A two-step technique to fabricate a glass fiber-reinforced composite interim removable partial denture: Case report

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Abstract

Fabrication of an interim prosthesis is an important procedure in oral rehabilitation because it aids in determining the esthetics, phonetics, and occlusal relationship of the definitive restoration. The loss and replacement of anterior teeth pose several challenges. Debonding of acrylic teeth from the denture base remains a major problem in prosthodontic practice. A 45-year-old man with periodontally involved lower central incisors was treated with extraction of these two teeth and replacement of missing with an acrylic resin interim denture. Two-step technique was used to fabricate the denture. The denture was reinforced using everStickC&B fiber (Stick Tech Ltd., Turku, Finland). At 3 months follow-up demonstrated good clinical success for the prosthesis. This technique provides a strong bond between the teeth and denture base. With this technique, the patient expressed great satisfaction with the interim denture from the retention point of view. Due to debonding of acrylic teeth from the denture base, the use of reinforcing materials, such as fiber reinforced composite, is indicated in cases of interim removable partial dentures replacing missing anterior teeth.

Keywords: Acrylic resin denture bases, fiber reinforced composite, teeth debonding

Introduction

Acrylic resins, introduced in 1937, have enjoyed a continual popularity, which is attributed to its simple processing technique and relative low cost of the fabrication process.[1]

The loss and replacement of anterior teeth pose several challenges. Temporary or provisional acrylic partial denture (APD) is one option for replacing missing teeth. It is the most cost-effective and less destructive treatment option. Dentists are faced with the demand for replacing missing teeth from patients with limited financial resources; therefore, the replacement of missing teeth with an APD is a common occurrence.

Interim removable partial dentures can provide esthetic relief and essential functionality for patients before and during the fabrication of final prostheses. One of the disadvantages of APD’s is its poor strength. The failure of the bond between acrylic resin teeth and denture base material remains a considerable problem. Teeth debonding from dentures can be frustrating to the patients as well as the dentist. Debonding of acrylic teeth from the denture base remains a major problem in prosthodontic practice. It has been estimated that between 22% and 30% of denture repairs involve tooth debonding, usually, in the anterior region of the denture.[2,3] This detachment may be attributed to a lesser ridge lap surface area available for bonding and the direction of the stresses encountered during function.[3-5]

Various materials and techniques can be used for fabricating interim removable partial dentures. Different materials were used for reinforcing acrylic resin denture base: Metal wires, polyethylene and glass fibers. Glass fiber reinforcement has shown a better reinforcement efficiency than metal wires or polyethylene fibers.[6-9] Most of the glass fiber reinforcements in dentistry have cross-linked polymers in matrix and those need light polymerization for hardening. Whereas denture base acrylic chemistry is based on linear polymers, and those are auto or heat polymerized. There is only one study where glass fiber with light curing matrix has been used with acrylic resin denture base.[9]

Case Report

A 45-year-old man was referred to the Department of Prosthetic Dentistry, Faculty of Dentistry, Tanta University (Tanta, Egypt) for treatment. Patient’s chief complaint was the mobility of the two lower central incisors. Oral examination
showed that these two teeth were periodontally involved [Figure 1] and have Grade III mobility. The treatment plan was to extract these two mobile teeth and replace them with a glass fiber-reinforced composite interim acrylic resin denture as a provisional measure.

Irreversible hydrocolloid (Tropicalgin, Zhermack SpA, Italy) was used to take impressions for both arches. The impressions were poured using dental stone (TecStone, Pearson Dental Supply Company, CA, USA). The laboratory technician was asked to fabricate the heat-cured acrylic resin denture base (Lucitone 199, DENTSPLY Prosthetics) with the clasps according to the design drawn on the laboratory sheet but without removing the suspected teeth for extraction [Figure 2].

Patient was referred to the Oral Surgery Department for extraction of the two lower central incisors. An hour after teeth extraction, the denture base was checked in the patient’s mouth [Figure 3].

A new impression for the lower arch only was taken using irreversible hydrocolloid while the denture base is in its place. The impression was poured using dental stone. Two artificial acrylic teeth were placed into the right position using set-up wax [Figure 4].

A silicone mold was taken for the teeth after the wax up. Enough space for the fiber and teeth were grinded in the denture base [Figure 5]. The length needed for the fiber was measured with wax [Figure 6]. The fiber (everStickC&B) was placed into the right position [Figure 7] after curing with light cure. Small channels were drilled inside the two denture teeth, and fibers were placed into the channels.

Auto polymerizing acrylic resin (Triplex Cold, Ivoclar, Vivadent) was used to cover the fibers and the grinded area in the denture base. The whole thing was put in the pressure kettle. Conventional finishing and polishing of the denture base and teeth were carried out.

The finished denture [Figure 8] was delivered to the patient and instructions of use were given to him. The patient was seen the next day of delivery for any potential corrections or modifications. The patient was seen once a month for a follow-up period of 3 months. During the follow-up period, there had been no subjective signs of teeth debonding or discoloration, and the patient expressed a great satisfaction with the interim denture from the retention point of view.
Discussion

For reinforcement, fibers can be positioned in two different ways: over the ridge lap or into the denture teeth. The first way gives more strength against the fracture in this particular area. If fiber reinforcement is used to prevent debonding between denture teeth and denture base, fibers should be placed into the denture teeth. In this report, small channels were drilled inside the two denture teeth, and fibers were placed into the channels.

The two-step technique was used to avoid the misplacement of the fibers during the packing stage of the acrylic resin. On the other hand, this two-step technique can be modified into one-step technique if the injectable type of acrylic resin is used.

The used fiber in this technique is silanated E-glass fiber impregnated with bis-GMA and PMMA. Reasons for choosing this type of fiber were the easiness of use, and no wetting of the fibers was needed. The fibers were also easy to harden by light cure into the right shape before placement. This allowed proper placement and positioning of fibers without any displacement after teeth addition.

Conclusion

The two-step technique to fabricate a reinforced interim removable partial denture provides a strong bond between the teeth and denture base. With this technique, the patient expressed great satisfaction with the interim denture from the retention point of view.

Clinical significance

Due to debonding of acrylic teeth from the denture base, the use of reinforcing materials, such as fiber reinforced composite, is
indicated in cases of interim removable partial dentures replacing missing anterior teeth.

**Acknowledgment**

The authors would like to thank the staff of Stick Tech Ltd. (Turku, Finland) for their support of this research in terms of providing the materials and the technical support.

**References**