REINFORCING MAXILLARY SINGLE COMPLETE DENTURE WITH METAL DENTURE BASE- AN INNOVATIVE APPROACH TO DEAL WITH DENTURE FRACTURE

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ABSTRACT

The main objective of any prosthetic treatment should be based on De Van’s statement that “Perpetual Preservation Of That What Remains Rather Than Meticulous Replacement Of What Has Been Lost.” This is especially true in terms of completely edentulous jaw opposing natural dentition. Several difficulties are encountered in providing a successful single complete denture treatment, the most common being repeated fracture of the prosthesis. An ideal solution to strengthen the single complete denture bases is to provide metal reinforcement by fabrication of metal based single complete denture. This case report describes the clinical management and step by step fabrication of single complete denture with metal denture base and partially edentulous mandibular jaw.

KEYWORDS: Single Complete Denture, Metal Denture Base.

INTRODUCTION

Construction of single complete denture opposing the natural dentition is the challenging task for the dentist. This may be due to certain drawbacks like prosthesis fracture, instability due to difficulty in obtaining occlusal balance and achieving satisfactory esthetics.\cite{1}

In addition, when a dentate arch opposes an edentulous arch, the edentulous arch is usually adversely affected. This may be due to firmness and rigidity with which the natural teeth that are retained in the bone and the magnitude of the force they can resist or deliver without discomfort or displacement. This force can be as high as 198 lb on single molar teeth. This is in sharp contrast with the force which a complete denture, resting simply on the delicate mucosa of the ridge, can resist or deliver. This force has been established as being a maximum static load of 26 lb.\cite{2}

It was stated that occlusal problems and denture-base fractures seen in the single complete denture are the result of one or all of the following factors like, occlusal stress on the maxillary denture and the underlying edentulous tissue from teeth, musculature accustomed to opposing natural teeth, the position of the mandibular teeth, which may not be properly aligned for the bilateral balance needed for stability, and flexure of the denture base.\cite{3}

Heat polymerized dentures are the dominant material for the fabrication of denture bases. These heat polymerized denture base resins present acceptable physical, biologic and esthetic characteristics at moderate expense. However, denture base resins in single complete dentures has been frequently found to fracture under excess masticatory forces. Metal bases have been proved to be a valuable alternative for denture bases opposing natural dentition to strengthen bases and to prevent them from fracture.\cite{4}

This case report describes fabrication of single maxillary complete denture which is reinforced with metal denture base to prevent fracture of denture.

CASE PRESENTATION

A 55-year-old male patient reported to Department of Prosthodontics, Inderprastha Dental College and Hospital, Ghaziabad, India with the chief complaint of fracture of maxillary complete denture. Intraoral examination revealed completely edentulous maxillary ridge and opposing complement of natural dentition with missing 31, 41, 42 (Fig 1). Mucosa was normal and the opposing teeth required minor alterations. Saliva was of...
medium consistency and patient was co-operative and philosophical according to House classification.

Patient was in a history of previously wearing single complete maxillary denture opposing to mandibular natural teeth. On examination it was revealed that the previous denture was fractured from the midline and retention, stability and support of the denture was also compromised. The denture was relined and the patient was advised for construction of a new denture with metal denture base so as to prevent frequent fracture of the denture. After an informed consent, a treatment plan was discussed and it was decided to construct single maxillary complete denture with metal denture base and a removable partial denture in mandibular arch.

**Technique:** Primary impression of maxillary edentulous ridge was made with modeling plastic impression compound and mandibular arch was made with irreversible hydrocolloid impression material(Alginate) in a metal stock tray (Fig 2).

![Fig. 1: Pre-operative maxillary and mandibular arch.](image1)

The cast was poured using dental plaster and a custom tray was fabricated. Border molding of the maxilla was performed with green stick impression compound and a secondary impression for maxillary arch was made with Zinc Oxide Eugenol Impression paste.(Fig 3)

![Fig. 2: Maxillary and mandibular Primary Impression.](image2)

Border molding of the maxilla was performed with green stick impression compound and secondary impression was made with Zinc Oxide Eugenol Impression paste.

The master casts were poured with Dental stone type III. A spacer was provided in the alveolar region which provided the relief. The master cast was then duplicated with Agar Agar duplicating impression material to form a refractory cast.(Fig 4)

![Fig. 3: Border molding of maxillary arch was performed with green stick impression compound and secondary impression was made with Zinc Oxide Eugenol Impression paste.](image3)
A refractory cast was poured with ethyl silicate bonded investment material. Die hardening of the refractory cast was performed. On the refractory cast, the denture base pattern wax was adapted and the sprues were attached and invested (Fig 5,6). The denture base was casted with cobalt chromium metal.

The metal denture base was finished, adapted on the master cast and polished. It was then tried in patient’s mouth (Fig 7).

Maxillomandibular relation was recorded. Teeth were arranged in centric occlusion so that the centric relation records could be verified. Adjustments in the artificial teeth were incorporated in preference to making natural teeth. Though a perfect balanced occlusion is impossible to achieve in such cases with involvement of natural teeth, a maximum effort was made to get an occlusion which was as close to balanced occlusion. Try in was done in patient’s mouth (Fig 8).

Fig. 4: Master Cast with spacer and duplicated using Agar Agar Impression material.

Fig. 5: Pattern Wax adapted over refractory cast and sprued.

Fig. 6: Refractory cast was invested and casted.

Fig. 7: Metal Denture base was adapted on master cast and metal try in was performed.
The tried waxed up maxillary single complete denture with metal denture base was acrylized with heat polymerizing acrylic resin. Mandibular removable partial denture was fabricated with conventional manner. The dentures were finished, polished and inserted in patient’s mouth (Fig 9). Post insertion instructions were given to the patient regarding its maintenance, nutrition and hygiene.

**DISCUSSION**

The position of the remaining natural teeth may create interferences in excursive movements which may lead to instability of the maxillary denture. These interferences may also create lever imbalance which may leads to fracture of maxillary complete denture. Correcting these interferences may be as simple as an occlusal adjustment or as severe as extraction of the offending tooth.\(^{[5]}\) A classification system was proposed by Kelly for the identification and treatment of these patients.\(^{[6]}\)

<table>
<thead>
<tr>
<th>Classification</th>
<th>Patient Criteria</th>
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<tbody>
<tr>
<td>CLASS-1</td>
<td>Patients for whom minor, or no, tooth reduction is all that is needed to obtain balance</td>
</tr>
<tr>
<td>CLASS-2</td>
<td>Patients for whom minor additions to the height of the teeth are needed to obtain balance</td>
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<tr>
<td>CLASS-3</td>
<td>Patients for whom both reductions and additions to teeth are required to obtain balance. The treatment of these patients usually involves a change in vertical dimension of occlusion</td>
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<tr>
<td>CLASS-4</td>
<td>Patients who present with occlusal discrepancies that require addition to the width of the occluding surface</td>
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<tr>
<td>CLASS-5</td>
<td>Patients who present with combination syndrome</td>
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</table>

The patient in this case report falls in class- 1 category. However due to supra eruption of mandibular natural denture dentition, there was infrequent fracture of maxillary complete denture. Therefore it was decided to fabricate a metal denture base in maxillary complete denture so as to increase the fracture resistance of the denture.

Though being heavy, the retention form achieved by the denture base with metal plate is more than the conventional acrylic complete denture. This can be accompanied due to fact that the wet ability of the metal is more than that of acrylic thereby increasing the contact area between the denture and the denture bearing mucosa.\(^{[7]}\)

One of the significant advantage is the high thermal conductivity of the metal. Because of this, the sensation of hot and cold can be easily perceived by the patient.\(^{[8]}\) Also it has been reported that metal base also proves to be effective in decreasing the fungal growth typically present beneath acrylic base complete dentures.\(^{[9]}\) Studies have also demonstrated that the metal-palate dentures are perceived as being more comfortable than the acrylic resin dentures.\(^{[10]}\) However the metal denture bases are difficult to adjust tissue surface than a plastic base. Also it is more difficult to reline and repair the metal tissue surface.

**CONCLUSION**

Metal bases for complete dentures can be used successfully and provide many advantages over the more commonly used acrylic resin. With metal bases for dentures, the patient benefits by having a more comfortable, better fitting, and stronger prosthesis. Also,
the dentist benefits by reducing post insertion visits and providing a restoration that will better satisfy the patient.

REFERENCES