

## Case Report

# A new technique to locate the external finish line in metal base maxillary denture: A clinical report

**Y. V. Omprakash, R. B. Hallikerimath, S. A. Gangadhar**

Department of Prosthodontics, K.L.E.S's Institute of Dental Sciences and Research Centre, Belgaum, Karnataka, India

### For correspondence

Dr. Y. V. Omprakash, No. 21/1, 9<sup>th</sup> Main, 5<sup>th</sup> Block, Jayalaxmipuram, Mysore - 570 012, India. E-mail: [visitomprakash@yahoo.com](mailto:visitomprakash@yahoo.com)

Polymers are the dominant materials for fabrication of denture bases because of their acceptable physical, biologic, and esthetic characteristics. Metal alloys are advisable in those situations in which the resin denture bases fail due to several reasons such as poor adaptation, inability to tolerate excessive masticatory forces, and so on. In metal denture base positioning of resin-metal junction (external finish line) is very much important so as to minimize weight, maximize strength, and ensure proper palatal contours. The objective information available regarding the exact location of external finish line in a metal base denture is not sufficient. In the past, placement of this external finish line was somewhat arbitrary. Improper placement of resin-metal finish lines may adversely affect phonetics.

This clinical report describes a new technique to locate external finish line precisely in metal base maxillary denture. This technique is easy to do, cost effective and reduces post-insertion visits by the patient.

**Key words:** External finish line, metal base dentures, resin metal junction

## INTRODUCTION

One of the driving forces in the evolution from the vulcanized rubber to the present day resins is the desire for an improvement in appearance and function. Since its introduction by Wright in 1937, polymethyl methacrylate resins have been successfully used for various applications in dentistry for many years.<sup>[1]</sup> They present acceptable physical, biologic, and esthetic characteristics at moderate expenses. However, there are instances in which they fail, for example, poor adaptation, inability to tolerate excessive masticatory forces, etc.

In those conditions, metal alloys can be used to enhance the physical properties of the complete dentures.<sup>[2,3]</sup> When a metal base maxillary denture is given to patient careful positioning of resin-metal junction is most important so as to minimize weight, maximize strength, and ensure proper palatal contours. Failure to achieve unobtrusive palatal contours may produce noticeable changes in phonation.<sup>[4-6]</sup> Hansen<sup>[7]</sup> discussed the important phonetic considerations and described a technique to estimate the location of resin-metal junction.

This article describes a new procedure to locate the external finish line precisely in a metal base maxillary denture.

## PROCEDURE

The preliminary steps were similar to that of conventional resin denture base techniques. Impressions and casts were obtained in the usual manner. Once the record block and occlusal rims were fabricated, face bow and jaw relation records were used to mount maxillary and mandibular casts. Teeth arrangement was completed based on the anatomic, functional, and esthetic guidelines [Figure 1].

At the try-in stage, the trial dentures were checked in the patient's mouth for proper esthetics. Palatal contours were adjusted till the desired phonetics was achieved for the patient. These contours were maintained in the final denture with the help of polypropylene matrix, made at the later stage.

Maxillary trial-denture was transferred to the edentulous master cast. Palatal segment of the base plate was removed to the junction of base plate and waxed up palatal contours near the teeth. Edges were beveled, recontoured, and finally sealed by using base plate wax [Figure 2].

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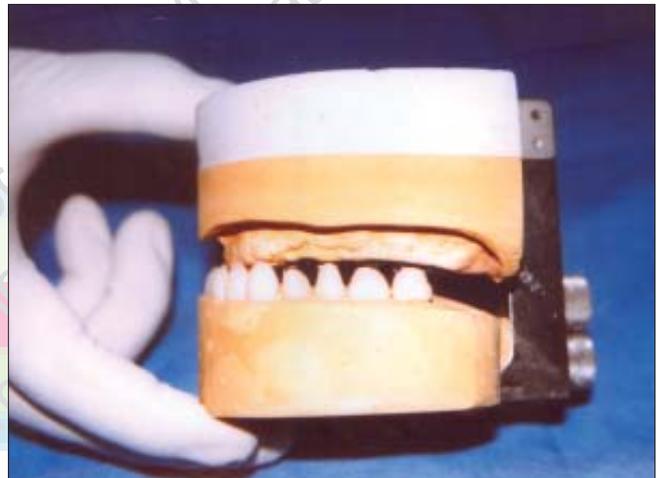
**Figure 1:** Trial denture arrangement on associated master cast



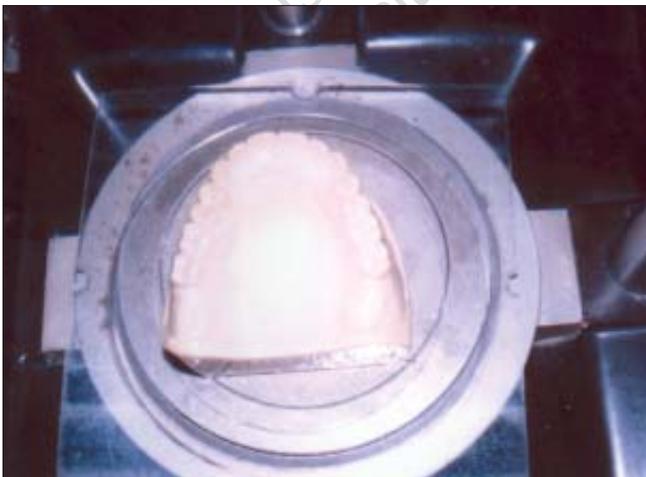
**Figure 4:** Stone index of trial denture arrangement made using Fixator



**Figure 2:** Trial denture arrangement displaying corrected palatal contours



**Figure 5:** Properly trimmed matrix positioned on master cast



**Figure 3:** Clear polypropylene matrix heat pressed on duplicate cast



**Figure 6:** Stone index with wax residue eliminated

The master cast with the tooth arrangement was then duplicated using reversible hydrocolloid. A clear, 1 mm thick polypropylene matrix was heat pressed on this duplicated cast using Biostar [Figure 3]. The matrix was trimmed at the junction of the land area and the vertical portion of the cast base. This matrix was later used as an aid to determine proper position and angulation of external finish line.

It was necessary to record the relationships of teeth to the tissue surfaces of the master cast at that stage. Making the stone index of the tooth arrangement using Verticator, Fixator or Reline jig, can do it. In this case, Fixator (SCHEU-DENTAL) was used [Figure 4].

The tooth arrangement was carefully removed from the maxillary master cast and wax residue was eliminated [Figure 5]. Polypropylene matrix was positioned on the master cast [Figure 6] and incrementally cut until 2.5 mm of space exists between the internal surface of the matrix and the palatal surface of the master cast [Figure 7]. This was done to get adequate space for the 24-gauge metal plate and to contour the resin metal finish line properly.

The edentulous master cast was then duplicated using reversible hydrocolloid and Heravest (Bego) refractory material. The polypropylene matrix was checked for its accurate fit on the refractory cast. 24-gauge wax pattern was adapted the palatal region of the cast and laterally loop pattern was used. The matrix was repositioned on the refractory cast and external finish lines were waxed to completion [Figure 8]. Internal surfaces of the matrix were used at this stage to indicate proper position and angulation of finish lines. It allows proper palatal contours developed during the previous stages to be accurately reproduced in the final denture.

A variety of metal and metal alloys, such as cobalt-chromium or nickel-chromium, aluminium, gold, titanium can be used. In this case, cobalt-chromium was used (Wironit L, Bego) because of its better physical properties, cost, and easy availability.

The wax-up cast was invested with Heravest refractory investment and it was cast with Wironit L-alloy, Bego. The casting was recovered, finished, polished, and fitted to the master cast [Figure 9]. The finished metal framework was positioned on the edentulous master cast in the Fixator [Figure 10]. Wax contouring was completed.

The processing was done in the usual manner. Once the dewaxing was completed, the metal plate was recovered and thoroughly cleaned to eliminate residual base-plate wax. It was then fixed to the master cast with small amount of cyanoacrylate cement to prevent displacement of the metal framework at the packing stage.

The processed denture was then recovered, finished, and polished. It was finally inserted in the patient, after the laboratory and clinical remounting procedures

were accomplished [Figure 11].

## DISCUSSION

Earlier 95% of the denture bases were being made by poly methyl methacrylate. Metal bases for complete dentures are indicated when a high degree of processing change is expected or additional strength is needed.<sup>[8]</sup> Processing change is greatest with a deep palatal vault, prominent residual ridge, or in large or excessively thick dentures. Increased strength is necessary in case of over dentures, shallow, flat, palates or in patients with compromised neuromuscular co-ordination who may drop their dentures, e.g., in Parkinson's disease.

Metal base dentures display excellent strength-to-volume ratios and can be cast in thin sheets maintaining rigidity and fracture resistance. They decrease interference with phonation,<sup>[4]</sup> exhibit high thermal conductivity, etc.<sup>[9]</sup> Despite of many advantages, metal denture bases do not enjoy widespread use in clinical practice unless proper palatal contours are obtained.

To re-establish physiologic contours that are consistent with optimal phonetics, one must consider bone resorption pattern in maxilla [Figure 12].<sup>[10]</sup> Studies have shown that most resorption occurs at the facial and crestal regions of the edentulous maxilla and, little or no resorption occurs on the palatal surface of the maxilla. So maintaining this palatal contour of the patient in the metal base denture is most important if one has to allow the patient to obtain all the benefits of metal base in the final denture.

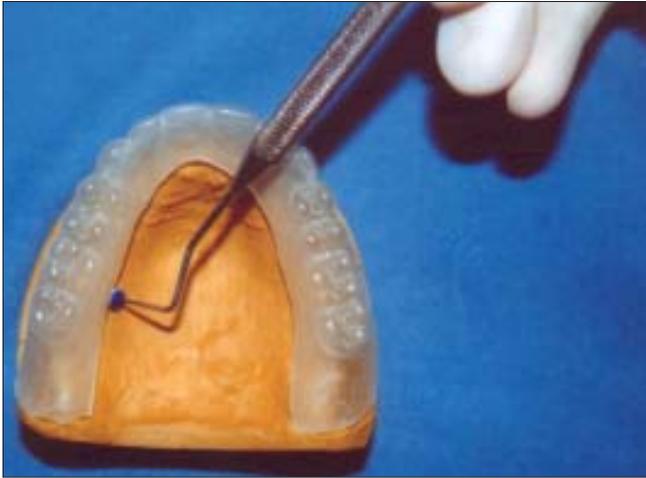
External finish line is the junction of resin to metal in the polished surface of the denture [Figure 13]. Proper positioning and angulation of external finish line is a must to avoid any noticeable changes in phonetics. Placing resin-metal junction too far laterally will result in an under contoured alveolar ridge and inefficient contact with the lateral border of the tongue.<sup>[11]</sup> Placing it too far medially will produce 'crowding of the tongue.'

Use of this technique may require additional laboratory time but it is easy, cost-effective, and requires less number of post-insertion visits by the patient. It does not require any expensive equipment other than the vacuum former. This technique can be used to achieve proper palatal contour for a particular patient rather than the same palatal contour decided arbitrarily for all the patients.

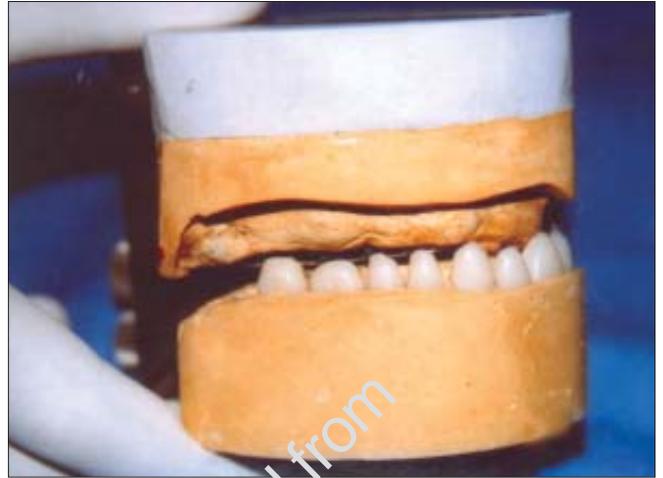
## CONCLUSION

By using metal base denture, patient benefits by having comfortable, better fitting, and stronger prosthesis and the dentist benefits by reducing the post-placement appointment.

Use of this technique to locate the external finish line precisely results in a prosthesis with surfaces that re-



**Figure 7:** Adjusting the matrix to provide 2.5 mm space



**Figure 10:** Metal framework repositioned with the stone matrix in the Fixator



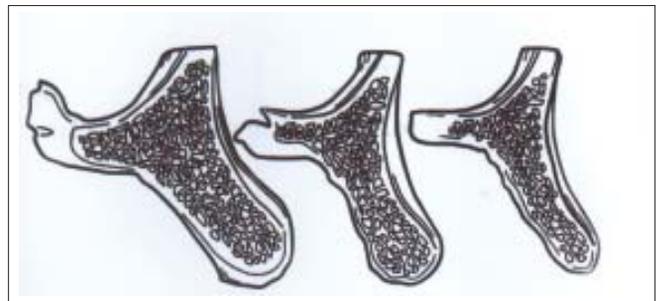
**Figure 8:** Matrix used to establish proper position and contour of finish line



**Figure 11:** Finished maxillary complete denture displaying appropriate palatal contours

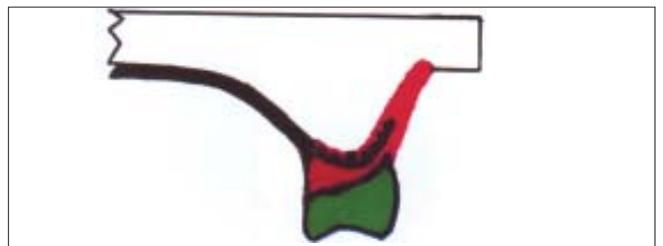


**Figure 9:** Completed metal framework



**Figure 12:** Resorption pattern seen in maxilla

establish proper anatomic, physiologic, and phonetic contours. Thus, it renders the patient all the benefits of metal base in the final denture.



**Figure 13:** External finish line in a metal denture base (cross section)

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