MANAGEMENT OF COMPLETELY EDENTULOUS MAXILLARY ARCH OPPOSING NATURAL DENTITION - A CASE REPORT

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Abstract:
The present case report deals with oral rehabilitation of completely edentulous maxillary arch opposing a full complement of natural dentition prosthetically by incorporating metal denture base in place of the conventional Poly Methyl Methacrylate material to combat the masticatory forces from natural dentition and improve the longevity of the prosthetic replacement, at the same time prevent resorption of the underlying residual maxillary ridge.

Keywords: Residual ridge resorption, Metal denture base, Single complete denture, Maxillary complete denture

Introduction:
Several difficulties are encountered in providing a successful, single complete denture treatment. It is the first complete denture for the patient. According to French FA\(^1\) artificial dentures function like mechanical machines in an anatomic environment. In cases where there is clash between esthetic and functional requirements, a choice is to be made by favouring one at the expense of the other or make some amount of compromises in most of the situations. Single complete dentures may be opposed by: (1) natural teeth (2) fixed restorations (3) a removable partial denture or (4) an existing complete denture.\(^2\) This particular patient was given a single maxillary complete denture opposed by natural mandibular teeth.

Patient presentation and Treatment plan:
A 48 year old lady reported to the department of prosthodontics including Crown and Bridge with a chief complaint of completely edentulous maxillary arch. Intra oral examination revealed high frenal attachment in maxilla (figure 1), high vault palate and opposing full complement of natural dentition (figure 2). Mucosa was normal and the opposing natural teeth required minor alterations. Saliva was of medium consistency and patient was cooperative and philosophical according to House\(^3\) classification. The main aim of the treatment plan was to re-establish proper vertical relation based on facial appearance, functional position, mechanical factors and phonetic factors.

Treatment procedure:
Impression of the lower natural teeth was made with an irreversible hydrocolloid impression material (Neocolloid, Zermack clinical, Italy) and an artificial stone diagnostic cast was poured. Preliminary impressions of the edentulous maxilla was made with irreversible hydrocolloid (Neocolloid, Zermack clinical, Italy) and dental stone cast was made for the construction of special tray. The custom tray was prepared with auto polymerising acrylic resin (Dentsply, Gurgaon, India) for making secondary impression. The secondary impression was made using green stick compound for border moulding (DPI Pinnacle Tracing sticks, Bombay, India) and zinc-Oxide Eugenol as impression material. Master cast was made with dental stone type III (Kalabhai, Mumbai, India) and the mould of the same was made with reversible hydrocolloid (Agar Agar) and a refractory cast was poured with ethyl silica bonded investment material. On the refractory cast, the denture base pattern wax was adapted.
and the sprues were attached and invested. The denture base was casted with cobalt chromium metal. The denture base covered the palate and residual ridges with retentive loops extending on the ridges and the posterior palatal seal area for mechanical retention of acrylic resin and teeth to the metal.

The vertical dimension of occlusion was established and Occlusion rim on the maxillary denture base was constructed and contoured for adequate lip support in the anterior region to simulate the vertical and horizontal overlap of the anterior teeth. The anterior region of the occlusion rim had the same thickness as the incisal edges of the anterior teeth to allow for this vertical overlap. Face bow transfer was made followed by recording of jaw relation which was secured in a semi adjustable articulator for teeth arrangement. The artificial teeth were selected and arranged in centric occlusion so that the centric relation records could be verified. The anterior teeth were arranged provisionally for esthetics. The eccentric relation records were made in wax, and the condylar elements of the articulator were adjusted. Posterior teeth were re arranged to satisfy the requirements of balanced occlusion. A preliminary arrangement of the artificial teeth was carried out to reveal the necessary changes to be made on the lower teeth. Adjustments in the artificial teeth were incorporated in preference to making changes to the 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.

A trial of waxed up maxillary compete denture was made followed by acrylization of the Complete denture (figure 3) with heat polymerizing acrylic resin (Trevelon, Dentsply, Gurgaon, India). The interferences in the denture were eliminated and denture given to the patient. Post insertion instructions were given to the patient regarding its maintenance, nutrition and hygiene.

Discussion:
One of the most common clinical situations involving a single denture is that of a complete upper denture and lower natural teeth. When a complete denture is opposed by natural teeth, it will always require some degree of contouring to provide a harmonious occlusion. The reasons for such alteration is mainly due to (1) unfavourable inclination of the occlusal plane (2) malpositioned individual teeth which have assumed positions resulting excessively steep cuspal inclinations, and (3) too wide buccolingual width of the natural teeth. Balance in natural dentitions is mainly seen only in centric occlusion but not in the protractive or lateral excursions. Protrusive and bilateral balance is not necessary for tooth retention as natural teeth resist stress from all directions individually and are thus stable. On the other aspect, artificial dentures merely rest on the surface of the tissues with a film of saliva between the dentures and the mucosa. The teeth and base function as one unit, and force exerted against any tooth in an unfavourable direction dislodges the whole denture. Dentures remain stable only when forces exerted against the teeth are directed favorably to the base support. Balanced occlusion contributes greatly to stability, efficiency, and comfort. Horizontal thrust not only tends to dislodge the dentures, but also tends to destroy the alveolar ridge.

Maxillary denture base may lack retention and encounter tissue changes of the edentulous ridge followed by discomfort, occlusal problems and fracture of denture bases. There might be occlusal stress on the maxillary denture and the underlying edentulous tissue due to forces from teeth and musculature and opposing natural dentition, and the position of the mandibular teeth, which are improperly aligned may also avoid achievement of bilateral balance for stability and lead flexure of the denture bases. The midline fracture in a denture is often a result of flexural fatigue. Areas of stress concentration such as a large fraenal notch act as additional factors, also dentures with a wedged or locked occlusion contribute to concentration of stresses. Though Poly Methyl Metha Acrylate (PMMA) denture bases have good mechanical, biological and esthetic properties, the impact and fatigue strength of PMMA are not entirely satisfactory, thus may fail when there is excessive para functional and/or functional forces.

Cobalt Chromium bases in maxillary denture reduces functional deformation and thrust to the supporting
tissues occurring in the anterior part of maxilla. Besides rigidity and fracture resistance these metal bases have several other added advantages like excellent strength to volume ratio, good adaptation to the supporting tissues, enhanced control of denture plaque, high thermal conductivity, high biocompatibility, very little dimensional changes in time through fluids absorption and does not interfere with phonation due to its decreased bulk which also makes the denture light weight.3

Summary and Conclusion:
In this particular case though the occlusal plane was dictated by the mandibular natural teeth, the plane was not very steep and hence the teeth required very little modification and a balanced maxillary complete denture was given to the patient which had a metal denture base with acrylic teeth. This combination provided great comfort to the patient as the metal denture base was strong to resist the catastrophic failure of (failure results from a final loading cycle that exceeds the mechanical capacity of the remaining sound portion of the material) and flexural fatigue if PMMA was to be used as denture base. The metal denture bases are good thermal conductors and less bulky. There would be no propagation of crack from the deep labial notch as well. The PMMA in the posterior palatal seal and denture teeth would allow for relining of the dentures in the long run.

References: