



Designing a Cast Partial Denture for Patients with Open Bite

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ABSTRACT

Designing a cast partial denture for a partial edentulous situation often poses challenges, especially the placement of components with respect to the existing dynamic occlusion of the patient. Whereas there are many reports of designing a Kennedy class 3 situations in normal occlusion there are no reports of designing the prosthesis in a patient with skeletally caused dental open occlusion or open bite. This case report presents designing of a cast partial denture in such a patient and discusses the effects of such occlusion on its design.

Keywords- *partial edentulism, surveyor, casting, connector, retainer*

Introduction

Since the advent of dental implants in Prosthodontics, there has been a drastic decrease in demand of removable dental prosthesis (RPD). There also has been a sudden shift of research and much emphasis has been given to fix rather than removable Prosthodontics. However, there is always a particular group of partial edentulous patients where implant supported prosthesis (ISP) or other fixed options are not indicated. One of such absolute contraindication is related to the abnormal lateral forces generated due to either normal or

pathogenic occlusion. Such patients often find themselves either treated by fixed partial dentures (FPD) or a removable partial denture in the form of cast partial denture (CPD). The success or failure of an RPD depends on many factors. ^{[1], [2]} Although occlusion has been proclaimed to be more significant to treatment planning of a fixed prosthesis, it also plays a significant role in treatment planning of any RPD. In designing of a framework, a prosthodontist must consider the effects of framework design, clasp configuration, denture base extension and the condition of the

primary and/or secondary abutments.³⁻⁵ Whereas, most of the malocclusion types pose challenges in designing of the framework, a patient with an anterior open bite may not seem to be a big challenge at the outset. This article discusses the rehabilitation of a Kennedy class 3 modification 1 partial edentulous situation with a cast partial denture in a patient who had a dental open bite due to skeletal excess. Two significant aspects of occlusion in relation to such malocclusion namely the occlusal plane and anterior guidance have been discussed in the light of the present case.

Clinical Case Report

An adult female patient aged 43 years, reported to the department of Prosthodontics of the University with chief complaint of inability to masticate since the loss of her mandibular posterior teeth. Medical history was non-contributory as was social and drug history. Dental history recorded tooth loss of mandibular right side first, followed by left side mainly due to caries. Bilateral loss of second premolars, first and second molars were present with loss of space due to mesial migration of last molars. Extra oral functional examination disclosed a low, high lip line (smiling line). Intra oral examination revealed Kennedy class 3 modification 1 partial edentulous situations (Fig.1A). Wear facets in relation to posterior teeth were present with absence of anterior guidance in relation to maxillary and mandibular canines. Maxillary left sided canine and first premolar was restored with single porcelain fused to metal crowns. Diagnosis and treatment plan was done after radiographic investigations, diagnostic mounting of primary

surveyed dental casts and evaluation of existing occlusion. Treatment option presented to the patient included a temporary partial denture followed by a definitive cast partial denture.

Primary cast obtained for diagnostic evaluation was surveyed on a dental cast surveyor and four principal factors were evaluated, namely the path of insertion and removal, aesthetics, interferences and guiding planes. Modifications in designing included non-placement of any component of cast partial denture in the area of the teeth that were discluding the posteriors in the existing state (premolars). Mouth preparations were done in the next appointment (Fig 1A) that included preparation of occlusal rest seats on the surrounding abutments, correction and preparation of guiding planes. This was followed by making of final impressions different consistencies of Addition polyvinyl siloxane material (Reprosil, Dentsply/Caulk; Milford, DE, USA) on a stock tray (Fig 1B). After preparing the master cast (Fig 1C), regular laboratory procedures were followed for fabrication of a cast partial denture. Once the metal framework was obtained it was first tried on the master cast (Fig 1D) and then on the patient. This was followed by jaw relations, teeth arrangement and denture processing (Fig 1E) (Fig 2A). The processed denture was finally inserted into the patient's mouth (Fig 2B and C) and the patient was given instructions regarding denture care and maintenance. The patient was followed for a period of 6 months regularly during which he successfully adapted to his prosthesis.

Discussion

Open bite is defined as an open vertical dimension between the incisal edges of the maxillary and the mandibular teeth, although loss of vertical dental contact can occur between the anterior or the buccal segment.⁶ Facial features include large total face height, especially with the elongated lower third of the face, increased interlabial gap, excessive dental eruption, altered occlusal plane, loss or lack of anterior guidance and anterior flaring of teeth. Patients usually face problems in mastication and speech besides possessing an unaesthetic appearance. Although there are many treatment options for the correction of both dental and skeletal open bite, most of the patients usually do not consider treatment of such condition especially if option is surgical. In the present case, the patient never approached for any correction of the condition, although



Figure 1: (A) Denture trial (B) Finished cast partial denture maintaining the existing open bite (C) Intraoral view of the cast partial denture his complaints about his dentition were more related to color and shade of natural teeth than problems in occlusion. While designing the components of the present case two significant aspects of occlusion will be discussed that affected the designing of the anterior direct retainers and the artificial teeth. The two important aspects were the missing canine guidance (which is an essential component of a mutually protected occlusion in natural dentition) and the altered occlusal plane.

In the open bite cases, the anterior guidance may be either absent or shifted. As seen in this case, in centric occlusion neither the incisor nor the canines guided the occlusion thus eliminating the mutual protection in eccentric movements. Because the canines do not guide the mandible in eccentric the posterior teeth (in this case maxillary premolar) bear the lateral forces in the eccentric movement of the mandible. Components of the cast partial denture that encircle the premolars therefore are guided by this posterior shift in mandibular guidance. Under no condition should metal come into contact with the cusp of the opposing teeth in lateral excursion otherwise, all the forces would be transferred to the abutment which is not biologically suitable for withstanding such forces. The other aspect of

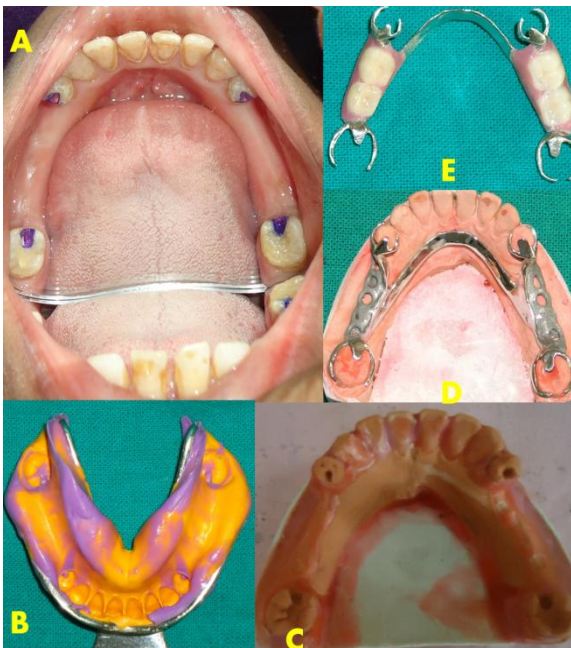


Figure (A) Mouth preparations (B) Final impression (C) Master cast (D) Framework (E) Cast partial denture with artificial teeth and denture base

occlusion that affects designing is the occlusal plane discrepancy which does not permit the use of anatomical teeth as artificial replacement for the cast partial denture. Teeth with long cusps would directly come in the path of lateral movement of the mandible which in turn would move the partial denture in a medio lateral direction. Any such movement of the framework is avoided by using teeth with either semi anatomic or non-anatomic cusps. Guiding planes in such cases play an essential role in combatting the lateral forces to the natural teeth. Proximal guiding planes should be established in such way that any lateral movement that is anticipated should not allow the framework to come into contact with the surface of the tooth on the proximal surfaces.^{7,8}

When designing a cast partial denture for a Kennedy Class 3 modification 1 with a long edentulous span, multiple components of the natural abutment teeth make the cast partial denture less self-cleansing. Features that have been described in the literature should be incorporated to make the partial denture more self-cleansing.^{9,10}

Conclusions

Cast partial dentures offer practitioners a significant option where other options are not achievable. Discrepancy in existing occlusion should be taken into account when designing the components of the partial denture.

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