

Cast Metal Occlusals: A Vital Tool for Single Complete Denture: A Case Report

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ABSTRACT

Background: Occlusal surface of the acrylic teeth of a single complete denture in opposition to natural dentition wears out with its use for a longer period of time, which may lead to decrease in the chewing efficiency, loss of vertical dimension of occlusion, change in centric occlusion, denture instability, temporomandibular joint disturbances etc. Re-fabrication of new denture set over a period of time, inclusion of highly cross linked acrylic teeth, amalgam or metal inserts on occlusal surface, use of composite, gold or metal occlusal surface, etc. are some of the treatment options available to counteract that problem. Several articles have described methods to construct gold and metal occlusal surfaces, some of which are time-consuming, expensive and require many cumbersome steps. This clinical case describes the sequence of steps for construction of metal occlusal surfaces on single complete denture using the lost wax technique.

Keywords: Occlusal wear, Dental Occlusion, Metal Plating, Acrylic resin.

INTRODUCTION

The use of acrylic resin teeth in opposition to natural teeth has been criticized because of rapid occlusal wear leading to changes in vertical dimension of occlusion and centric occlusion, temporomandibular disturbances, loss in chewing efficiency and extrusion of opposing teeth⁽¹⁾. When the prosthodontist is concerned with maintaining an equally stabilized occlusion for the natural dentition, restored teeth, and teeth on the removable partial denture, it is important to choose a material for occlusal surfaces that is compatible with the opposing dentition. Acrylic resin denture teeth wear at an accelerated rate when opposed by natural teeth or porcelain or metal

restorations.

Metal occlusal surfaces have clinically demonstrated compatibility with opposing natural teeth. It is indicated a) when constructing a complete denture to oppose a reconstructed dental arch made up of metal occlusal surfaces, b) when constructing complete or removable partial dentures with a functionally generated path concept where considerable modification of the denture teeth is necessary to place the occlusal surfaces and the core in harmony, c) when special wax carving techniques are completed on a fully adjustable articulator for the development of a functional occlusion, and d) when reinforcing or strengthening of the denture or overdenture is required¹.

Several methods¹⁻⁷ have been advised in the dental literature to construct metal occlusal surfaces on the acrylic resin teeth to prevent wear



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and increase chewing efficiency. This article presents quick, simple and relatively inexpensive procedure for construction of metal occlusal surfaces on complete dentures.

CASE REPORT

A 52 year old male patient came to the Department of Prosthodontics, Karnavati School of Dentistry, Uvarsad, Gandhinagar with the chief complaint of worn out occlusal surfaces of lower single complete denture teeth and difficulty in mastication, due to use of current denture over a period of time. Also, patient wanted new denture with an effective chewing efficiency at possible lower cost. Oral manifestations showed severe wear of occlusal surface of prosthetic teeth of lower single complete denture with atrophied mandibular ridge beneath, opposing full arch fixed partial denture and showing normal Class I orthognathic relation. History revealed that patient was wearing denture since 2 years and in that duration, he got his denture made twice due to frequent attrition and consequent denture instability.

The clinical examination and history of the patient concluded that the frequent attrition of the single complete denture could be due to self-induced excessive chewing and opposition of acrylic resin teeth to the porcelain of the upper full arch fixed partial denture. The patient was presented with different treatment options such as 1) denture or implant supported overdenture with use of porcelain teeth, 2) implant supported fixed prosthesis, 3) denture or implant overdenture with metal occlusal surface. The patient was not keen on aesthetics of the posterior denture teeth since he wanted the denture with as low cost as possible and had no time constraints. Hence, the lower single complete denture with cast metal occlusals was planned out, taking into consideration all the patient's concerns.

PROCEDURE

The preliminary impressions were made of the upper and lower arch, followed by final impression of the lower atrophied ridge using Admixed technique⁸. Then, the maxillomandibular relationship was recorded of the lower edentulous arch to the upper full fixed partial denture in the conventional manner. Face-bow transfer records

were taken and these, along with maxillomandibular relationship, were transferred to the semi-adjustable articulator.

Mounting of upper and lower casts were done on the semi-adjustable articulator. Following mounting, teeth arrangement was done using cross-linked acrylic teeth (Acryrock, Ruthinium Dental Products, S.p.a, Italy) and try-in was carried out. After try-in, the occlusal surface of lower trial denture was reduced with the help of carbide trimming bur so as to create 2-4 mm of interocclusal clearance. The reduction of teeth should be done more on the central portion than the cusps in order to gain mechanical retention of the castings. The articulator was moved in protrusive and lateral positions in order to check the adequacy of interocclusal space.

Then the addition of inlay wax was done on the reduced denture teeth and the occlusion was contoured for individual teeth (Figure 1). Secondary anatomic details were carved and occlusion was again checked in centric, protrusive and lateral movements on the articulator (Figure 2 and 3). The wax patterns for the cast metal were contoured following Functionally Generated Path Technique (Hardy chew-in technique)⁹ in order to adjust the lower single complete denture to the bilaterally balanced occlusion. After making necessary occlusal adjustments on articulator, putty indices were made of the posterior teeth with addition silicone impression material (Figure 4). Index was reduced to 2 mm occlusogingivally replicating the amount of thickness of metal castings needed (Figure 5). The inlay wax was then flown in the putty index in order to produce the wax patterns for the casting procedure. A 14-gauge half-round casting wax was attached on the inferior surface of the wax patterns in order to give rigidity to the castings. Small wax beads were also added to it, so as to provide mechanical retention with the acrylic resin (Figure 6).

Sprue formers were attached to the internal surface of the wax patterns and these were carefully removed from the putty indices (Figure 7). The patterns were invested with phosphate bonded investment and the metal casting process was completed using a Ni-Cr alloy. After divesting the castings, the metal occlusals were recovered; and



Fig 1: Wax patterns over reduced occlusal surface.



Fig 4: Putty indices of occlusal surfaces.



Fig 2: Occlusal adjustment (left side)

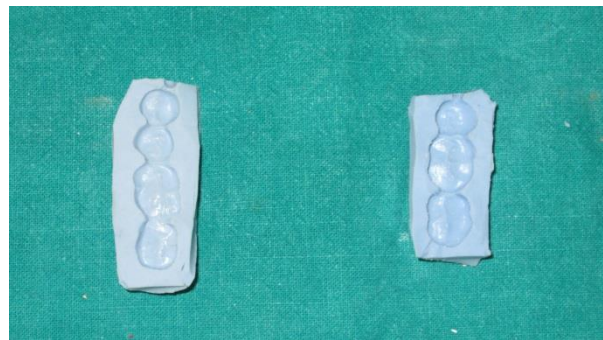


Fig 5: Indices reduced to 2 mm occlusogingivally



Fig 3: Occlusal adjustment (left and right sides)



Fig 6: Wax patterns for casting.

finishing and polishing procedures were carried out (Figure 8). The inlay wax was removed from posterior quadrant and metal occlusal units were placed in their respective positions. Further reduction of the resin teeth was done to accommodate the 14-gauge half-round retentive strip. After the restoration of the vertical dimension



Fig 7: Spruing of patterns.



Fig 8: Cast metal occlusals.



Fig 12: Showing final denture.



Fig 9: Cementation of castings and occlusal adjustment.



Fig 13: Showing Denture Insertion.



Fig 10: Cementation of castings and occlusal adjustment



Fig 11: Occlusal units after heat cure acrylic processing.

of occlusion, the castings were sealed to the resin teeth with ivory wax (Figure 9 and 10). The occlusion was again checked for centric, protrusive and lateral movements on the articulator.

The denture teeth along with metal castings were removed from the articulator along with addition of wax to modify the buccal and lingual resin contours. Addition of wax facilitated removal of the resin teeth after the boilout. The flasking of the teeth with metal occlusal surfaces was done in the usual manner. The buccal surfaces of the teeth were depressed towards the occlusal surface during flasking, which facilitated positive retention of the castings in the mold and permitted easier removal of the resin teeth after the boilout. After the completion of the boilout procedure, the resin denture teeth were removed from the mold facilitated by space created by wax removal. Then, the mold was flushed with clean boiling water, after which the tin foil substitute was painted. Heat cure acrylic resin was selected according to the matched shade of the upper teeth, mixed according to manufacturer's directions and packed into the mold cavity. The curing process was carried out and the occlusal units were then removed and polished

(Figure 11). The metal occlusal units were placed on the record bases in articulator and were waxed for further try-in procedure. After try-in procedure, the trial denture was processed in the usual manner; and finishing and polishing were done (Figure 12). The lower complete denture was finally delivered to the patient. During insertion, the denture was checked for proper border extensions, proper adaptation and occlusion (Figure 13).

DISCUSSION

The use of standard technique with required indicated clinical and laboratory alterations may contribute to greater clinical success. The technique presented has been proven clinically advantageous. Metal or gold occlusal surfaces have reported to cause minimal wear to the opposing occlusal materials and increased chewing efficiency¹⁰. Metal occlusal surface has advantages of inherent physical property of metal, the adaptability of the occlusal surface and psychological advantage. This technique should be considered in the cases where the prosthetic occlusion is in contact with an enamel, composite resin, porcelain or combination of such materials.

The retention of acrylic resin teeth with the metal casting is achieved by metal beads provided on the internal surface of castings. Therefore, it eliminates the need for luting cements or bonding agent, which, in the authors' experience, have proven unsuccessful either in retaining the castings or maintaining esthetics due to discolouration and precision occlusion¹¹. The esthetic acceptability is controlled by the amount of reduction to the prepared teeth and by avoiding an unsightly layer of discolored luting agent on facial surfaces. Instead of individual units, single joint unit is fabricated to improve the retention, and provide ease of finishing and polishing of the casting. This technique allows for precisely designed occlusal relationships beyond those possible with stock denture teeth.

Also, since the patient had been presented with an atrophied mandibular ridge, the increased weight of the prosthesis facilitated the property of stability of the lower single complete denture. The main disadvantage of using metal occlusal surface is the display of metal, but the patient was not concerned about the metal display since he was

more concerned with the chewing efficiency of the denture.

Some authors advocate the use of light cure composite resin to duplicate the occlusal surface. Although the composite resin wears on occlusal surface, but the rate of wear is less than that of the most acrylic resin artificial teeth¹². Alternative to metal occlusal surface, porcelain teeth can be used but they contribute to maximum stress, are brittle, expensive and show mechanical locking with denture base.

In alternate treatment options, (a) implants could not be placed because of high cost, needed surgical intervention and also increased chair side time; (b) crossed linked acrylic teeth could not be used, since they also tend to wear off when opposed by metal occlusal contacts.

SUMMARY AND CONCLUSION

To satisfy unique clinical requirements, it is sometimes appropriate to employ denture teeth having metal occlusal surfaces. An effective technique is presented which permits denture teeth to be constructed with custom made metal occlusal surfaces. Acrylic resin is attached to the metal occlusal surfaces via direct resin processing to the internal metal beads.

The present approach towards the patient's diverse problem has served as a better treatment modality. The approach seemed to be best suited for the patients not too keen on posterior aesthetics. Patient's opinion is being taken monthly about the denture use. Patient seemed to be happy and satisfied with the functional efficiency of the denture with no need for refabrication.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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