flexible RPD lacks important elements of the traditional RPD; namely, occlusal rests and a rigid framework.

Biomechanically, both the metal and flexible unilateral Nesbits are flawed. The supposed benefit of being single-sided (no bilateral support) creates an unstable prosthesis. This design does not allow for a broad distribution of force like the traditional bilateral design that includes indirect retainers and palatal coverage, etc. Nesbits are subject to forces during function, resulting in a rocking buccal-lingual motion.4,5 This creates excessive pressure on the abutment teeth. The flexible Nesbit also has the added disadvantage of excessive tissue pressure, causing accelerated bone loss of the edentulous ridge.

While the Nesbit unilateral RPD addresses the patient's desire for a smaller and economical tooth replacement, I have been reluctant to recommend it. Its inherent mechanical shortcomings and possible catastrophic risk of swallowing have precluded its use in my practice until recently. A simple modification was all that was necessary to create an enhanced Nesbit RPD. By adding an implant to this original traditional Nesbit design, a more stable, supported, and retentive prosthesis is obtained. The danger of accidental dislodgement has been minimized and the unfavorable forces on the abutment teeth and the edentulous ridge have been eliminated.

CASE REPORTS
The following cases will describe unique ways implants can be used to improve the safety and function of a unilateral RPD. For the sake of brevity, please understand that each of these patients underwent a complete evaluation including dental history, complete radiographs, and oral exam. I feel passionate that each patient's treatment diagnosis is unique and treatment should only be selected after a great deal of time listening and getting to know our patients. While these 3 patients selected a unilateral IARP option, others with similar problems selected a traditional bilateral partial and others selected a fixed-implant prosthesis.

Case No. 1
A 68-year-old male patient presented with discomfort to chewing, upper left. An examination disclosed a failing posterior abutment of a 4-unit fixed bridge (Figure 8). The bridge was sectioned and No. 15 was extracted atraumatically with concurrent socket bone grafting.

Treatment options were discussed and included: (1) implant-supported fixed bridge for Nos. 13, 14, and 15 (sinus grafting would be necessary); (2) bilateral conventional metal RPD; and (3) unilateral IARP.
The patient selected option No. 3. His selection was based on the avoidance of additional surgery (lateral wall sinus augmentation). He also declined option No. 2 due to the fact that it would cross his palate.

A single crown was required for tooth No. 13, since the bridge was sectioned and the old abutment fit was poor. It was decided to use a precision extracoronal attachment (Micro ERA [Sterngold]) to increase retention of the RPD, and improve esthetics since the buccal clasp on No. 13 would not be needed (Figure 9).

An implant (Legacy [Implant Direct]) was placed in the small island of bone distally and allowed to heal for 3 months before beginning construction of the prosthesis. Figures 10 to 12 demonstrate the fabrication of the IARPD.
The partial was inserted without the locator attachment to allow soft-tissue settling. The next day, a LOCATOR abutment (ZEST Anchors) was torqued into the implant and the metal housing processed into the intaglio side of the partial.

**Case No. 1 Highlights**

1. Most extracoronal attachments used to support a precision RPD require 2 splinted crown abutments to prevent excess force on the teeth. The posterior implant with locator attachment eliminated the need for a second crown on No. 12.

2. Please note that No. 12 does have a definitive rest seat and lingual bracing arm. This is traditional RPD design and will limit harmful lateral and vertical movement in function (Figure 12).

3. Esthetics was addressed since no buccal clasp will show in a broad smile.

4. The patient’s desire to avoid complicated, time-consuming sinus surgery with its associated morbidity was complied with.

5. Implant placement in these type of cases is simple: location is less demanding than with fixed restorations and there is no need for large/long implants. The IARP D design allows for a combination of tissue and implant support, hence the forces are much less on the implant.

**Case No. 2**

This case is what I call a “salvage” case. A 50-year-old female who was formerly treated by a periodontist presented to our office for a second opinion. Two implants had been placed in the lower right quadrant and a fixed implant-supported prosthesis was planned. However, the implant in the No. 27 position had failed 2 times and the patient refused another implant surgery (Figures 13 and 14). The posterior implant (Biomet 3i) had osseointegrated.

Complications to treatment included: she was angry
with her former periodontist; tooth No. 26 was very weak periodontally and had a +2 mobility; she did not want any metal to show; and her finances were limited. She requested a fixed bridge from Nos. 26 to 29. I explained that tooth No. 26 was too weak to be used as a fixed-bridge abutment, and that connecting natural teeth to implants is not without complications.

After much deliberation, it was decided to fabricate a unilateral IARP by placing a locator attachment on the osseointegrated implant (Figure 15). This would help provide stability, support, and retention for a unilateral partial. A metal framework was used with a mesial-occlusal rest seat, guide plane, and circumferential clasp on No. 30. Anteriorly, No. 26 received a metal lingual apron for bracing and a flexible pink buccal retentive arm (Figures 16 to 18).

This case was definitely a compromise, but resulted in a happy patient.

**Case No. 2 Highlights**

1. Problem solving patient's expectations (a fixed bridge was not appropriate in this situation).
2. Adding a flexible pink clasp eased the patient's esthetic concerns, but a lingual bracing arm helped with the stability of a weak tooth (Figure 18).
3. This treatment was very cost-effective, a major concern of this patient.

**Case No. 3**

This 55-year-old male had been a patient for some time. At each recall, I would see an extremely long fixed bridge (Nos. 17 to 23) that was failing (Figure 19). The posterior abutment was loose and recurrent decay was developing. Never really having a good solution to his looming problem, I dreaded the day when treatment would become necessary. My initial thoughts regarding treatment options included: (1) a new fixed bridge (an option with which I was uncomfortable); (2) two new anterior crowns and a bilateral RPD (where to place the rests and clasps on the opposite side concerned me); and (3) a fixed implant-supported bridge for Nos. 18 to 21 and separate anterior crowns Nos. 22 and 23. (Concerns included proximity to the mandibular nerve, excessive interarch space [Figure 20], the unpredictability and cost of vertical bone augmentation.)

The unilateral IARP gave me an option with which I felt comfortable. The patient agreed, so the failing fixed bridge was sectioned and tooth No. 17 was extracted with
concurrent bone grafting. Three months later, an implant was placed at site No. 17, utilizing single-stage surgery (Figure 21). The prosthesis construction was begun 4 months later and went smoothly. An extra coronal ERA attachment was utilized for its retention, esthetics, and stress-breaking features. After insertion and one day of tissue settling, a locator attachment was utilized for the distal implant abutment (Figures 22 to 24).

An esthetic and functional prosthesis was created, resulting in a satisfied patient.

**Case No. 3 Highlights**

1. Optimal esthetics were achieved with no display of metal; however, still note the lingual plate providing stability behind the double-abutted anterior abutments (Figure 23).

2. Splinted double anterior abutments were utilized in this case since both teeth needed new crowns and because the long edentulous space justified the splinting to resist movement of the RPD during function (Figure 22).

3. Selection of the best implant site: Site No. 17 was chosen because of its residual height and width. Teeth Nos. 18 to 21 had been missing for 20+ years and resorption made these sites a poor choice (Figures 21 and 22).

4. The large interocclusal space makes this case a classic indication for a RPD and not a fixed-implant prosthesis (Figure 20). The crown height space is excessive. A fixed-implant prosthesis would create a vertical cantilever magnifying stress to the prosthesis and implants.

**DISCUSSION**

Each of these patients could have pursued a fixed-implant reconstruction, yet each declined this option. It has been my experience when discussing the option of fixed-implant restorations requiring extensive bone grafting that the patient often selects an alternative treatment option. Patients often choose the less challenging removable option. Many reasons exist, including: (1) financial limitations; (2) patients are often emotionally unable to commit to the additional bone augmentation surgery with associated morbidity; and (3) the time commitment of more complicated cases.

The use of RPD enhanced by the addition of implants has been a major growth area of my practice. Demographic studies show an increase in the number of baby boomers who have maintained many of their own teeth. 6-8 years ago, this age group was often fully edentulous but is now partially edentulous.

Many of the problems with conventional RPDs can be overcome with the placement of one or more strategically positioned implants. Enhanced RPDs have been described in the literature under the following names: IARPD, implant-
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Table. Advantages of Implant-Assisted Removable Partial Dentures

- Improved comfort and confidence
- Patients who formerly were unable to wear conventional removable partial dentures (RPD) are often able to wear an implant-assisted RPD
- Enhanced retention, support, and stability
- Improved esthetics if clasps can be eliminated
- Preservation of bone
- Better distribution of forces and elimination of damaging leverage to natural abutment teeth
- Psychological advantage to patient of preserving compromised natural teeth that are not suitable to use as abutments to support a RPD
- An increase in chewing force
- A contingency plan where implant placement may be staged and this prosthesis can be used as an interim option

Associated with a unilateral partial were eliminated. Secure retention was also obtained reducing the risk of swallowing and allowing for a smaller, less bulky, RPD design.

REFERENCES


CLOSING COMMENTS

While simple in theory, IARP treatment requires a comprehensive understanding of implant therapy and mastery of removable prosthodontic fundamentals. As with all dental treatment, a complete diagnosis must first be completed. Special considerations include evaluation of atypical anatomy, and measuring intra- and interarch spaces. A good understanding of RPD design concepts is a prerequisite for successful treatment.

This article demonstrates a different use of the IARP concept. The unilateral posterior edentulous space is one of the most difficult situations to treat with a RPD. By placing one strategic implant, each of these patients was able to receive a unilateral Nesbit IARP. The destructive forces retained partial overdentures,10 and implant-supported removable partial dentures.11 There are many advantages to IARP versus conventional RPD12 (Table).

Figures 25 and 26 help demonstrate how the placement of an implant neutralizes the unfavorable torqueing forces which RPDs place on abutment teeth.
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POST EXAMINATION QUESTIONS

1. In the author’s opinion, restoration of unilateral missing posterior teeth with a fixed implant-supported prosthesis is the most current ideal option.
   a. True  b. False

2. The “Nesbit” partial is another option. This small, removable prosthesis is used to replace 3 to 4 on one side of the arch.
   a. True  b. False

3. Biomechanically, both the metal and flexible unilateral “Nesbits” are flawed.
   a. True  b. False

4. The flexible “Nesbit” does not cause excessive tissue pressure that normally would result in accelerated bone loss of the edentulous ridge.
   a. True  b. False

5. Most extra coronal attachments used to support a precision removable partial denture (RPD) require 2 splinted crown abutments to prevent excess force on the teeth.
   a. True  b. False

6. The implant-assisted removable partial dentures (IARPD) design allows for a combination of tissue and implant support, hence the forces are much less on the implant.
   a. True  b. False

7. Demographic studies show an increase in the number of baby boomers who have maintained many of their own teeth.
   a. True  b. False

8. Enhanced RPDs have been described in the literature under the following names: IARP. In the closing comments, the author clearly states that a good understanding of RPD design concepts is not required for successful treatment.
   a. True  b. False
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