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Light Protection of Fiber-reinforced Strip Using Aluminum Foil for the Direct Splinting Technique

M Anagnostou • E Papazoglou
G Mountouris • M Gaintantzopoulou

Clinical Relevance

Double-folded aluminum foil can be used to protect the fiber-reinforced strip from premature polymerization in a wrong position.

SUMMARY

The critical point of the clinical procedure of direct splinting is the placement of the fiber-reinforced strip, which has to be well adapted to tooth surfaces. This article describes the use of aluminum foil to cover and protect the fiber-reinforced strip from light polymerization during the direct splinting technique. The advantage of using aluminum foil is to prevent premature curing of the fiber-reinforced strip, which would necessitate repetition of the procedure. With this technique, the strip is gradually exposed and adapted to the lingual/palatal surfaces of the teeth and light cured, allowing for ample working time.

M Anagnostou, DDS, postgraduate student, Department of Operative Dentistry, School of Dentistry, University of Athens, Athens, Greece

*Efstratios Papazoglou, DDS, MS, PhD, assistant professor, Department of Operative Dentistry, School of Dentistry, University of Athens, Athens, Greece

G Mountouris, DDS, Dr Dent, associate professor, Department of Operative Dentistry, School of Dentistry, University of Athens, Athens, Greece

M Gaintantzopoulou, DDS, MDS, Dr Dent, lecturer, Department of Operative Dentistry, School of Dentistry, University of Athens, Athens, Greece

*Reprint request: 2 Thivon Street, Goudi, GR 11527, Athens, Greece; e-mail: spapazog@otenet.gr

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INTRODUCTION

Fiber products are used for the indirect fabrication of crowns (Lehmann, Eickemeyer & Rammelsberg, 2004) and the frameworks of fixed partial dentures (Freilich & others, 2002) for the direct replacement of a missing tooth with an adhesive prosthesis (Strassler, Haeri & Gultz, 1999; Ferreira & others, 2000). Fiber products are also used for the fabrication of posts (Drummond & Bapna, 2003), the reinforcement of provisional restorations (Ferreira & others, 2000; Hamza & others, 2004) and denture base materials (Vallittu, 1996) and for the repair of dentures (Polyzois & others, 2001).

Additionally, reinforcing fibers for splinting teeth with the direct technique are currently used for periodontal splints, retention after orthodontic treatment and stabilization of teeth after trauma (Ferreira & others, 2000; Rada, 1999; Rudo & Karbhari, 1999; Serio, 1999; Strassler & others, 1999).

The fibers used for the direct splinting technique are commercially available in two forms: pre-impregnated and non-pre-impregnated. The critical point of the clinical procedure of direct splinting is placement of the fiber-reinforced strip, which has to be well adapted to the tooth surfaces. The impregnated fiber-reinforced strip is very sensitive to light polymerization, even from the light of the dental unit.

Several techniques have been proposed to adapt the strip to the tooth surfaces and to protect it from light polymerization in a wrong position during direct splinting. One method for the adaptation of the fiber-reinforced strip is to place it onto the lingual/palatal surfaces, hold it passively in position by lightly pulling stabilizing strands of dental floss through all interproximal areas using one hand, then proceeding with light polymerization (Papazoglou & Anagnostou, 2004).

Another method is to adapt the strip on the resin composite-covered teeth with suitable hand instruments and light cure the composite, tooth-by-tooth (Strassler & others, 1999). The portion of the strip not yet adapted may suffer from premature curing (Rada, 1999) and may need the application of a new strip. This paper describes the use of aluminum foil to protect the fiber-reinforced strip from light polymerization during the direct splinting technique. This technique can be applied to any commercially available strip.

DESCRIPTION OF THE TECHNIQUE

The length of the fiber-reinforced strip should be determined based on the size of the teeth to be splinted. If the strip is not pre-impregnated, it should be impregnated with adhesive resin and covered in order to protect it from light, since it is very sensitive to light polymerization after impregnation. A piece of aluminum foil is cut to a length slightly shorter than the strip (Splint-It, 3 mm Splinting Strip Uni-directional Fiber, Pentron, Wallingford, CT, USA) and double folded to cover the strip (Figure 1). Aluminum foil covers protect the strip from premature light polymerization.

After rubber dam placement (Figures 2 and 3), the teeth are cleaned with a non-fluorinated, non-flavored pumice. They are then etched, dried, primed and bonded. Low viscosity polyvinyl siloxane impression material is injected into the interproximal areas to protect them from the inadvertent flow of resin composite (Strassler, Tomona & Spitznagel, 2003). Alternatively, wooden wedges can be used to protect the interproximal areas. However, silicon is easily placed and does not exert any pressure on adjacent teeth. Consequently, low viscosity composite is applied to the lingual/palatal tooth surfaces. The critical point of the clinical procedure of direct splinting is placement of the strip, which has to be well adapted to the tooth surfaces (Figure 4).

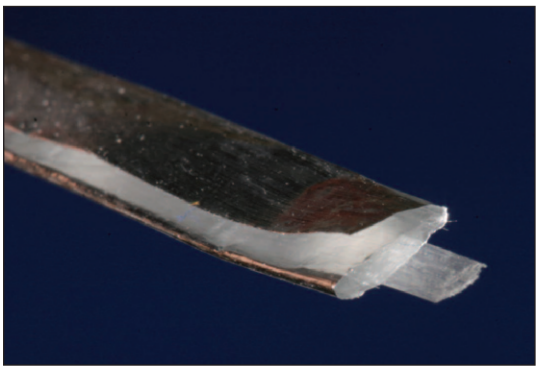

Figure 1. *Double-folded aluminum foil covers the fiber-reinforced strip.*

Figure 2. *Rubber dam placement, labial view.*

Figure 3. *Rubber dam placement, occlusal view.*

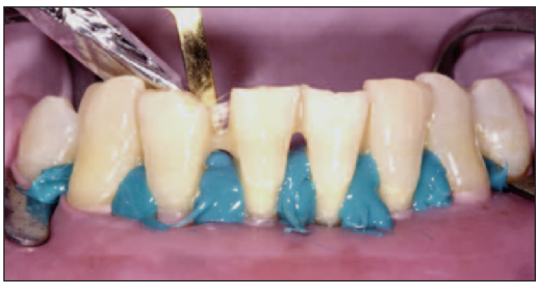

Figure 4. *Low viscosity polyvinyl siloxane impression material placed in the interproximal areas to avoid unwanted flow of resin composite. Tooth by tooth, the strip is gradually exposed, adapted to the lingual surfaces of the teeth using suitable hand instruments and light cured.*

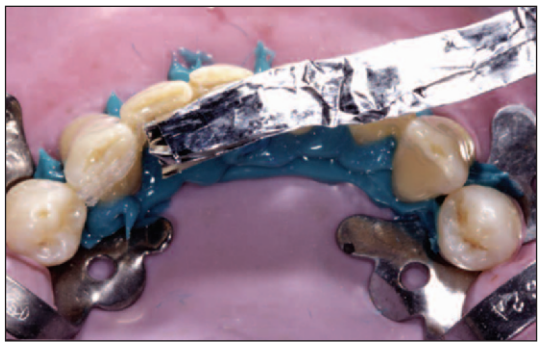

Figure 5. *One end of the strip should be exposed just prior to placement of the fiber-reinforced strip, pulled and embedded into the composite. The portion of the strip not yet adapted is still covered with aluminum foil to prevent light polymerization in a wrong position.*

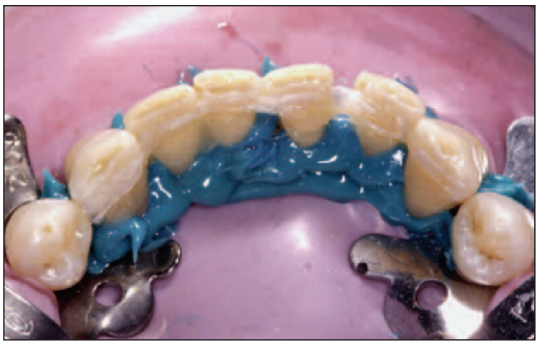

Figure 6. *The fiber reinforced strip adapted at the lingual tooth surfaces prior to resin composite application.*

Figure 7. *Completed direct splinting device, occlusal view.*

Figure 8. *Completed direct splinting device, labial view.*

One end of the strip, which is already covered and protected from light with aluminum foil, is exposed just prior to placement of the fiber-reinforced strip. It is then pulled and embedded into the composite. The portion of the strip that is adapted to the lingual/palatal surfaces is light cured. The portion of the strip that is not yet adapted is still covered with aluminum foil to prevent light polymerization in a wrong position (Figure 5).

Tooth-by-tooth, the strip is gradually exposed, adapted to the lingual/palatal surfaces using suitable hand instruments and light cured (Figure 6). It is important to maintain the strip close to the tooth surfaces to prevent void formation at the tooth-strip interface. Caution should be exercised, since excessive force at this point may move mobile teeth and may be detrimental. Medium-viscosity hybrid resin composite is used to cover the fiber-reinforced strip and seal possible irregularities. Shaping, finishing and polishing follow (Figures 7 and 8).

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