

Increasing the Durability of Food Platform Area in Complete Denture Prosthesis: A Clinical Case Report

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ABSTRACT

Many clinical situations arise when patients wearing complete denture prosthesis are faced with rapid occlusal changes of food platform area. The frequent wear of occlusal surface alters vertical dimensions of occlusion, which in turn leads to rapid changes in underlying tissues. Due to increased consumption of chewable tobacco and related products, prosthodontist are faced with an ever growing demand of providing durable occlusal surfaces in complete denture patients. This has seen a commercial rise of prefabricated metal occlusal surfaces which are difficult to alter to customize occlusal surfaces. This article in the form of a clinical case report describes a simple method of fabricating customized occlusal surfaces from base metal alloys that has the advantage of being individualized besides being economical. The complete denture fabricated with modified posterior occlusion yielded satisfactory results for the patient. After one year and six months of use there was no evidence of occlusal wear in the existing dentures. The underlying residual alveolar ridges were also in good condition.

KEYWORDS: Occlusion, Base Metal Alloy, Complete Denture, Wear

INTRODUCTION

Maintaining the food platform area over a period of 4-5 years in dental prosthesis with resin posterior teeth is difficult to achieve, especially when patients have para-functional habits like clenching and consume high abrasive food products. The advantage of resin teeth when esthetics are concerned are not only related to its color properties, but also versatile incorporation of sex, personality and age factor within a complete or a partial denture, making resin teeth a formidable material to be rejected. However the constant wear that takes place in the resin teeth alters the food platform area slowly but consistently. Due to the alteration in the food platform area the overall efficiency of mastication with denture prosthesis decreases. With the passage of time the sharpness of the cuspal

tips is decreased and the denture can no longer penetrate into a morsel of food. Decreased efficiency of cuspal tips is partly compensated by increase in bite force. While doing so the additional occlusal forces are being transmitted to the residual alveolar ridge. These forces bring about a rapid alteration in the denture foundation area. With time the denture becomes more unstable on the altered denture foundation area. A vicious circle is initiated which ultimately results in rapid ridge resorption. As soon as the cuspal tips start to wear, the efficiency of the denture decreases in many ways. The ability of the denture teeth to grip and hold the food at one place improves not only the efficiency of mastication but also decreases the energy required to carry such processes. Proper cuspal

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anatomy of artificial teeth therefore has a direct bearing on the patient's compliance in the long run.

The entire occlusal table of natural teeth is not a flat surface, but it can be rather compared to a corrugated surface. The corrugation of food platform area is an important feature of masticatory designing. For mastication to be effective all its components like biting, piercing, cutting, tearing, shearing, incising, grinding, accumulating, assimilation and integrating depend upon the anatomy of the food platform area. Resin artificial teeth due to the inherent disadvantage of wear cannot maintain the food platform area for a long time unless modified using different materials like gold¹⁻³ and porcelain.⁴⁻⁷ Because of the economic viability of gold alloys in present times a method of modifying the food platform area has been attempted by using base metal alloy as a replacement for the occlusal surface of the resin teeth. Factors other than the material used for artificial replacement have also been studied.⁸⁻¹¹

This clinical case report is of a male patient whose chief concern over the last few years was his frequent need for the fabrication of complete dentures.

CASE REPORT

A male patient, aged 62 years plus visited Department of Prosthodontics, Subharti University with chief complaint of inability to masticate with old dentures. Medical history was noncontributory and dental history revealed that the patient has changed 4-5 dentures in the past 6 years. Other significant observations were the presence of habit of chewing tobacco since last 35 years. Examination of the patient did not reveal any negative findings.

The existing denture that the patient was wearing was fabricated approximately one year back and the posterior teeth of the complete denture were severely worn off and stained (**Fig. 1**). The patient also revealed that he has had many dentures made in the last 5 years and every denture faced the same problem. Upon investigation, it was found out that the tobacco containing product that the patient was used to, contains high content of abrasives. The

treatment option that was considered most feasible and advantageous to the patient was to construct complete denture prosthesis with posterior occlusal surfaces made in base metal alloy.



Figure 1: Patients old complete denture prosthesis showing worn occlusal surfaces

Treatment procedure: Treatment was started after recording a thorough case history from which any factor that could lead to rapid resorption of residual alveolar ridges at a later date were identified. Primary impressions were made using impression compound (Pinnacle, DPI). A special tray was fabricated based on the selective pressure theory of impression making. Border molding, final impressions were made with green stick compound (Pinnacle, DPI) and zinc oxide eugenol impression paste (DPI) respectively. Maxillary cast was mounted using a face bow onto a Hanau semi adjustable articulator (Waterpik, Ft Collins, CO, USA). The centric relation was confirmed with a Gothic arch tracer. The articulator was then programmed accordingly after taking a protrusive record. Anterior teeth were arranged and then tried in the patient's mouth. After approval by the patient and his close associate the procedure for customizing posterior teeth was started. Posterior teeth from the same teeth set were taken and attached to a plastic tab. An impression of the entire tab along with artificial resin teeth was made using a combination of putty and light body addition, silicon elastomer (Reprosil, Dentsply/Caulk; Milford, DE, USA). The tab was removed and mold was thus formed. Hard crown wax (Harward, Germany) was then poured into the putty mold up to a level of at least 1.5 mm and while the wax was still soft, mini bell pin heads were attached to each individual wax pattern. All the wax patterns were then sprued individually first and then later sprued together in

unison (**Fig 2**). Investing and casting of the wax patterns were done and then each individual casting was verified for the accuracy of fit in the putty mold from which the wax patterns were originally fabricated. All the castings were then placed in the occlusal index within the putty mold. Over this tooth colored self-cure acrylic resin was then added whose shade was the same as that of the anterior teeth.



Figure 2: Occlusal surfaces in wax sprued together

After processing of the self-cure acrylic to the occlusal metal the posterior teeth were ready for final arrangement. The teeth were arranged in balanced occlusion on the articulator. Posterior trial was done and the denture was then processed in the conventional way. Laboratory and clinical remount was done to eliminate the errors due to denture processing (**Fig 3 and 4**). The occlusion was evaluated for both centric and eccentric interferences. At the time of denture insertion the patient was instructed regarding the maintenance and care of dentures in general. Some of the extra instructions were given regarding the care of occlusal metal and frequent follow up. The patient was extremely pleased with the denture rehabilitation (**Fig 5**).



Figure 3: Finished complete denture prosthesis with metal occlusal surfaces



Figure 4: Verification of centric and eccentric contacts in patients mouth



Figure 5: Complete denture after one and a half year of use

DISCUSSION

Flavored tobacco use and addiction are widespread in north and east part of India. Even elders who are above 65 years old consume the same due to the product being easily available and less economical. The main component of this pan masala is Areca nut which in turn is derived from a palm tree, believed to have originated in either Malaysia or the Philippines.^{12,13}

Intoxication and addiction associated with areca chewing is due to its chemical constituents like arecaidine and arecoline (alkaloid in nature). In addition, it also contains condensed tannins in the form of arecatannins (procyanidins) that have been found to have extremely strong relation to oral cancer.¹⁵⁻¹⁷ Among the various factors studied in denture mastication, maintaining a food platform area has always provoked interest among many disciplines of dentistry. One of the reasons for that, being its unpredictable and ever changing status.¹⁸ Fabrication of gold occlusal is expensive and has its technical limitations therefore use of base metal

alloy seems logical and inexpensive. Care should be taken when selecting such a case. It is important that the patient's systemic status is not compromised to the extent where rapid resorption of alveolar bone can take place. Other important factors in case selection are adequate inter-arch distance, normal skeletal relationship, good mental attitude and economic viability for the patient.

Necessary modifications in the treatment plan included decreasing vertical dimensions of occlusion. As the opposing metal comes into contact there will be sound that can be annoying. This sound can be produced during speaking as well as during mastication of food. To minimize the chances of opposing teeth coming into contact, the vertical dimensions were kept at a lower side so that even when the mandible is brought close to the maxilla there exists some space between the two. The same decreased vertical dimensions also would help to decrease the stresses transmitted to the residual alveolar ridge.

One important non-negotiable aspect of complete denture prosthesis with occlusal metal is balancing of occlusion for preservation of residual alveolar ridge and stability. There are two different approaches towards achieving this goal. One approach is to first balance the occlusion on the wax patterns and then cast them and the other approach first completes the casting of occlusal metal and then balances the teeth in occlusion. The second approach is less technique sensitive.

Balancing is achieved mainly by adjusting the alignment of various teeth, however minor interferences can be corrected through occlusal equilibration. The errors in occlusion due to processing and storage in water were corrected by remount procedures. Difficulties involved during balancing the occlusion includes difficulty to trim metal, time consuming, loss of polish on metal and distortion because of underlying wax. Patients who receive such dentures should follow strictly follow up protocol. Especially important is the long term frequent check up on the underlying residual alveolar ridge and the overlying mucosa.

SUMMARY AND CONCLUSION

Complete denture prosthesis with posterior occlusal surface in the base metal alloy is an excellent choice in patients whose dentures undergo rapid and frequent wear. The patient was particularly happy because of the fact that even after more than a year of denture usage, he no longer still has to put extra effort while masticating. This concludes that the food platform area was as good as original after long term use.

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