

## Bilateral Free-End Distal Extension Partial Denture Treatment Options

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### Abstract

The use of dental implants is not always affordable for many patients. In such situations, removable partial dentures constitute a feasible option. Attachment provides an important psychological and mechanical union in treating patients. The Kennedy Class I partial denture actually may be a combination of both tissue-supported and tooth supported restorations.

The design of the maxillary Class I removable partial denture will be also based on the opposing mandibular teeth, or fixed bridge, or removable partial denture or complete denture.

Solid attachments are indicated when there is a removable partial or complete denture on the opposing jaw.

Resilient attachments can be used when on the opposing jaw there are natural teeth or fixed bridgework.

**Keywords:** Extra-Coronal; Intra-Coronal Attachment; Solid, Resilient; Partial Denture

### Introduction

The replacement of missing teeth in a partially edentulous arch may be accomplished by a fixed prosthesis or removable prosthesis. A removable partial denture may derive its support from both the teeth and tissues of residual ridge. Support for bilateral Free-end distal extension partial denture is provided by teeth and tissues of the residual ridge. The design of this prosthesis is intended to be removed from and replaced into the mouth. Because of this it is not rigidly connected to the teeth or tissues. It means that the partial denture is subject to movement in response to functional loads such as those created by mastication. It is known that a complete denture is entirely tissue supported, and the denture can be moved toward the tissue under function movements. In contrast, any movement of a partial denture base is inevitably a rotation movement that if tissue ward, may result in undesirable torquing forces to the abutment teeth and loss of planned occlusal contacts. Therefore every effort must be made to provide the best support for the bilateral distal extension partial denture, in order to minimize these forces [1,2].

Retention for removable partial dentures is described as follows:

- Primary retention is accomplished mechanically by placing retaining elements on the abutment teeth.
- Secondary retention is provided by the intimate relationship of denture bases and major connector [maxillary] with the underlying tissues [3,4].

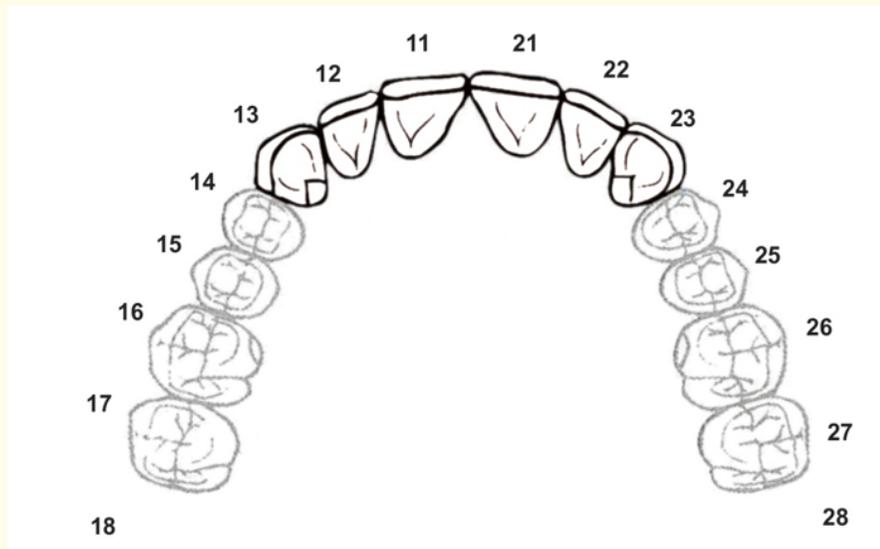
### Purpose of the Study

The purpose of this critical study is to assess the treatment designs for bilateral free-end distal extension by using attachment.

**First option:** Denture design for bilateral free-end distal extension should be based on the biomechanics factors, giving priority to principles such as refraction, stability and support.

The design of the maxillary removable partial denture will also be based on the opposing mandibular natural teeth or fixed bridgework or removable partial denture or complete denture.

The figure 1 shows Kennedy Class 1.



**Figure 1**

This method of classification is probably the most widely accepted classification of partially edentulous arches today.

Solid function attachments are indicated if there is a removable partial denture or a complete denture on the opposing mandibular arch. Milled lingual arms are recommended with solid function attachments. Extra-coronal solid attachments D2.7, Strategy-DE, Allegro-DE, Swiss Ex. Segmented attachments between 11-21 teeth, Omega M., Interlock will be used [5-13].

Extra-coronal attachments are positioned entirely outside the crown contour. The advantages of this type of attachment are that the normal tooth contour can be maintained. It is necessary, minimal tooth reduction and the possibility of the devitalizing the tooth is reduced. Also the path of the insertion is easier for patients with extremity problems.

It is more difficult to maintain hygiene with extra-coronal attachments and patients should be instructed on the use of dental floss and hygiene accessories. This will well help to prevent irritation of tissues which can be caused by food entrapment [6-9].

The versatile strategy-DE attachments is a simple effective extra-coronal attachment designed for removable precision partial dentures and implant overdentures. Its compact design allows the Strategy-DE to be positioned at various aspects of the framework-distal-mesial buccal or lingual and where inadequate space exists for clip [10-12].

The versatile Allegro DE solid attachment can be used for partial dentures and overdentures [11]. D 2,7 and Swiss EX are extra-coronal solid type attachments can be used for unilateral and bilateral precision partial dentures with limited vertical height [11].

Omega-M attachment is the most widely used connector for segmented bridge restorations. It is used as reinforcing secondary attachment for removable partial denture. The female is closed for segmentation between abutment and pontic. Can be placed interproximal between teeth (21# and 11#).

If on the opposing mandibular arch there are natural teeth or fixed partial denture, the bilateral free-end distal extension are most commonly restored with resilient function attachments.

Resilient attachment can be used Dalbo or Swiss Mini, Swiss Anchor, ASC 52, ORS-DE, ZAAG RPD.

The Dalbo S (small) and the Dalbo Mini are adjustable extra-coronal attachment which allow for vertical and hinge movements. The Dalbo has built-in indirect retention with the upright bam providing stability and resistance to distal lift-off. This is one of the oldest and most successful extra-coronal resilient attachments. Can be used for bilateral free-end partial denture, unilateral partial denture and transosteal implants [11-20].

The SA Anchor resilient attachment can be used for partial denture and implant bar type restoration [11]. The applications for the ASC 52 and ORS-DE are for partial dentures ant tissue bar supported implant restorations [11,12,20].

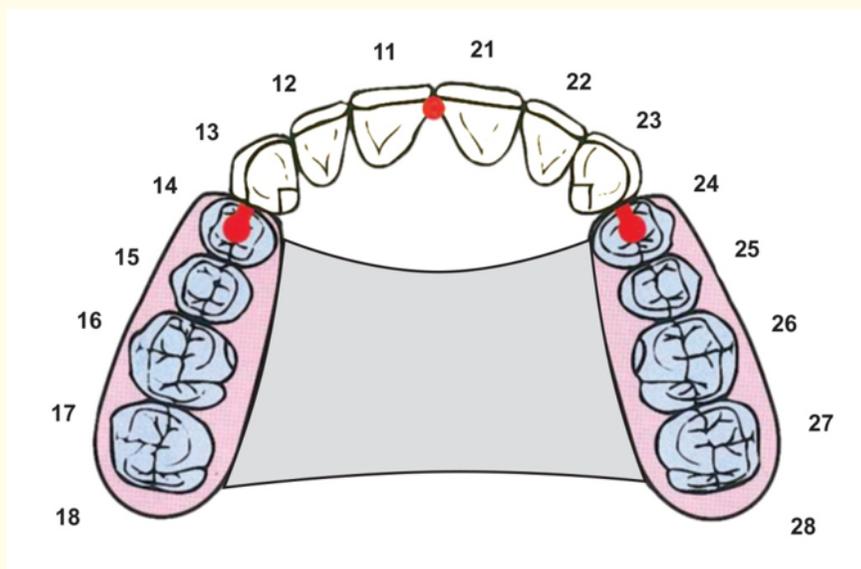


Figure 2

### Maxillary major connector design

There are six basic types of maxillary major connectors: 1) Single palatal bar, 2) single palatal strap, 3) U-shaped palatal connector, 4) Anterior-posterior palatal bars, 5) Combination anterior and posterior palatal strap-type connector and 6) palatal plate-type connector [15-17].

The selection of the type of connectors is based on four factors: 1) mouth comfort, 2) rigidity, 3) location of denture base and 4) indirect intention [5,6].

Palatal-plate major connector should be used for this case. Anterior border does not extend anterior to the first teeth. Posterior border is not located at the junction of hard and soft palates [17-19].

### Second treatment design

In this case, intra-coronal solid attachments can be used on the opposing mandibular arch are removable partial denture or complete denture. Removable partial denture with double abutted crowns on the #12-13 and #22-23 is suggested. Milled lingual arms are recommended for stability, retention and support. A cylinder type attachment such as the Omega-M may be placed interproximal between #12-13 and #22-23. The male of the Omega-M attachment becomes part of the removable milled lingual arm. The Omega-M is a small intra-coronal non-adjustable cylindrical slide attachment. It is used as a reinforcing secondary attachment for removable partial dentures. The female is closed for segmentation between abutment and pontic [13]. Attachments can be used as follows: Omega-M, SCOPE-RD, PT snap biloc and McColloum.

The attachments Scope-RD, PT-snap, Biloc should be used for bilateral partial dentures. It is recommended that a lingual arm is added for partial dentures [11].

The applications of McColloum attachment are as follows: 1) Removable precision partial dentures, 2) It may be used initially for a segmented bridge and then converted to a partial denture later [11,13].

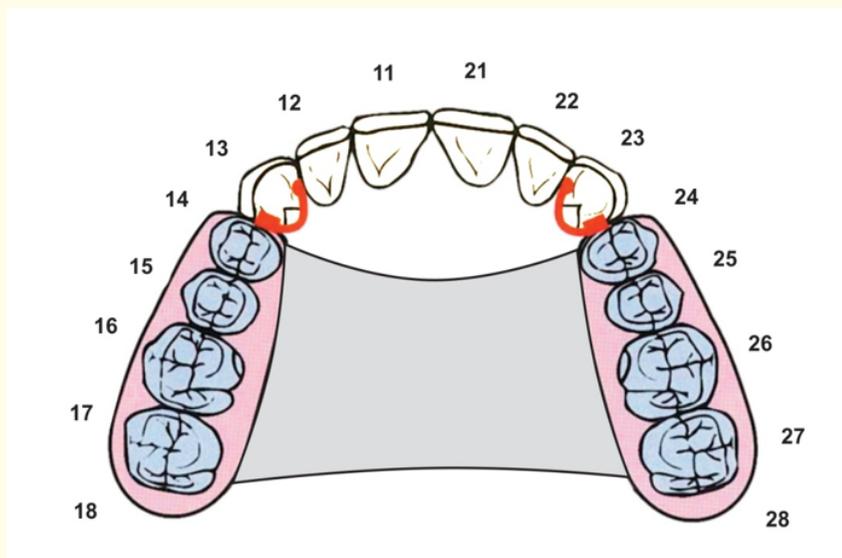


Figure 3

### Maxillary major connector design

Palatal-plate major connector should be used the above mentioned.

### Discussion

The best treatment plan for restoring a bilateral free-end distal extension partial denture is implant supported prosthesis. This treatment design is not feasible in some cases either due to insufficient bone or economic reasons.

One of the affordable non-invasive solutions for rehabilitation of Kennedy's Class I case is the removable partial denture which requires careful attention and meticulous treatment planning for restoring both esthetics and functional patient's desires.

The simplicity of the framework design may diminish the associated complains that most commonly take place with removable partial denture rehabilitation. Attachments have solved the esthetic problems associated with employing clasps especially in the anterior region.

A semi-precision attachment utilized with cast metal framework removable partial denture can enhance tremendous roles as both retention and esthetics than increase patient's self-confidence [21].

Glossary of prosthodontic terms 8<sup>th</sup> edition defines attachments as a mechanical device for the fixation, retention and stabilization of prosthesis or as retainer consisting of metal receptacle and a closely fitting part. The former (the female (matrix) component) is usually contained within the normal or expended contours of the crown of the abutment and the later (the male (partix) component) is attached to a pontic or the denture framework. It is known that the attachments may be classified as either precision or semi-precision. The selection of the above attachments depends on the method of fabrication a tolerance of fit [22].

The use of resilient or solid attachments for the distal extension Kennedy Class I removable partial denture must be undertaken to improve both retention and stability. Extra-coronal resilient attachments (ERAs) have demonstrated appropriate mechanical resilience, retention and stability. The main advantage of ERA attachments, when compared with conventional clasp retained removable partial denture, are their esthetics, by eliminating the use of buccal/facial clasps of the RPDs thereby making the retentive design of the prosthesis invisible [23,24].

Different attachment designs permit different movements between the component parts, which affect dental biomechanics. For example, the Dalbo attachment belongs to the hinge type and permits vertical movement with limited hinge movement. The ERA permits universal hinge movement. Its retention depends on interaction between the patrix and matrix components. In this situation axial forces are transferred to the long axis of the abutment. The combination of attachment and clasp can reduce the effect of horizontal force. However If a hinge attachment denture is inappropriately designed the abutment tooth can also be injured [24,25].

Some investigators reported than under occlusal forces, the resilience of the attachment could be adjusted to distribute the force properly between the abutment and alveolar ridge [26].

Some authors had investigated the effects of the attachments on the extension base RPDs. They found that the resilient attachment protected the abutments [26].

It has been reported that the Dalbo attachments distributed more stress to the alveolar ridge and reduced stress on the abutment tooth [27].

Numerous studies had been conducted to test the effect of distal extension partial dentures of both abutments and residual alveolar ridge [28,29].

There are no studies to examine the use of the resilient or solid attachments for RPDs, concerning the opposing jaw, if there is natural teeth, fixed bridge, partial or complete dentures.

The purpose of this study was to clarify the use of the attachments, when on the opposing jaw there are natural teeth, fixed bridgework, removable partial denture and complete dentures.

Bilateral free-end distal extension, Kennedy's Class I partial denture, is most commonly restored with resilient function attachments when there are opposing natural teeth or fixed bridge. A resilient attachment processed with as light space between the male and female components to allow the prosthesis to be tissue supported [13,25].

Solid attachments must be used when the opposing jaws are partial or complete dentures. Solid attachment processed with the male and female indirect contact to share the biting forces with tissue during mastication [13,25].

### Conclusion

We can conclude that:

1. The extra-coronal resilient attachment can be used for retention of RPD and protection of the abutment teeth,
2. An indirect retainer is recommended to stabilize the denture due to the motion of the attachment during function,
3. The situation of the opposing jaw (natural teeth, complete/partial denture, and fixed bridgework) should be examined.

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