

## REVIEW ARTICLE

# Classification of Unconventional Removable Partial Denture

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## ABSTRACT

Many treatment modalities are available for replacing missing teeth; removable partial denture, fixed partial denture or dental implant. The need of patient have led to the outcome of the special, i.e the unconventional approach for fabricating partial dentures. Each treatment option and has its own advantages and disadvantages. It is essential to clinically classify partially edentulous patients based on removable treatment options unlike classifications like Kennedy, Applegate. Classification of unconventional removable partial denture will guide choice of treatment based on suitable options. This classification will give a distinctive scheme for treatment in exceptionally unique conditions. In conventional classification treatment options are based on ideal situations but this classification will aid in planning treatment modality of partially edentulous patients where conventional treatment options do not fulfil the purpose.

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## INTRODUCTION

The choice between several treatment options for replacing missing teeth is influenced by clinical factor, dentist, and patient. Replacement of missing teeth is one of the most important needs for patients attending clinics to restore esthetics and/or function. Many treatment modalities are available for replacing missing teeth; removable partial denture (RPD), fixed partial denture, or dental implant. Each modality is a possible treatment option and has its own advantages and disadvantages. It is essential to clinically classify partially edentulous patients based on removable treatment

UNCONVENTIONAL REMOVABLE PARTIAL DENTURE	I] BASED ON CONDITION OF REMAINING TEETH	a) Periodontally Compromised	i) Guided plane removable partial denture ii) Swing lock removable partial denture	
		b) Endodontically Treated Teeth	Removable partial overdenture	
		c) One To Three Teeth Missing	Nesbit denture	
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options unlike classifications such as Kennedy and Applegate. Classification of unconventional RPD will guide choice of treatment based on suitable options. This classification will give a distinctive scheme for treatment in exceptionally unique conditions. In conventional classification, treatment options are based on ideal situations, but this classification will aid in planning treatment modality of partially edentulous patients where conventional treatment options do not fulfill the purpose.

## BASED ON CONDITION OF REMAINING TEETH

### Periodontally Compromised [Figure 1]

#### Guided plane RPD

It differs from the normal concept of design and construction and yet still adheres to the basic design philosophy. A guide plane RPD [Figure 2] being anchored on both sides of the arch is joined together with a rigid major connector can provide cross-arch stabilization to the forces operating in a buccolingual direction.<sup>[1]</sup>

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**Figure 1:** Periodontally compromised



**Figure 3:** Swing-lock removable partial denture



**Figure 2:** Guided plane removable partial denture

Indication-it aids in stabilization of teeth which are periodontally compromised.

#### *Swing-lock RPD [Figure 3]*

The swing-lock RPD was introduced to the dental profession by Simmons in 1963.<sup>[2]</sup> It consists of labial/buccal retaining bar hinged at one end and locked with a latch at the other, together reciprocating lingual plate to gain a maximum retention and stability.

#### Indications

1. Inadequate bone support
2. Inadequate retention
3. Missing key abutments
4. Economics
5. Mobility.

#### Contraindications

1. A swing-lock RPD should not be used for patients who have poor oral hygiene
2. Inadequate manual dexterity



**Figure 4:** Removable partial overdenture

3. Deep vertical overbite with minimal horizontal overjet that does not permit a lingual plate for a maxillary prosthesis
4. Short lip or little vestibular depth which may allow the labial bar and struts to be visible
5. High frenal attachment, which will interfere with the labial bar
6. Prominent labial alveolar ridge with no labial undercut, which will not provide room for bar placement and will interfere with appearance and lip function.<sup>[3]</sup>

#### **Endodontically Treated Teeth**

##### *Removable partial overdenture [Figure 4]*

According to GPT 9, overdenture is a removable partial or complete denture that covers and rests on one or more remaining natural teeth, roots, and/or dental implants; a dental prosthesis that covers and is partially supported by natural teeth, tooth roots, and/or dental implants. It is also called as overlay denture, overlay prosthesis, and superimposed prosthesis.

## Indication

1. Patients with few remaining retainable teeth in an arch;
2. Patients with mal-related ridge cases; patients needing single denture;
3. Patients with unfavorable tongue positions, muscle attachments, and high palatal vault, which render the stability and retention of the prosthesis difficult. [4-6]

## Contraindications

Patients with questionable oral prophylaxis, systemic complications, and inadequate inter-arch distance.

## Advantages

1. Preservation of alveolar bone, proprioception, enhanced stability, and retention and maintenance of vertical dimension of occlusion.
2. It is also useful for patients with congenital defects such as oligodontia, cleft palate, cleidocranial dysostosis, and Class III occlusion.
3. Overdenture can be easily converted to complete denture over a period of time.
4. Harmony of arch form.

## Disadvantages

1. Caries susceptibility
2. Overcontour
3. Undercontour
4. Esthetics
5. Meticulous oral hygiene is pertinent to prevent caries and periodontal disease
6. Encroachment of interocclusal distance
7. Expensive approach with frequent recall checkups of the patient compared to conventional removable complete denture. [5-9]

## One–Three Teeth Missing

### *Nesbit denture [Figure 5]*

Nesbit dentures are a modification of conventional RPDs used to replace one–three missing teeth on the same side of the upper or lower arch. They provide a low-cost option that employs newer technology to replace missing teeth, whereby no metal clasps are fitted around supporting teeth on either side of the gap, to keep the denture from settling into your gum tissue. The result is a much smaller and more comfortable prosthesis compared to the standard partial denture.

Nesbit dentures are mostly used as provisional replacement while patients await implant restoration, since there is no connecting metal or plastic behind the lower front teeth, or across the roof of the mouth,



**Figure 5:** Nesbit dentures



**Figure 6:** Cu-Sil partial denture

to connect to the opposite side of the jaw. This means that there is no bilateral support from the other sides of the mouth to stop damaging forces from impacting the teeth supporting the Nesbit. Hence, it should be short term to avoid damaging adjacent teeth.

Unfortunately, a serious risk of aspiration and swallowing exists due to its small size and limited retention. This danger can produce laceration, infection, and requires hospitalization and surgical intervention.

## BASED ON SUPPORT

### **Cu-Sil Partial Denture [Figure 6]**

Cu-Sil dentures are designed to preserve the very few remaining natural teeth and thus the alveolar bone. They have effect on retention and stability of dentures. In addition to this, it gives the patient psychological satisfaction of retaining the natural teeth as they were. Vertical dimension and proprioception are maintained by retained natural teeth. Attachment devices are avoided entirely. Cu-Sil is a tissue-bearing appliance featuring a soft elastomeric gasket. It clasps the neck of each natural tooth, sealing out food and fluids, cushioning, and splinting each natural tooth from the hard denture base. [10] It helps to prevent tooth loss and improves the prognosis of loose, mobile, isolated, elongated, or periodontally involved abutments by eliminating wear, stress, and torque. This treatment modality does not require any tooth preparation and extra patient visit. It does not require any special armamentarium and

material. If a tooth is lost in future, existing denture can be modified to occupy its place. They serve as a solution for single standing or isolated teeth present in dental arch. They are not indicated for patients with large number of teeth evenly distributed across the dental arch. These dentures are associated with some disadvantages. The functional duration of soft liner used is short for 3 years.

#### Disadvantages

1. It needs frequent corrections.
2. Entire gingival margin of remaining teeth is covered, leading to plaque accumulation.<sup>[11]</sup>

#### Implant-Supported RPD [Figure 7]

The challenging problem with the use of conventional RPDs is the distal rotation of the acrylic base in the free-end region of RPDs distal to the last natural tooth. Distal implants effectively convert a Kennedy Class I or II denture to a Kennedy Class III denture. Due to the placement of an implant in a distal position, fewer implants are needed to achieve a successful distal extension RPD while preventing alveolar ridge bone loss over time.<sup>[12]</sup> The use of dental implants has become widely accepted, and many studies have demonstrated that the association of RPDs with implants improves the prosthetic biomechanics, resulting in greater patient satisfaction.<sup>[13-15]</sup> Decades have now passed since implants and RPDs have been utilized in combination. It is also noteworthy to discuss the cost differences associated with implant-assisted RPDs versus fixed prosthesis. Blum and McCord have previously compared long-term costs of both systems and demonstrated that the use of implants in RPDs is seen as a less expensive option than fixed prosthesis where numerous implants would be required with necessary crowns over restorations.<sup>[16]</sup>

#### Telescopic Denture [Figure 8]

Although first described by Starr in 1886, telescopic copings were initially introduced as retainers for RPDs at the beginning of the 20<sup>th</sup> century. Due to its resemblance to the collapsible optical telescope, this system of double crowns, which can be fitted into each other, became known as the telescopic denture. Telescoping refers to the use of a primary full-coverage casting (coping/male telescopic portion) luted to the prepared tooth with a secondary casting (superstructure/secondary crown/female telescopic portion), which is a part of the denture framework and is retained by means of interfacial surface tension over the primary casting.<sup>[17,18]</sup> They act by transferring forces along the direction of the long axis of the abutment teeth and provide guidance, support, and protection from movements

that might dislodge the RPDs. Telescopic crowns can also be used as indirect retainers to prevent dislodgement of the distal extension base away from the edentulous ridge.

#### Advantages<sup>[17,18]</sup>

1. Creation of a common path of insertion.
2. Easy to perform routine oral hygiene.
3. Rigid splinting action.
4. Distribution of stresses to the abutment teeth.
5. Provision of suitable abutments for RPDs even when the remaining teeth are periodontally compromised. Much easier insertion and removal for the patient. Accommodates future changes in the treatment plan. Psychologically well-tolerated by patients.



Figure 7: Implant-supported removable partial denture

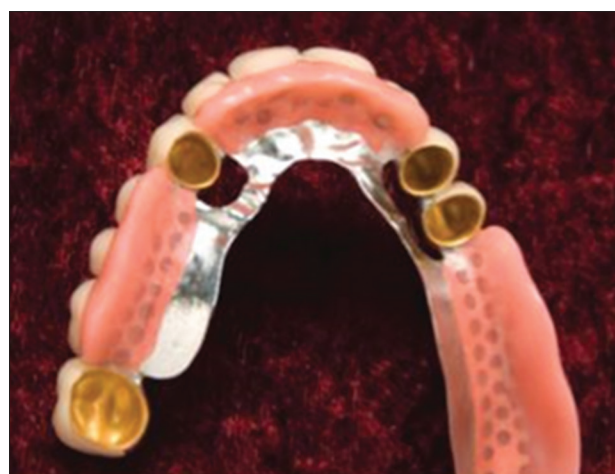


Figure 8: Telescopic denture



Figure 9: Andrew's bridge

### Disadvantages

1. Increased cost.
2. Complex laboratory procedures.
3. Extensive tooth reduction required.
4. Increased number of dental appointments.
5. Difficulty in achieving esthetic.
6. Retention diminishes after repeated insertion/separation cycles.
7. Readjustment of retentive forces is difficult.

### Fixed RPD (Andrew's Bridge) [Figure 9]

Dr. James Andrews of Amite, Louisiana, introduced the fixed removable Andrews Bridge System (Institute of Cosmetic Dentistry, Amite, La.).

### Indication

1. Patients whose residual ridge have a relationship to the opposing dentition that would prohibit the esthetic placement of the pontics of a fixed partial denture.
2. Patients requiring diastemas to harmonize the natural dentition.
3. Patients who have extensive alveolar bone and tissue loss.<sup>[19]</sup>

### Advantages: According to Prieskel,

1. Reduced denture bulk, occupying minimal vertical and horizontal space.
2. Four different curvatures of the bar follow the ridge and permit the use of the bar anteriorly.
3. Various lengths replace one–four teeth.
4. The denture provides good retention with little wear.
5. It provides high tensile and yield strengths.
6. It permits replacement of missing alveolar structure for esthetic reasons.<sup>[20]</sup>
7. Special transfer sleeves for each bar are provided so that a duplicate removable prosthesis can be made quickly.

### Disadvantages

1. Failure as a result of inadequate soldering.
2. It should not be used for patients having occupations, where the restoration may become jarred loose and swallowed or aspirated.
3. Technique sensitive procedures.

## BASED ON MATERIAL USED

### Flexible Denture [Figure 10]

Flexible denture (soft dentures) is generally used when traditional dentures cause discomfort to the patient.

Flexible RPDs are practically indicated in every partial edentulous condition provided the patients are ready to keep a removable appliance in his/her mouth. Flexible denture contains polyamide nylon material. Flexible partial dentures utilize the undercuts in the ridge for retention so it is indicated in ridges where bilateral undercuts are present. Patients having tilted teeth (due to missing adjacent tooth for long time) develop an undercut where rigid partial denture is tough to insert. In such cases, flexible partial dentures are a better option. Apart from this, it is indicated in patients with allergy to acrylic monomers as there is almost no free monomers in this material; cases where clasps have to be given in esthetic zone like on maxillary canine, cases where economic conditions limit the use of implant and patient does not want FPDs.

### Indications

1. In patients who are allergic to nickel, flexible partial dentures can solve the problem faced with cast partial dentures.
2. In patients with large bony exostoses that cannot be removed, flexible partial dentures show good retention.



Figure 10: Flexible denture



Figure 11: Non-metal clasp denture

- It is also indicated in patients having microstomia, systemic diseases like scleroderma,<sup>[21]</sup> or due to any other reasons if there is reduced mouth opening. In such cases, flexible partial dentures have shown a good success.

#### Advantages

- Flexibility of the material allows it to engage the undercut beneath the bony exostoses, that is, not possible in rigid partial dentures
- Unbreakable
- Lightweight
- Better esthetics
- Ease of fabrication
- Reduced chairside time
- Flexible denture flanges for patients exhibiting undercut tuberosities can solve this problem.<sup>[22,23]</sup>

#### Disadvantages

- Intended only for provisional or temporary use
- Debonding of the acrylic teeth from nylon denture base
- Tend to absorb water content and will discolor
- High surface roughness and low hardness
- Technique sensitive
- Cannot be relined
- Difficult to polish and adjust

#### Non-metal Clasp Denture [Figure 11]

The use of metal clasps on anterior teeth may cause esthetic problems. Methods to overcome this esthetic dilemma include the painting of clasps with tooth-colored resin,<sup>[24]</sup> the use of lingually positioned clasps, engagement of mesial rather than distal undercuts, and the use of gingival approaching clasps. Unless, clasps can be avoided using precision attachments, some of the RPD framework will be invariably visible. The possibility of injecting the plasticizing resin into the mold has opened a new perspective to full denture and RPD technology.<sup>[25]</sup> Acetal (Bio Dentaplast, Bredent, Senden, Germany), a thermoplastic resin, may be used as an alternative denture clasp material. Acetal was first proposed as an unbreakable thermoplastic resin RPD material in 1971. It was during this period that Rapid Injection Systems developed the first tooth-colored clasps with a thermoplastic fluoropolymer.

Merits and demerits of acetal resin clasps against conventional clasps.<sup>[26]</sup>

- Clasps fabricated with acetal resin are esthetically pleasing because the color matches with that of tooth color.
- Due to their low modulus of elasticity, they can be



**Figure 12:** Light polymerized partial denture

used in larger undercuts than recommended for chromium-cobalt alloy and also exert less stresses on abutment teeth. This may be advantageous in clinical situation where esthetics and periodontal health are priorities.

- Acetal resin provides less retention compared to chrome cobalt. Hence, further study has to be done regarding various thicknesses and designs of clasps and framework for its successful dental application.
- In patients with metal allergy, acetal resin can be used as a clasp material.

#### Light Polymerized Partial Denture [Figure 12]

PMMA is also widely accepted as a material for provisional restorations, denture repairs, and denture relines. Although PMMA is considered to be an indispensable polymeric material in prosthodontic practice, a growing number of patients are presenting with hypersensitive reactions to PMMA. The material for the denture base used in such patients should be selected from other polymeric materials that are non-allergic to the patient.<sup>[27,28]</sup>

Light-activated indirect composites like two urethane dimethacrylate (UDMA) composites are potential alternatives to poly(methyl methacrylate) (PMMA), although they contain multifunctional methacrylate monomers of 30 wt% or more. MMA monomer has been reported to cause allergic reaction on contact with skin or oral mucosa.

Polymerized UDMA denture bases are non-toxic and that the unpolymerized material appears to have low toxicity. UDMA monomer is also less allergenic than other acrylate series.<sup>[29]</sup>

#### Cobalt Chromium Alloy

Co-Cr alloys are used for the metal framework of cast partial dentures, since they are much less ductile than nickel-chromium. The popularity of the chromium-cobalt

alloys has been attributed to their low density (weight), high modulus of elasticity (stiffness), low material cost, and resistance to tarnish. Cobalt-chromium alloys are the most common base-metal alternative for patients known to be allergic to nickel.

## CONCLUSION

The classification for unconventional partial denture facilitates uniform use of this system. It will help dental school faculty and practitioners assess patients for the most appropriate treatment for better care. Cases where conventional RPDs are not indicated it will guide in selecting type of unconventional RPD treatment based on available options.

## REFERENCES

1. Stewart KL, Rudd KD. Stabilizing periodontally weakened teeth with removable partial dentures. *J Prosthet Dent* 1968;19:475-82.
2. Simmons JJ. Swinglock stabilization and retention. A preliminary clinical report. *Tex Dent J* 1963;81:10-2.
3. Becker C, Bolender C. Designing swinglock partial dentures. *J Prosthet Dent* 1981;46:126-32.
4. Brewer AA, Morrow RM. *Overdentures Made Easy*. 2<sup>nd</sup> ed. St. Louis: The C. V. Mosby Co.; 1980.
5. Rahn A, Heartwell C. *Textbook of Complete Dentures*. 5<sup>th</sup> ed. Philadelphia, PA: WB Saunders Co.; 1993.
6. Preiskel HW. *Overdentures Made Easy: A Guide to Implant and Root Supported Prosthesis*. London, UK: Quintessence Publishing Co.; 1996.
7. Preiskel HW. *Precision Attachments in Prosthodontics: Overdentures and Telescopic Prosthesis*. 2<sup>nd</sup> ed., Vol. 2. Chicago, IL: Quintessence Publishing Co.; 1985.
8. Thayer HH. *Overdentures and the periodontium*. *Dent Clin North Am* 1980;24:369-77.
9. Negrutiu M, Sinescu C, Romanu M, Pop D, Lakatos S. Thermoplastic resins for flexible framework removable partial dentures. *TMJ* 2005;55:295-9.
10. Gagandeep K, Sangeetha G, Deepika S. Cusil denture: A novel conservative approach. *Unique J Med Dent Sci* 2013;1:56-8.
11. Sabarigrinathan V, Hema G. Cusil like denture. *Int J Health Sci Res* 2014;4:195-7.
12. Kuzmanovic DV, Payne AG, Purton DG. Distal implants to modify the Kennedy classification of a removable partial denture: A clinical report. *J Prosthet Dent* 2004;92:8-11.
13. Bortolini S, Natali A, Franchi M, Coggiola A, Consolo U. Implant-retained removable partial dentures: An 8-year retrospective study. *J Prosthodont* 2011;20:168-72.
14. Mijiritsky E, Lorean A, Mazor Z, Levin L. Implant tooth-supported removable partial denture with at least 15-year long-term follow-up. *Clin Implant Dent Relat Res* 2015;17:917-22.
15. Campos CH, Gonçalves TM, Garcia RC. Implant-supported removable partial denture improves the quality of life of patients with extreme tooth loss. *Braz Dent J* 2015;26:463-7.
16. Blum IR, McCord JF. A clinical investigation of the morphological changes in the posterior mandible when implant-retained overdentures are used. *Clin Oral Implants Res* 2004;15:700-8.
17. Langer A. Telescopic retainers for removable partial dentures. *J Prosthet Dent* 1981;45:37-43.
18. Weaver JD. Telescopic copings in restorative dentistry. *J Prosthet Dent* 1989;61:429-33.
19. Everhart RJ, Cavazos E Jr. Evaluation of a fixed removable partial denture: Andrews bridge system. *J Prosthet Dent* 1983;50:180-4.
20. Vaswani P, Sanyal P, Kore A, Prajapati A. Prosthodontic rehabilitation of anterior bony defect with fixed removable bridge system: A clasplless approach. *J Oral Biol* 2016;3:1-4.
21. Samet N, Tau S, Findler M, Susarla SM, Findler M. Flexible, removable partial denture for a patient with systemic sclerosis (scleroderma) and microstomia: A clinical report and a three-year follow-up. *Gen Dent* 2007;55:548-51.
22. Lowe LG. Flexible denture flanges for patients exhibiting undercut tuberosities and reduced width of the buccal vestibule: A clinical report. *J Prosthet Dent* 2004;92:128-31.
23. Sharma A, Shashidhara HS. A review: Flexible removable partial dentures. *IOSR J Dent Med Sci* 2014;13:58-62.
24. Ozcan M. The use of chair side silica coating for different dental applications: A clinical report. *J Prosthet Dent* 2002;87:469-72.
25. Bortun C, Lakatos S, Sandu L, Negrutiu M, Ardelean L. Metal free removable partial dentures made of thermoplastic materials. *TMJ* 2006;56:80-7.
26. Lekha K, Savitha NP, Roseline M, Nadiger RK. Acetal resin as an esthetic clasp material. *J Interdiscip Dent* 2012;2:11-4.
27. Tanoue N, Nagano K, Matsumura H. Use of a light-polymerized composite removable partial denture base for a patient hypersensitive to poly(methyl methacrylate), polysulfone, and polycarbonate: A clinical report. *J Prosthet Dent* 2005;93:17-20.
28. Hochman N, Zalkind M. Hypersensitivity to methyl methacrylate: Mode of treatment. *J Prosthet Dent* 1997;77:93-6.
29. Ogle RE, Sorensen SE, Lewis EA. A new visible light-cured resin system applied to removable prosthodontics. *J Prosthet Dent* 1986;56:497-506.