



## International Journal of Allied Medical Sciences and Clinical Research (IJAMSCR)

ISSN:2347-6567

IJAMSCR |Volume 8 | Issue 1 | Jan - Mar - 2020  
www.ijamscr.com

Case Report

Medical research

### Maxillary and mandibular distal extension rehabilitation: combination of cast partial denture with RPI system and flexible partial denture: a case report

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#### ABSTRACT

##### Introduction

The aim of this paper is to present a case of partial edentulous in maxillary and mandibular arch. Removable partial denture (RPD) is one of the various treatment options available for the replacement of teeth for partially edentulism patients.

##### Case presentation

A 56-year-old female reported to the Department of Prosthodontics with a chief complaint of missing teeth and inability to masticate. Shows Kennedy's Class 1 in maxillary arch and Kennedy's Class 1 Mod.1 in mandibular arch. After complete examination cast partial denture with respect to maxillary arch and flexi denture with respect to mandibular arch have been considered as a feasible management option to solve functional problem.

##### Conclusion

Distal extension cases require much skill to accomplish a proper design of partial denture. This is due to the difference in tooth and soft tissue which eventually results in non-axial loading. Forces must be controlled through optimal tissue health, maximum coverage of soft tissue, proper use of direct retainers and placement of all components in their most advantageous positions, and flexible dentures as an alternative in cases where cast partial denture is ineffective. The purpose of this article is to provide an overview approach to this treatment modality by way of a case report.

**Keywords:** Removable Partial Denture, Bilateral Distal Extension Cases, RPD design, Wax pattern, Surveying.

## INTRODUCTION

Removable partial denture is considered as an acceptable and economical treatment modality for patients with partially edentulous arch [1]. Distal extension RPD is represented as one of the most critical treatment statuses for achieving successful long- term prognosis and preservation of the remaining natural teeth and their supporting structures. In bilateral distal extension RPDs, the problems raised are related to the difference in support between the abutment teeth and the residual ridges. Therefore, it is important to consider a properly designed RPD for the preservation of the remaining natural teeth [2, 3]. Cast partial denture compared with acrylic partial denture provides better result in terms of retention, stability, comfort and periodontal health of abutments [4]. Biocompatible metals like cobalt-chromium are widely Used for RPD frameworks. Metal -based frameworks have many advantages over acrylic framework.

Cast partial dentures are not indicated in every clinical scenario where multiple teeth are missing, so it is very important to determine type of prosthesis which is most beneficial for the patient. Several clinical studies have reported that acrylic removable prosthesis tends to develop significant damaging effects on the periodontal status of abutment teeth more than the cast metal removable partial dentures [5, 6]. An alternative denture prosthesis design in which optimal flange height and thickness can be achieved is by using flexible denture base material. For clinical cases such as Kennedy's Class I & II, which involve distal extension, the flexible dentures by engaging the soft tissue undercuts and clasping the adjacent teeth provide excellent retention and better comfort for the patient. Therefore, this case report describes bilateral partial edentulism in maxillary and mandibular ridge restored with cast partial denture and the flexible partial denture respectively.

## CASE PRESENTATION

A 56-year-old female reported to the outpatient clinic of Department of Prosthodontics with a chief complaint of missing teeth and inability to masticate. The patient had a history of multiple grossly decayed posterior teeth in both maxillary and mandibular arches which were extracted two years back without any prosthetic replacement.

## Clinical features

Extra oral examination showed no evidence of facial asymmetry or TMJ abnormalities. Intra-oral examination showed a dentate situation of Kennedy's Class 1 in maxillary arch and Kennedy's Class 1 Mod.1 in mandibular arch. All teeth except 16, 17, 18, 26, 27, 28 were present in maxillary dentition. 24 was restored with a porcelain fused metal crown. Fractured DO and MO GIC restoration were present w.r.t 13 and 14 respectively. Ellis class I fracture was present w.r.t 22. In mandibular dentition all teeth were present except 34, 36, 37, 38, 46, 47, and 48. Root canal treatment was completed w.r.t 35 and class I GIC restoration was present w.r.t 45. Bilateral lingual tori were present which needed special attention during the treatment planning. The remaining teeth were periodontally healthy to consider as abutments for the removable prosthesis.

## Investigation

Radiographic evaluation showed satisfactory bone support around the remaining teeth and no signs of periodontal and periapical lesions.

## Treatment options

The diagnostic casts were studied and different treatment plans were proposed to rehabilitate and restore function and aesthetics, ranging from conventional removable partial dentures to implants. Prosthetic rehabilitation with dental implants were not considered due to inadequate bone height and width ideally needed for the same and certain financial constraints. Fixed partial denture option was not possible in this case due to absence of posterior abutments. Following a detailed clinical examination and careful evaluation of the objective parameters of the patient's age, profession, smile, aesthetic and functional demands and to boost her confidence towards life, it was found that cast partial denture in the maxillary arch and flexible denture in the mandibular arch were best suited.

## Treatment

The patient was referred to Department of Periodontics and Department of Conservative Dentistry & Endodontics for complete oral prophylaxis and restore the cervical abrasion lesions w.r.t 25, 44, to replace the fractured restorations and the aesthetic restoration w.r.t 22.

The patient was recalled for the diagnostic impressions and were made with irreversible hydrocolloid impression material (Imprint, DPI, India) and poured in type III dental stone (Kalabhai Karson Pvt. Ltd). After retrieving the casts, facebow record was taken and mounted on Hanau semi adjustable articulator. After evaluating the diagnostic casts, surveying of the maxillary cast was done followed by designing (a) cast partial denture for the maxillary arch and (b) flexible partial denture w.r.t mandibular arch to accommodate the lingual tori thereby avoid future complications. In the maxillary distal extension base, the retentive meshwork must be extended to hamular notch and the type of major connector should be selected based on the support and rigidity needed for preservation of tissues, and anatomic limitations. The maxillary denture design had planned as antero-posterior palatal strap as major connector and RPI clasp system on 15 and 25 was adapted for better aesthetics and function. The distal occlusal rest seat was planned w.r.t 14 and mesial occlusal rest seat w.r.t 15 & 25, and the cingulum rest seats w.r.t 13 and 23 for indirect retainers. The clinical crowns w.r.t 14, 15 were weakened due to the restoration and therefore the rest seats w.r.t 13, 14, 15 were prepared on the metal ceramic fixed partial denture and cemented prior to the mouth preparation. The dislodged FPD w.r.t 33, 34, 35 and 45 were replaced with fixed prostheses. The rest seat and the guide plane mock preparations w.r.t 23 and 25 were done on the cast and required mouth preparations were carried out. Once the preparations were evaluated, the final impressions were made using polyvinyl siloxane addition silicone material (Aquasil Soft Putty, Aquasil Light Body, Densply, Germany), poured and retrieved. Surveying was repeated and unfavourable undercuts were blocked out and refractory cast was made for maxillary cast and the trial denture base with occlusal rims made for mandibular arch. Preformed wax Patterns were used for framework wax pattern fabrication. The pattern was finished, invested, casted, sandblasted and polished for the framework trial and for checking the adaptation. The maxillary occlusal Rim was then fabricated and the maxillo-mandibular relation was recorded. The patient was recalled for the try-in and necessary adjustments, followed by the conventional processing and the final insertion.

## Follow-up

The patient was reviewed after 1 week and minor adjustments were done. She was scheduled for follow-up after 1-month and 3-months reported with no discomfort and was highly satisfied with the treatment outcome both in terms of aesthetics and function.

## DISCUSSION

The cast partial has historically been the option of choice because the lack of posterior abutments in Kennedy Class I cases obviated the possibility of fixed bridgework. [7]. Cast partial denture with respect to maxillary arch is considered ideal in this case as patient desired for cost effective swift treatment. Implant treatment was prohibited as it required longer procedure and much costlier than removable prosthesis. More over, minimum amount of bone required for implant was inadequate and patient was also not willing for any surgical procedure due to certain financial constraints. According to Stewart [8], for class 1 partially edentulous arch, bilateral clasps is indicated although this design does not permit optimal control of harmful forces as the clasp exert little or no neutralizing effects on leverage induced stresses. Therefore, stresses must be controlled by other means that is indirect retainers given bilaterally on canines in this case. Horizontal forces are harmful forces and applied on the supporting teeth and the alveolar ridge. To minimize their effect, it is important that the retentive and the stabilizing arm of the clasp to be fitted correctly in the appropriate areas on the tooth and also is important to find the right direction of insertion of the denture itself.

Mesial rest preferred over distal rest on rearmost abutment as it increases arch of rotation, therefore more vertical forces as compared to horizontal forces and mesial rest also provide buttressing effect [9]. The properties of cobalt chrome are the perfect balance between deformation, stiffness, and elasticity, results in efficient performance for many years. Acrylic denture with stainless steel clasp is not very stiff and tend to deform very quickly. Metal -based frameworks provide high strength and so could be used in thin sections. They have good thermal conductivity for more natural experience. The use of RPI system is based on use of an I-bar retentive element, a mesial

rest, and a distal proximal plate. I-bar philosophy was introduced by kratochil in 1963.

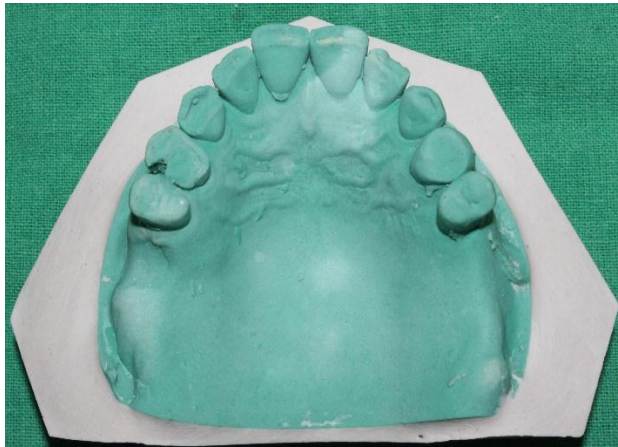
**Leeway of using I-bar include**

- Food accumulation is minimised because tooth contours are not significantly altered.
- Minimise torqueing forces and direct occlusal loads parallel to long axis of abutments.
- Clasp terminus disengages from tooth when occlusal load is applied to the adjacent distal extension base.
- Lateral forces are minimized as approach arm does not contact the abutment.

Flexible removable partial denture was indicated in mandibular bilateral distal extension case as placement of lingual bar requires at least 8mm of space between gingival margin and floor of

mouth, which was insufficient and expected interference from the bilateral lingual tori. Flexible denture prosthesis is fabricated of nylon based thermoplastic material that does not sacrifice function and preserves aesthetics. Flexible dentures are an excellent alternative to traditional acrylic dentures [10] as it provides:

- Translucency of the material picks up underlying tissue tones,
- No clasping is visible on tooth surfaces (clear clasps), improving aesthetics,
- Strength and flexibility
- Free movement is allowed by the overall flexibility
- Biocompatible and free of monomer and metal, as these being the principle causes of allergic reactions in conventional denture materials.



**Diagnostic cast**



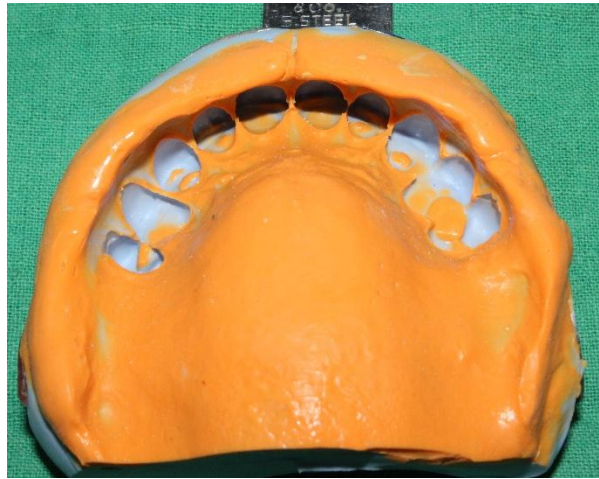
**Occlusal view (mirror image)**



**Right lateral view**



**Left lateral view**



**Final impression**



**Wax Pattern**



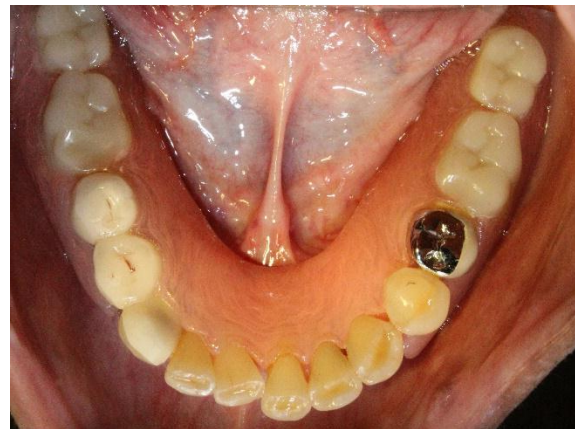
**Metal framework**



**Metal framework trial intraorally**



**Final prosthesis**



**Lateral view**



**Frontal view**

## **CONCLUSION**

The design of distal extension removable dentures should be chosen after proper evaluation of each patient situation and consider the merits and demerits of the components if not planned accordingly. In this case the patient expectations regarding the rehabilitation of function and the

aesthetics were fulfilled economically within a short span of treatment time by not involving any invasive dental procedures.

**Conflict of Interest:** There is no conflict of interest

**Financial Support:** Nil

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**How to cite this article:** Shinu Daniel, Reeta Yadav, G.Ajay Kumar. Maxillary and mandibular distal extension rehabilitation: combination of cast partial denture with RPI system and flexible partial denture: a case report. *Int J of Allied Med Sci and Clin Res* 2020; 8(1): 25-31.

**Source of Support:** Nil. **Conflict of Interest:** None declared.