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Special Purpose Removable Partial Dentures – Review Article

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Abstract: It is often observed in clinical practice that many patients present with varying conditions in the oral cavity. Variations could be anatomical, physiological, or connected to the specific patient's lifestyle. Regardless of the type of variation, it is critical that the prosthesis functions properly for each patient. When a traditional removable partial denture does not fulfil the demands of a patient owing to variances, various adjustments are performed to match the patient's needs. Unconventional removable partial dentures are the name given to such dentures (special purpose removable partial dentures). These unconventional dentures will help patients make treatment decisions based on the best possibilities available, as they provide a unique treatment plan for extremely unusual situations. Treatment options in conventional RPD are based on ideal scenarios, but unconventional RPD aids in the design of treatment modality for partially edentulous individuals when conventional treatment alternatives fail to meet the needs. A thorough knowledge about the special purpose removable partial dentures is essential to the success in the field of Prosthodontics. It should be approached in a methodical manner. This enables the dentists to make the best choice. This paper presents a review of available literature emphasizing the various unconventional partial dentures.

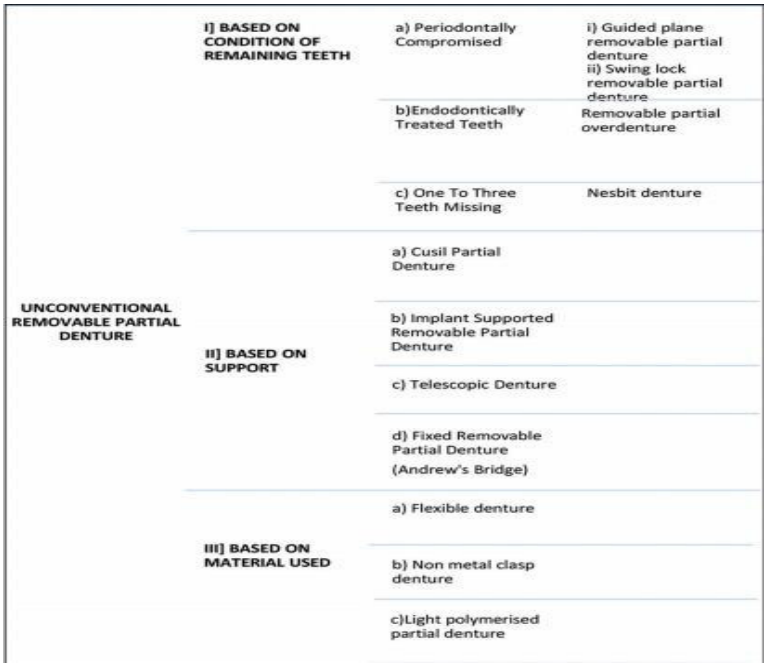
Key words: unconventional dentures, partial dentures, removable partial dentures, RPD.

INTRODUCTION[1]

The choice between the several treatment options for replacing missing teeth is impacted by clinical factor, dentist and patient. One of the most important needs for patients visiting clinics to restore aesthetics and/or function is the replacement of lost teeth. Removable partial dentures (RPD), fixed partial dentures (FPD), and dental implants are all options for replacing missing teeth. Each treatment method has its own set of benefits and drawbacks. Although partial dentures cannot be considered a replacement for artificial teeth, they have long been and continue to be the staple treatment for partially edentulous individuals. Conventional methods of denture fabrication cannot be used in the every case of partial edentulism. In case of compromised conditions, a minor change in the fabrication of the prosthesis is required to attain the optimum results. The increasing demand of the patients and the creative ideas of the Prosthodontist have resulted in the development of unique that is special purpose (unconventional) removable partial dentures. The unconventional partial dentures use novel approaches based on the same old Prosthodontia basics. These are a simple, effective, and non-invasive therapeutic option to the classical conventional procedure.

CLASSIFICATION OF UNCONVENTIONAL PARTIAL DENTURES[1]

it is critical to clinically identify partially edentulous individuals depending on removable treatment choices, unlike Kennedy and Applegate categories. The classification of unconventional RPD will aid in the selection of treatment alternatives. This classification will provide a distinct treatment scheme for extraordinarily rare circumstances, assisting in the development of treatment alternatives for partially edentulous patients when standard treatment options fail to meet the needs.



BASED ON THE CONDITION OF THE REMAINING TEETH:

PERIODONTALLY COMPROMISED

1. **GUIDE PLANE REMOVABLE PARTIAL DENTURE** [1, 2,3,4]:

- These are removable partial dentures with multiple proximal plates that slide on guide planes and clasps with rests, all of the weakening teeth are meticulously arranged.
- A removable partial denture with a guiding plane that is anchored on both sides of the arch and linked together with a rigid major connector (broad stress distribution) can give cross-arch stabilisation to buccolingual forces.
- The mobility of the teeth has stayed the same or decreased in all recorded cases when the guide plane removable partial denture has been worn.
- INDICATION - It aids in the stability of teeth that have been weakened by periodontal disease.
- DISADVANTAGE - Because several clasps and proximal plates of minor connectors (large metal display) are employed, the denture is not suitable in situations requiring cosmetic considerations (Kennedy's Class IV).

2. **SWING LOCK REMOVABLE PARTIAL DENTURE** [5, 6, 7, 8]:

- The swing lock denture was introduced by Dr.Joe J Simmons in 1963.
- The design was recommended for maximising stability and retention by getting access to many more tooth surfaces through the unique clasping mechanisms provided by the lock, hinge, and gate assembly, allowing all teeth to become primary abutments.
- In addition to the lingual major connector, this denture incorporates a labial bar (two major connectors). A hinge on one side and a lock on the other join the labial bar to the remaining elements of the denture, which extends labially all the way along the arch. During insertion, the labial bar can be unlocked and then locked.
- Swing lock dentures are so named because the labial bar moves around a hinge joint.

- **INDICATIONS**-

- Too few remaining natural teeth left to support a conventional removable partial denture.
- For conventional design, the remaining teeth are too mobile to serve as abutment teeth.
- In the lack of key abutments, fabricating a conventional removable partial denture is very impossible (primary abutments). The swing lock denture can be employed because it relies on the remaining teeth for support, retention, and stability. For example, when a canine is lost, a vulnerable lateral incisor serves as a terminal abutment.

- **CONTRAINDICATIONS**:

- Poor oral hygiene
- High frenal attachment
- Short lip or little vestibular depth
- Inadequate manual dexterity

I. **ENDODONTICALLY TREATED TEETH**:

1. **REMOVABLE PARTIAL OVERDENTURE** [9, 10, 11]:

- According to GPT 9, overdenture is a removable dental prosthesis that covers and rests on one or more remaining natural teeth, the roots of natural teeth, and/or dental implants; a dental prosthesis that covers and is partially supported by natural teeth, natural tooth roots, and/or dental implants.

- **INDICATIONS**

- Patients with few remaining retainable teeth in an arch; patients with mal-related ridge cases; patients who require a single denture
- Patients with unfavourable tongue placements, muscular attachments, and a high palatal vault, which make the prosthesis unstable and difficult to retain.

- **CONTRAINDICATIONS**

- Patients with poor oral prophylaxis, systemic problems, and an insufficient inter-arch distance.

1. **ONE TO THREE TEETH MISSING**
2. **NESBIT DENTURE** [1]:

- Nesbit dentures are a type of conventional RPD that are used to replace one to three lost teeth on the same side of the upper or lower arch.
- The unique feature is that because there is no bilateral support from the other sides of the mouth to prevent destructive stresses from contacting the teeth supporting the Nesbit, it should be short term to avoid injuring adjacent teeth.
- INDICATIONS - Nesbit dentures are typically utilised as a temporary solution while patients wait for implant restoration.
- ADVANTAGES – No metal clasps, smaller and comfortable
- DISADVANTAGES – serious risk of aspiration and swallowing.

BASED ON THE SUPPORT

1. **CU – SIL DENTURES** [12, 13]:

- For individuals with few remaining natural teeth, several treatment alternatives are available, of which the Cu-sil denture, a newer type of transitional denture that serves as a therapy option for the preservation of few remaining natural teeth and hence the alveolar bone.
- Cu-sil dentures are one such friendly option that is both conservative and preventive in nature, since it aims to retain existing teeth while minimising alveolar ridge resorption.
- Cu-sil is the most basic and softest removable partial available. It's a tissue-bearing acrylic appliance with a soft elastomeric seal that clasps the neck of each natural tooth, sealing out food and fluids while cushioning and splinting each natural tooth from the hard acrylic denture base.
- By eliminating wear, stress, and torque, it helps to avoid tooth loss and improves the prognosis of loose, mobile, isolated, elongated, or periodontally involved abutments. This method of therapy does not necessitate any dental preparation or an additional patient visit.
- DISADVANTAGES – required frequent corrections, may lead to plaque accumulation.

3. **IMPLANT SUPPORTED REMOVABLE PARTIAL DENTURE** [14, 15, 16]:

- The distal rotation of the acrylic base at the free end region of RPDs distal to the last natural tooth is a difficult problem with conventional RPDs.
- A Kennedy Class I or II denture can be converted to a Kennedy Class III denture using distal implants.
- Fewer implants are required to produce a successful distal extension RPD while limiting alveolar ridge bone loss over time since the implant is placed in a distal position.
- Removable partial dentures supported by a combination of implants and the remaining teeth help to preserve soft tissue and hard tissue, boost patient satisfaction, reduce component wear and tear, helps to maintain bone loss within normal limits, and peri-implant soft tissue stable.
- INDICATIONS - lack of stability, decrease in function, reduced fibroelasticity of the peripheral soft tissue
- ADVANTAGES – cheaper (fewer implants needed), preserves bone quality and quantity.

4. **TELESCOPIC DENTURE** [1, 17, 18]:

- Although first described by Starr in 1886, telescopic copings were initially introduced as retainers for RPDs at the beginning of the 20th century.
- This arrangement of two crowns that can be fitted into each other became known as the telescopic denture because of its similarity to a collapsible optical telescope.
- Telescoping is when a primary full-coverage casting (coping/male telescopic portion) is luted to the prepared tooth and a secondary casting (superstructure/secondary crown/female telescopic portion) is a part of the denture framework and is retained by interfacial surface tension over the primary casting.
- They work by distributing forces along the abutment teeth's long axis and providing guiding, support, and protection from movement that might dislodge RPD's.
- ADVANTAGES – creation of common path of insertion, rigid splinting action

5. **FIXED RPD (ANDREW'S BRIDGE)** [19, 20, 21, 22]:

- Dr. James Andrews of Amite Louisiana (Institute of Cosmetic Dentistry, Amite, LA, USA) first introduced a fixed-removable prosthesis in 1965
- When all other conventional fixed or removable partial dentures failed to treat severe residual ridge resorption or jaw defect cases due to trauma and/or surgical ablation, Andrew's Bridge was developed to provide biomechanical stress distribution to improve or achieve comfort, hygiene, normal phonetics, and mostly normal aesthetics.

- Andrew's Bridge is a fixed retainer with removable pontics. The pontic assembly of a fixed removable partial denture is removed by the patient for preventive maintenance. The retainers are permanently fused to the abutments and are either porcelain fused to metal (PFM) or full veneer metal. The retainers are joined with prefabricated castable bars and then cast together, or a prefabricated metal bar is soldered to the metal copings after casting.
- Andrew's Bridge which has qualities of both the fixed partial denture and the removable partial denture can be indicated in cases where the abutments would support a fixed partial denture but a severe defect is present in the edentulous space.
- INDICATIONS – extensive supportive tissue loss and alveolar bone loss.

BASED ON THE MATERIAL USED

1. **FLEXIBLE DENTURE** [23, 24, 25]:

- When conventional dentures cause the patient distress, a flexible denture (soft denture) is typically employed.
- Flexible RPDs are basically advised in every partial edentulous situation as long as the patient is willing to use a removable prosthetic.
- Polyamide nylon is used in flexible dentures. Because flexible partial dentures rely on the ridge's undercuts for retention, it's recommended for ridges with bilateral undercuts.
- Patients with slanted teeth (due to a long period of missing adjacent teeth) develop an undercut, making hard partial dentures difficult to place. Flexible partial dentures are a superior alternative in certain situations.
- INDICATION - It is indicated in patients with acrylic monomer allergies because this material contains almost no free monomers; cases where clasps must be placed in the aesthetic zone, such as on the maxillary canine; and cases where financial constraints prevent the use of implants and the patient does not want FPDs.

2. **NON METAL CLASP DENTURE** [26, 27]:

- Metal clasps on the anterior teeth can cause aesthetic issues.
- Painting clasps with tooth-colored resin, using lingually positioned clasps, engaging mesial rather than distal undercuts, and using gingival approaching clasps are all options for overcoming this aesthetic challenge.
- An alternate denture clasp material is acetal (Bio Dentaplast, Bredent, Senden, Germany), a thermoplastic resin. In 1971, acetal was proposed as a non-breakable thermoplastic resin RPD material.
- MERITS – esthetically pleasing because of colour matching, in patients with metal allergy.

3. **LIGHT POLYMERIZED PARTIAL DENTURE** [28, 29, 30]:

- PMMA is also commonly used for interim restorations, denture repairs, and relines.
- Despite the fact that PMMA is an essential polymeric material in prosthodontics, a growing number of individuals are experiencing hypersensitivity reactions to it.Other polymeric materials that are non-allergic to the patient should be used for the denture base in such patient.
- Light-activated indirect composites, such as two urethane dimethacrylate (UDMA) composites, are potential alternatives to poly (methyl methacrylate) (PMMA), despite the fact that they contain multifunctional methacrylate monomers of 30 wt percent or more.
- When MMA monomer comes into contact with the skin or oral mucosa, it has been documented to trigger allergic reactions.
- MERITS - Denture bases made of polymerized UDMA are non-toxic and that the material that hasn't been polymerized appears to have toxicity is low. In addition, UDMA monomer is less allergenic compared to other acrylate series.

II. **MISCELLANEOUS**:

1. IMMEDIATE PARTIAL DENTURE [37, 38]**:**

- Immediate denture is dental prosthesis designed to replace damaged dentition and related structures of maxilla and mandible and inserted immediately following removal of remaining teeth.
- Immediate dentures can reduce alterations in the patient's appearance,that can occur when natural teeth are removed. Immediate dentures provide continual support, the tongue, lips, and cheeks will not change their positions and they allow patients to continue their social activities without being in an edentulous state.
- DEMERITS -Absence of stimulation provided by the natural teeth, involves a precise and time consuming protocol, anterior try for aesthetics is absent.

III. RECENT ADVANCES:

1. **CAD CAM PARTIAL DENTURES** [31, 32, 33, 34, 35, 36]:

- The RPD framework is made up of four parts: the base, plate, clasp, major, and minor connectors.
- Every aspect of the RPD framework must be well designed and given a high value during the design phase.
- Because of the wide variety of RPD pieces and their irregular shapes, designing a 3D RPD framework takes a long time and is difficult. For many years, researchers looked into the best CAD/CAM method and software for 3D designing of the RPD framework.
- Three steps make up the design process:

- scanning a definitive impression or pouring a cast from a definitive impression
- Using commercially available RPD computer aided design (CAD) software to export the scanned information for digital preparation and surveying of the cast.
- Creating a 3D printed RPD by incorporating all of the necessary framework components (minor and major connectors, guiding planes, rests, clasp assemblies, etc.).

- MERITS – reduced fabrication time and expenses, increased profitability and productivity of the laboratory.

CONCLUSION

The classification of unconventional partial denture facilitates uniform use of the system. It will help the Prosthodontist as well as Dentists assess patients for most appropriate treatment for better care. This article helps in reviewing cases of compromised and modified conditions where the unconventional RPDs can be used.

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