

Preventing Combination Syndrome by Maxillary Tooth Supported Overdenture and Mandibular Cast Partial Denture: A Case Report

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Abstract: Rehabilitation of patients with partially edentulous maxillary and mandibular arches entails a very comprehensive diagnosis and treatment planning for the operator. Long term complications and benefit to risk ratio has to be evaluated before selecting a treatment plan. This holds true especially if the remaining teeth under evaluation are bilaterally present maxillary bicuspid and mandibular anterior teeth and bicuspid. To prevent the possibility of an ensuing Combination Syndrome, retaining the maxillary bicuspid becomes critical. Tooth supported overdentures have a long and documented history of preserving the inter-abutment bone loss which is an aftermath of Combination syndrome. Following is hereby a case of maxillary tooth supported overdenture and mandibular cast partial denture.

Keywords: Abutment, Alveolar bone, Combination syndrome, Overdenture, Cast partial denture.

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I. Introduction

In the field of Prosthodontics a special emphasis has always been put on preservation of oral structures along with replacement of missing dental structures. One such oral structure which plays a pivotal role in the treatment planning of removable prosthesis is the residual alveolar ridge. Bone resorption under dentures can affect not only the alveolar bone but also, in some situations, the basal bone^{1,2,3}. It is a well documented fact that tooth supported overdentures lead to preservation of alveolar bone between the abutment teeth. Overdentures supported by tooth abutments or perimucosal implants are a preferable alternative to treatment with conventional complete dentures. The main advantages are decreased resorption of the residual ridges, psychological benefits for the patients and maintenance of masticatory performance^{4,5}. To improve retention of the denture and patient comfort, the abutment may be provided with attachments or conical crowns if the patient is able to maintain satisfactory oral hygiene⁶. Similarly loss of posterior teeth may result in the loss of neuromuscular stability of the mandible, reduced masticatory efficiency, loss of the vertical dimension of occlusion and attrition of anterior teeth⁶. There is, however, no definite relationship between the extent of posterior tooth loss and severity of signs and symptoms of mandibular dysfunction^{7,8,9,10}. In patients with shortened dental arches, a major benefit from wearing removable partial dentures is improved masticatory performance¹¹.

II. Case Report

A 58 year old female reported to the Department of Prosthodontics, GDCH Mumbai with a chief complaint of inability to eat food and compromised esthetics. Her medical history revealed hypothyroidism since 10 years for which she was taking Levothyroxine 100 mcg daily and mild asthma for which she carried an inhaler of Salbutamol 100mcg. Her dental history revealed multiple extractions due to decay in teeth and mobile teeth over a period of 15 years. Extraoral examination did not reveal any significant findings. Intraoral examination revealed present 14, 24, 35, 36, 37, 45, 46 and 47 (Fig. 1).



Fig. 1

The residual alveolar ridge of maxillary arch has a firm overlying mucosa.

The remaining teeth were firm and asymptomatic. Radiographic examination with an orthopantomograph revealed adequate bone support especially wrt 14 and 24. A diagnostic impression of both arches was made with irreversible hydrocolloid (Tropicalgin, Zhermach) and poured with Type III Gypsum product (Kalstone, KALABHAI) and casts were made. A tentative jaw relation was recorded to determine the future esthetics and the appropriate vertical dimension for treatment planning and the casts were mounted on a mean value articulator. The interocclusal distance at the appropriate vertical was insufficient for a maxillary overdenture with a precision attachment. After explaining every type of treatment modality to the patient, a tooth supported maxillary overdenture fabricated with metal copings on 14 and 24 and a tooth tissue supported cast partial denture was selected as the appropriate treatment modality.

MAXILLARY ARCH:

Teeth 14 and 24 were endodontically treated and a post obturation restoration of nanohybrid composite was done. Tooth preparation was done wrt 14 and 24 and clinical height was reduced to 1mm and a chamfer margin was placed. Post space was prepared and an impression of the tooth preparation with the post space was made using addition silicone using a double mix single stage putty wash technique. Metal copings were fabricated using Nickel chromium alloy and cemented. A primary impression of the maxillary arch was made. A primary cast was fabricated with Type II gypsum product over which a custom tray was fabricated using autopolymerising resin. Border moulding was done using Type 1A impression compound (DPI) following which a wash impression was made using Light body condensation silicone (Orangwash, Zhermach) (Fig. 2). Temporary denture bases were fabricated using autopolymerising resin and occlusal rim was fabricated. A facebow record was taken using the occlusal rim and the edentulous bite fork using a earpiece type springbowfacebow (Whipmix, USA) and the maxillary cast was mounted on a semiadjustable articulator.



Fig. 2

MANDIBULAR ARCH:

A diagnostic impression was made with irreversible hydrocolloid (Tropicalgin, Zhermach) and poured with Type III Gypsum Product (Kalstone, KALABHAI). The cast was then surveyed with a Jelenko surveyor and appropriate design was selected.

Lingual plate was chosen as a major connector and an indirect retainer, RPI assembly on 34 and 44 with lattice design joining the denture base to the major connector.

Tooth preparation: Due to lack of favourable undercuts on the buccal aspect of 34 and 43, Porcelain fused to metal crowns with rests and guiding planes were fabricated on the teeth.

A medium body impression (Aquasilmonophase, Dentsply) was made of the mandibular arch and poured in Type IV Gypsum product (Kalrock, KALABHAI). The metal framework was fabricated using cobalt chromium alloy. The metal framework was tried in the patient for retention and stability. The framework was

then placed on the master cast and a tray was fabricated by placing the tray material on the lattice framework on the edentulous portion of the framework. Border moulding with Type 1A impression compound (Dental Products of India) followed by a wash impression with light body condensation silicone (Orangwash, Zhermach) was made of the edentulous area after placement of the framework intra orally. The resultant altered cast now had the dentulous portion in its anatomical form and the edentulous area in its functional form (Fig. 3). The framework was again placed on the altered cast and temporary denture base was fabricated with light cure temporary denture base material (Light tray, IvoclarVivdent , Liechtenstein) and occlusal rims were fabricated.



Fig. 3

A centric jaw relation was recorded using maxillary and mandibular occlusal rims using occlusal wax checkbite method using bite registration paste (Obite, DMG). A protrusive interocclusal record was taken using the same rims with bite registration paste. The mandibular cast was mounted accordingly after zeroing of the articulator using the centric interocclusal record and programmed according to protrusive interocclusal record. Teeth arrangement was done to establish bilaterally balanced occlusion (Fig. 4). Try in was done and approved by the patient. The cast partial denture framework was then acrylised using a conventional compression moulding technique. The maxillary overdenture was processed using injection moulding technique. The dentures were delivered to the patient and recall was done at 24hours, 48 hours, 7 days, 14 days, 30 days, 3 months and 6 months (Fig. 5).



Fig. 4



Fig. 5

III. Discussion

Various methods to preserve the denture supporting alveolar bone have been proposed, executed and documented in the past. Dentures by virtue of applying a compressive force on the supporting alveolar bone leads to its eventual resorption. The condition is accentuated when the complete denture opposes natural dentition. Mandibular anterior teeth opposing a maxillary complete denture gives a distinct mechanical

disadvantage to the operator. The cascade of events that follow lead to resorption of the anterior maxillary ridge with supraeruption of mandibular anterior teeth, resorption of mandibular posterior ridge and hypertrophy of the maxillary tuberosity. These combination of symptoms when occurring together constitutes the Combination Syndrome. The presence of abutment teeth leads to forces being transmitted along their roots which leads to generation of tensional forces in the body of the alveolar bone. The tensional forces have been shown to stimulate bone growth which aids in the anabolic activity of the bone to compensate for the catabolic activity leading to remodelling of the bone. This is also in accordance with Functional Matrix theory which dictates that function of the structures influences the form. The end result is preservation of the alveolar bone. In 1970 Howell¹² reported a clinical study of submerged endodontically treated roots, some of which had been under observation for more than 10 years. Howell's purpose was an attempt to preserve alveolar bone. He claimed there was no apparent loss of bone in this long-term study and appears to be the first to utilize this technique for bone preservation under complete dentures¹³. The residual alveolar ridge is not mechanically equipped to receive compressive forces from the denture base. Therefore it becomes imperative to preserve the teeth and convert the conventional complete dentures into tooth supported overdentures wherever possible.

A cast partial denture with appropriate surveying and subsequent designing will prevent the mandibular fraction of Combination Syndrome. An accurate functional impression will prevent mandibular posterior ridge loss and lingual plate will prevent supraeruption of mandibular anterior teeth in the absence of centric stops which is the case when opposing a complete denture.

IV. Conclusion

Combination syndrome is an enigma to the operator rendering him or her with a distinct mechanical disadvantage and a potential myriad of complications in the future. The bone loss which ensues in the maxillary anterior and mandibular posterior regions is a part of positive feedback mechanism which sets a vicious cycle aggravating the problem. Tooth supported overdenture coupled with a cast partial denture serves as a reasonable, preventive and pragmatic approach to prevent this potential complication. Advantages of this modality include simple design, relatively lesser cost and preservation of remaining teeth. The limitations include case selection with ideal maxillary abutment positions, technique sensitive procedure and patient compliance. The dentures if made without a sound knowledge of component designing may actually contribute to the condition. In summation, a maxillary tooth supported overdenture and a mandibular Kennedy Class I cast partial denture when made using a sound design and an accurate technique may be used to prevent and even counteract the effects of Combination syndrome.

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