

## Review Article

# Esthetic Metal Reinforcement for Fabrication of a Complete Maxillary Denture

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**Abstract**

Denture base fractures are a common problem in diary clinics. This article describes a simple technique to make cast metal reinforcement with Co-Cr dental alloy to be incorporated inner denture base maintaining the esthetic. This technique represents a rehabilitation option to help clinicians saving time for treatment that involves recurrent fractures of denture base without spend of time with recurrent appointments. This technique decreases patient dissatisfaction providing better resistance and stability for complete dentures.

**Keywords**

- Dental base fracture
- Dentures
- Metal cast reinforcement
- Denture fabrication

**INTRODUCTION**

Poly methyl methacrylate (PMMA) is the most common material for fabrication of complete denture base [1]. It has favorable characteristics as easily handling, esthetics, low cost, low solubility and thermal conductivity [2]. However, its lifetime expectancy is limited [3,4] cause some material properties such as high thermal expansion coefficient, low resistance and fatigue, low elasticity modulus, low traction resistance and low flexibility [5,6,7] could lead to some mechanical troubles.

These characteristics could generate clinical problems in relation to increase the possibility of complete denture base fractures fabricated only with PMMA [8,9,10]. For upper complete dentures, the most common place for fractures is the middle line in the pre-maxillary area [7,8,11]. Fractures are attributed to disharmonious occlusion, impact by recurrent falls and/or excessive occlusal load [12,13].

Literature describes various methods to avoid or diminish the fractures occurrence [14,15], as chemical changes of acrylic resin [16,17], internal inserting of metallic structures [18-21], intrinsic embedding of fiber glass or fiber carbon and polyethylene [22-24] or internal inserting of stainless steel wire [22,25,26]. All techniques aim to improve dimensional stability [12] and, consequently, retention [8] and fracture resistance [14,15].

Usually, fractures associated to complete dentures are common in the diary clinics and require repairs that make the repaired area more suitable to the recurrent fractures, since less resistance area is attributed to it [3,9]. To solve this problem, additional appointments is required generating discomfort and disappointment for both the patient and the dentist [12]. Thus, this article aimed to describe a simple and effective technique

to fabricate complete dentures incorporating internal metal cast reinforcement of Co-Cr alloy that provides higher fracture resistance without aesthetic impairment or increasing the time spend in regular appointments.

**TECHNIQUE**

1. Realize conventional procedures to fabricate complete dentures [12] until deflasking and cleaning the waxed artificial teeth.
2. Make centralized perforations on internal surface of each artificial teeth about 3mm depth at least up to first molars using rounded bur #8 or similar mounted in electrical prosthetic motor to provide space for seating and locking of metal cast structure that will be fabricated after (Figure 1).
3. Realize wax relief with wax pink #7 or similar (Wilson, Polidental, São Paulo/Brasil) in the palatal and inter proximal areas near the artificial teeth about 1-2mm of thickness to ensure correct positioning of the metal cast structure that will be fabricated without contact with the external surface of the complete denture after flask pressing of acrylic thermo polymerizable resin (Clássico, São Paulo/Brasil) (Figure 1).
4. Make wax pattern of the cast metal reinforcement (Rainbow, São Paulo/Brasil) using the perforation spaces to fix the structure in each artificial tooth (Figure 2).
5. Make casting of the metallic structure with Co-Cr dental alloy (Talmex, Fit Flex, Paraná/Brasil) and finish until the polishing (Figure 3).



**Figure 1** Central perforations of the internal surface in each artificial tooth and wax relief about 1-2 mm of thickness ready for waxing of structure.



**Figure 2** Wax of structure filling the rounded perforations and perfectly adapted inner them and maintaining virtual spacing from palatal surface due wax relief.

6. Make sure the cast metal reinforcement is seating correctly and adapted in the perforations without deformations. Then, apply covering of opacifier of ceramic (Noritake EX3, Kota, São Paulo/Brasil) or similar compatible with the dental alloy used to not allow structure visualization after final processing of the denture (Figure 4). The color of the opacifier may be pink or tooth color opaque.
7. Make conventional procedures of characterization of the denture base (STG VipiCril, VIPI, São Paulo/Brasil) intended to do gingival base most similar possible to the natural gingival tissues (Figure 5).
8. Realize the final processing with acrylic thermo polymerizable resin (Clássico, São Paulo/Brasil) including colorless palate (Figure 6A- Figure 6C) or pink. All metal structure must be into the acrylic resin.
9. Install the complete denture into the mouth of the patient (Figure 7).

## DICUSSION

Studies suggest that fabrication of internal metallic reinforcement of complete dentures could decrease fractures incidence [17,12], mainly in the middle line of anterior area of the upper complete denture. The fracture incidence of 29% in complete dentures that had no reinforcement has been shown in the literature [8]. In relation to life time expectancy, 28% needed some repair in the first year of follow-up [3].

Balch et al., 2013 classified as a disadvantage the use of any reinforcement for complete denture since this procedure increase cost of treatment. On the other hand, use of reinforcement for complete denture fabrication could prevent or decrease fractures

of denture base [7,14,15] improving its denture resistance. Moreover, the metal reinforcement can be used as additional benefit for complete dentures since increase of lifetime expectancy is expected beyond decrease of problems and disappointment of the patient that lead to several appointments to solve recurrent fracture problems. It is important to highlight that this technique increase approximately 10% of cost treatment. This value considering the effect of reinforcement could be considered an advantage of its usage.

It is very important to choose a suitable location for metallic reinforcement [27] because it is possible to affect the resistance of acrylic resin [25] and esthetic [17]. The technique described provides as advantage the increase of resistance from the structure connected among the artificial teeth [7]. Use of opacifier may avoid negative light effects that could impair the denture esthetic by transparence of metallic structure after denture processing [28].

Several studies analyzed influence of reinforcements in bases of complete dentures as fiber glass, polyethylene, stainless steel wire and other metallic alloys [8,10,23,25,15,29]. Takahashi et al., 2013 reported that reinforcement of cast metallic structure of Co-Cr alloy decreased the stress area when compared to Co-Cr wire or fiber glass reinforcements. Thus, this technique is supported by their results.



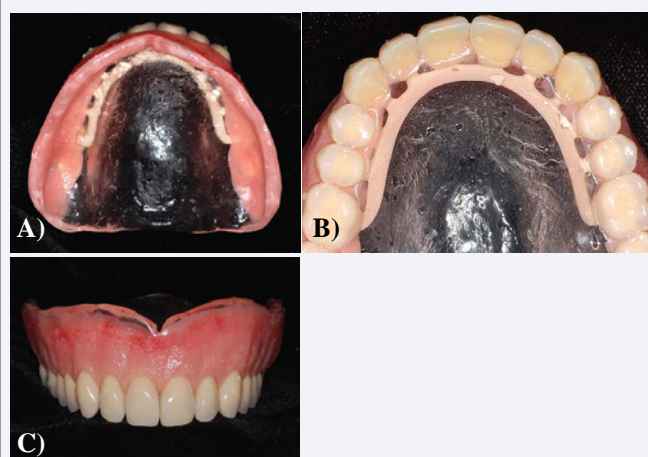
**Figure 3** Cast metal reinforcement seated and adapted correctly in the rounded perforations of the artificial teeth.



**Figure 4** Coverage of the cast metal reinforcement with ceramic opaque agent.



**Figure 5** Gingival characterization procedure of the denture bases.



**Figure 6** A: Internal view of denture showing metal cast reinforcement in position. B: Occlusal view of denture showing metal cast reinforcement in position. C: Frontal view of the finished denture. Observe that no view of the structure is visualized by transparency of the acrylic resin.



**Figure 7** Complete denture into the mouth of the patient.

The technique described is indicated to offer better stress distribution in complete dentures using easily handling technique by prosthetic laboratories with no increase of time for clinical appointments of the dentist. However, the dentist is responsible also by treatment success since the lifetime expectancy of this treatment is directly related to some basic cares in complete denture fabrication as efficient adaptation of the denture bases and occlusal adjust. These cares could decrease the disharmonious occlusion and decrease the occlusal load levels resulting in less risk of fractures [12]. Finally, are important correct instructions for patient handling of the dentures to avoid accidents as falling and perfect hygiene.

## SUMMARY

This article describes a simple method to manufacture an esthetic metal cast reinforcement incorporated inner of the complete denture. This technique improves the denture resistance and life expectancy decreasing recurrent fractures, has low cost, has good esthetics and save clinical time of the dentist.

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