



A SIMPLE METHOD OF COMPLETE DENTURE REINFORCEMENT USING A PERFORATED METAL MESH - A CASE REPORT

Dental Science

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ABSTRACT

An economical and easy solution to reinforce acrylic denture bases is by incorporating metal reinforcements to the denture. Metal can be added to the denture bases in the form of wires, bars, mesh or plates. Studies have proven a considerable beneficial effect on the fracture resistance of PMMA by incorporating metal to the PMMA matrix. This case report describes the prosthetic rehabilitation of an edentulous patient with metal reinforced complete dentures

KEYWORDS

Acrylic resin, flexural fatigue, perforated metal mesh, metal grid strengthener, sandwiched technique

Introduction

In the present world of dentistry, PMMA still captures its place as the most common and successfully used denture base material. The flexural fatigue and stress concentration in complete dentures remains a point of concern.¹ Acrylic resin, despite being an excellent denture base material does have certain disadvantages like low impact strength and low fatigue resistance.^{2,3} Fracture of the acrylic denture base can occur due to multiple reasons like- existing high palatal vault, an excessively thin denture base, high frenal attachment or merely just accidental reasons. Reinforcement of acrylic denture base materials is done to improve its mechanical strength.

Various methods have been proposed in the literature for the reinforcement of these heat cured denture bases. They include:

- Substituting PMMA with Polycarbonates and polyamides,
- Chemical modification of PMMA by incorporating cross linking agents or rubber in the form of butadiene styrene, and more commonly,
- Strengthening by incorporating fibers or metal inserts into the heat processed denture bases.⁴

Metal can be added to the denture bases in the form of wires, bars, mesh or plates. Studies have proven a considerable beneficial effect on the fracture resistance of PMMA by incorporating metal to the PMMA matrix. This paper presents a case report on the prosthetic rehabilitation of an edentulous patient with metal reinforced complete dentures.

Case report:

A 55 year completely edentulous male patient reported to the Department of Prosthodontics in IDST, Modinagar with a chief complaint of a fractured maxillary denture. He also wanted to replace his old pair of dentures with a new one. His major concern was to improve his masticatory function. Intraoral examination revealed a normal mucosa with a U- shaped maxillary arch and a V-shaped mandibular arch [Fig. 1 and Fig. 2]. The patient was informed about the various options of reinforcement of the denture, like having a metal substructure, a metal mesh or incorporating other materials like fibers. The patient agreed to the most economical option of incorporating prefabricated metal mesh insert in the maxillary denture.



Fig. 1 and 2: Intraoral views of the U- shaped maxillary arch and a V-shaped mandibular arch.

The preliminary steps of complete denture fabrication remained the same. Primary impressions of the maxillary and mandibular arches were made with impression compound. The primary casts were obtained after proper beading and boxing of the primary impressions [Fig. 3]. Special trays were fabricated after proper adaptation of the spacer, with the help of autopolymerizing resin. Border molding was performed using green stick compound (Low fusing compound; DPI Pinnacle) and the secondary impressions were made with zinc oxide impression paste.



Fig. 3- Primary casts obtained



Fig. 4- Master casts obtained after the border molding and final impression

After the master casts were obtained [Fig. 4], temporary denture bases and occlusal rims were made. Tentative jaw relation was carried out following facebow transfer. The casts were mounted in a semi-adjustable articulator. The artificial teeth were adjusted and teeth arrangement was done [Fig. 5] following the principles of teeth-setting and the trial denture was assessed intra-orally before its processing.



Fig. 5- The waxed up complete denture



Fig. 6- Flasking of the maxillary denture done and separating media applied

The flasking procedure [Fig. 6] was carried out for both the arches. The size of the reinforcement mesh (MAAC –CE Reinforcement Golden Mesh Shiva Products -Thane) was marked using a marker, and was trimmed accordingly with the help of scissors. Following which it was adapted to the master cast by using a universal plier and kept aside to be incorporated after the dewaxing procedure.

The dewaxing process was completed. At this time the pre-adjusted metal mesh was checked on the maxillary cast for any last minute corrections in its adaptation. A sort of sandwiched procedure was implemented which involved adapting some amount of the dough resin on the maxillary cast over which the metal mesh was placed accurately [Fig.7]; and the denture was packed in the conventional manner. The processing was carried out.



Fig.7 – Metal mesh adapted over the maxillary cast

The small thickness of 0.4mm of the mesh helped in avoiding over dimensioning of denture base. The processed dentures were retrieved and cleaned using an ultrasonic cleaner. The dentures were finished, polished and tried in the patient's mouth for evaluation of appropriate esthetics and occlusion [Fig.8 and 9]. After the necessary occlusal corrections, the prostheses were delivered. [Fig.10, 11 and 12]



Fig. 8- The finished set of dentures



Fig.9- Intaglio surface of the metal mesh reinforced maxillary denture



Fig.10- The complete denture prosthesis in place



Fig. 11 and 12- The right and left occlusal view

Discussion

A fractured denture is an important problem not only for the patients but also for the dentists and dental laboratory technicians.⁶The fracture occurs as a result of crack initiation and propagation from areas of high stress concentration. In order to overcome this problem, various methods of reinforcements have been proposed.

The metal grid strengthener for heat processed PMMA denture bases is available in both stainless steel and gold plated metal. They have a thickness of 0.4mm and their mesh design helps to produce a good resin bond. The considerable decrease in the propagation of microcracks due to the metal reinforcement aids in reducing the chances of fracture.^{7,8}This sandwiched technique of incorporating the metal mesh aids in achieving a uniform thickness of acrylic without increasing the bulk of the denture base.

However, a pronounced disadvantage of incorporating metallic components is that they are obviously unaesthetic, prone to corrosion and exhibit poor adhesion to the acrylic denture base. To mask the unaesthetic look of the metallic component, a technique of coating the metallic mesh with self-cure autopolymerizing resin has also been mentioned in the literature.⁹ This aids in masking it from the translucent heat cure resin, thereby enhancing esthetics.

Conclusion

Reinforcing complete dentures have depicted a significant increase in the impact strength when compared to unreinforced dentures. Incorporating the perforated metal mesh to the heat-cured acrylic denture was an economical method of reinforcing the acrylic denture.

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