Esthetic Cast Direct Retainers for Distal Extension Removable Partial Dentures.
Maninder Hundal, MDS

Correspondence: Dr (Ms) Maninder Hundal. Email: maninderhundal10471@gmail.com

Abstract
Extra-coronal cast direct retainers are an essential component of cast removable partial denture prosthesis. However, the conventional cast circumferential clasp or the bar clasp may appear un-aesthetic due to visible metal display when used in the smile zone. This article describes two designs to facilitate hiding them as an alternative to the conventional extra-coronal cast direct retainer assembly for the distal extension partially edentulous situation. Necessary descriptions with steps of construction given for two cases.

Key Words: Cast removable partial denture, esthetics, hidden clasp design.

How to cite this article: Hundal M. Esthetic cast direct retainers for distal extension removable partial dentures. J Pak Prosthodont Assoc 2014; 02 (01): 109 – 112.

Introduction:
Evidence based dentistry suggests that the need for restoration of partially edentulous condition is on the rise.¹ Not every patient presenting with a distal extension partially edentulous situation is a candidate for the ideal treatment modality of implant prosthesis either due to medical or financial limitations.² Therefore the need for restoring such cases with cast removable partial denture (RPD) will remain to continue until the stem cell research reaches a stage wherein the entire missing human tooth can be bioengineered in vivo.

The conventional extra-coronal cast circumferential or bar clasp used for retaining the RPD on abutments in the esthetic zone of the oral cavity can be quite soring to eyes. Although precision attachments or resilient retainer systems may be used, the conventional extra-coronal clasp assembly still remains the most commonly used direct retainer. This is because it is less technique sensitive and more versatile to use. With this background it is intended to present two ‘hidden clasp designs’³ for the distal extension situation that satisfies the esthetic and functional criteria. The description given below for two cases is about incorporating these clasp designs.

Case 1
This case incorporates the Mesial Groove Reciprocation (MGR) clasp⁴ which is an esthetic extra-coronal retainer for the maxillary canine in a distal extension RPD when the canines are used as abutments. A 36 year old NCO reported at our clinic with the chief complaint of difficulty in chewing due to missing upper posterior teeth. Intraoral examination (Figure 1) revealed:

1. Partially edentulous condition (Missing teeth Nos. 16,17,24,25,26,27,28 & 47).
2. Caries involving tooth; 21.

Figure 1: Case 1: Pre-op clinical intraoral view.

Treatment included:
1. Thorough oral prophylaxis.
2. Composite restoration in tooth No. 21.
3. Three unit metal-ceramic FPD replacing tooth Number 47.
4. Maxillary cast RPD replacing the missing teeth incorporating the MGR clasp on tooth No. 23 as shown in Figures 2 (A, b & c).

Figure 2: Case 1: Post-op clinical views
Case 2
This case incorporates the Equipoise RPD System design which is an esthetic retentive concept for the distal extension situation especially when the premolars are used as abutments. A 35 year old lady with good socio-economic status reported with the chief complaints of compromised esthetics, pain in some of her caries involved upper and lower teeth and difficulty in chewing food. Intraoral clinical examination revealed: (Figure 3: Pre-op photograph).

Figure 3: Pre-op clinical view.

1. Partially edentulous condition (Missing teeth Nos. 12,15,16,17,26,27,28,36,37,46,47 & 48).
2. Dental caries in teeth No. 11,15,24,28,38 & 45.

Treatment consisted of:
1. Thorough oral prophylaxis.
2. Composite restoration for the carious lesions in the involved teeth.
3. Three unit metal-ceramic FPD replacing tooth No. 12.
5. Full metal crowns for teeth Nos. 18 & 38.
6. Maxillary cast RPD involving Equipoise clasp system on teeth No. 24,25,44 & 45. Internally braced clasp for teeth Nos. 14 & 34. Cast circumferential clasp for teeth Nos. 18 & 38. See Figure 4 showing post-op view.
Figure 4: Post-op clinical view.

Discussion:
Restoring facial esthetics with the provision of a cast RPD while keeping the biomechanical principles in mind can be a challenge. Various hidden clasp designs are available which modify visibility of the direct retainer in the esthetic zone. Among these include; the MGR clasp, saddle lock system, twin flex clasp, internally braced clasp and the Equipoise RPD system.

In the MGR clasp design retention is attained with a 19 gauge wrought I bar clasp arm with its tip engaging a prepared ‘retentive dimple” on the distal-labial surface of the canine (abutment) which is hidden from the frontal view. The surfaces of the abutment are modified as under:

1. The labial surface is prepared so that its height of contour is at the same occluso-gingival level as that of the lingual surface. The distal height of contour is also modified to retain at least 2-3 mm of infrabulge.
2. Instead of a distal guide plane, a 1 mm retentive dimple is prepared in the centre of the distal half of the labial surface, gingival to the height of contour.
3. A vertical mesial groove guide plane 1-2 mm in length is prepared in the mesial-lingual surface within the mesial-marginal ridge enamel nearly parallel to the planned path of placement as possible. This mesial reciprocation groove is extended over the mesial marginal ridge to terminate in a spoon shaped mesial rest seat. This rest seat will usually require a small supplemental amalgam as dentin may be exposed when preparing sufficient depth for lateral force resistance.
4. Reciprocation for the retentive clasp arm is provided by both the distal proximal plate and the mesial lingual rod like minor connector which engages the above explained vertical mesial groove guide plane. Both these reciprocating features are parallel to the path of placement. Simultaneous, continuous tooth contact is maintained as the prosthesis is either seated or removed and as the clasp arm flexes over the height of contour in much the same manner as the reciprocation provided by a lingual plate.

The Functional dynamics of MGR clasp design are explained below:

1. Resistance to occluso-gingival movement of the MGR clasp is provided by the occlusal rest and denture base.
2. Mesial-gingival relief in the retentive dimple and infrabulge contour gingival to the tooth contact of the distal proximal plate permits a non-binding rotation of the denture base about the fulcrum of the mesial rest.
3. Indirect retention is provided by a mesial rest anterior to the fulcrum line on the canine or premolar of the contra lateral side.
4. Functional rotation in a maxillary distal extension removable partial denture can occur but it is usually minimal because of the additional support provided by the broad palatal major connector.
5. Resistance to gingival-occlusal displacement of the MGR clasp is provided by the retentive clasp arm and the mesial lingual minor connector as well as the distal proximal plate.

The drawbacks of the MGR clasp design are:

1. It can only be used on abutments with adequate crown height.
2. This design does not permit the retentive terminal to completely disengage from the tooth during functional movements of the prosthesis hence the major connector and base should provide as much vertical support as possible.
3. Extensive palatal coverage is usually necessary which may be uncomfortable for the patient.
The Equipoise RPD system was proposed by J.J. Goodman and it is an esthetic retentive concept for distal extension situation. It works very well on a premolar abutment. In this design the occlusal rest is placed away from the edentulous span. The equipoise clasp is a retentive lingual back action clasp which encircles more than 180° of the greatest circumference of tooth, extends from the mesial and circles around the lingual and distal surfaces of the tooth to engage the distal buccal undercut. It is kind to the abutment tooth as it engages when the partial denture is in function. Vertical interproximal reduction of 0.5mm-1mm from tooth adjacent to the abutment is done so that rigid metal of the RPD framework can extend into this area which provides reciprocation (Figure 4). An optional bucco-lingual retentive groove at mid and gingival third junction on distal surface of abutment tooth may be provided.

Goodman advocated that in addition to its esthetic superiority the unique class II lever design protects, preserves and strengthens abutment tooth while directing all forces down along its long axis.

The drawbacks of this design are:
1. The concept does not work well on anterior natural teeth without visibility of the framework through the contact area.
2. The interproximal tooth reduction makes the teeth susceptible to caries.
3. The mesial proximal plate may introduce torque.
4. There can be potential loss of proximal space with a non complaint patient.
5. During processing of the cast RPD, excess acrylic may surround the clasp thus preventing its flexure into the retentive undercut. Also the clasp may not seat completely in the mouth or may place unfavourable forces on the abutment tooth. “Freeing up” the clasp after processing is difficult and time consuming. To counter this, a spacer is placed around the clasp during processing which can be easily removed during finishing and polishing procedures.

Conclusion
To conclude the MGR clasp and Equipoise clasp designs are good alternatives to the conventional extra-coronal cast circumferential or bar clasp direct retainer in a distal extension partially edentulous situation. They facilitate esthetic restoration and function with RPD.

References