AESTHETIC UPDATE

Compiled by Geoffrey M. Knight

Fibre reinforced resin restorations

One of the more frustrating aspects of placing an adhesive restoration is having to resort to the use of 'pins', usually after several failed attempts at giving the restoration a permanent home.

Pins work in the short term but eventually corrode and stain both tooth and restoration. Perhaps the most unsatisfactory feature is the affinity they seem to have of either finding their way into the pulp or fracturing off a large portion of remaining tooth whilst being inserted.

Gordon Christensen has recommended trenches or small pot holes in teeth to assist with stabilizing an adhesive restoration as he found that retention using pins reduces over time whilst retention with pot holes or trenches improves.

Woven ceramic and polyethylene fibres are being increasingly used to strengthen composite and resin modified glass ionomer cement restorations. Incorporating these woven fibres into either pot holes or trenches dramatically improves the resistance to fracture and all but eliminates the need to use metallic pins to assist with retention.

Products currently available in Australia are: Fibrespan* for pot holes and for trenches; Polydentia Fibre-Splint ML† woven ceramic; Ribbond‡ woven polyethylene; and Connect§ woven polyethylene. Each of these fibres have specific advantages and applications.

The multi layer ceramic fibres appear to be the strongest and tolerate exposure to the oral environment well. The main disadvantage with these materials is the difficulty of handling them after they have been cut into small lengths as the weave of the fibres falls apart and becomes difficult to handle in intricate clinical applications.

The polyethylene fibres are difficult to cut and require special shears, but easier to handle clinically than the ceramic fibres. The main disadvantage of these materials is that they swell and stain if exposed to the oral environment and care must be taken to make sure that these fibres are **always** embedded within a restoration.

The following clinical case shows a vital tooth that had been used as a bridge abutment. Caries had undermined the tooth causing it to fracture and the bridge to fail. An alternative to devitalizing the tooth and placing a post and core was to make a composite resin core held in place using woven fibres. Endodontic intervention and post placement remain a future option.

Fig. 1 shows caries removal and the preparation of three trenches that had been prepared with a 1/2 round slow speed bur, situated around the perimeter of the root surface. Carefully placed to about

Fig 1

1.5 mm deep and just over 2 mm in length avoiding both pulpal involvement and root perforation. The gingival tissues have been cauterized with TCA to control gingival exudate and the tooth has been etched with 37 per cent phosphoric acid for 10 seconds then washed with water and dried with oil free air.

Three small increments of 2 mm wide polyethylene fibres were cut into sections 3 mm long with the shears provided in the kit and impregnated with unfilled composite resin. Fig. 2.

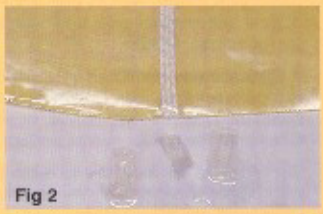

Fig 2

▶

*Nulite Systems, International Pty Ltd, Hornsby, NSW
†Regional Dental Supply Co, Fitzroy, Vic
‡Rudolf Gunz & Co Pty Ltd, Beaconsfield, NSW
§Kerr Australia Pty Ltd, Castle Hill, NSW

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A thin layer of resin modified glass ionomer cement was applied over the preparation and small increments of hybrid composite resin puddled into each of the trenches.

Each length of fibre was then placed into a trench and seated firmly by working the fibre into the base with a Ward's Carver. When each fibre had been positioned the preparation was co-cured to produce a stress free bond between the tooth and the core. Fig. 3.


Fig 3

Further increments of composite were added and the core was contoured using course diamonds points. Fig. 4.


Fig 4

Several trial seatings were required in order for the abutment to seat snugly over the core. The bridge was then re-cemented into place using a resin modified glass ionomer luting cement. Fig. 5.


Fig 5

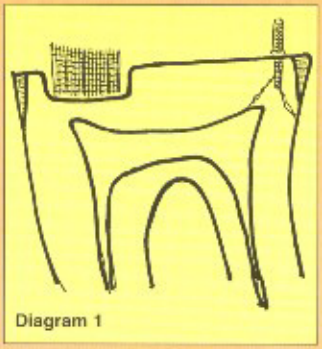
Diagram 1


Diagram 2

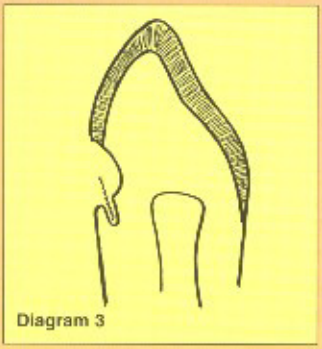
Diagram 3

There are a wide range of clinical applications for this technique. Fibre reinforced pot holes or trenches can be used to improve retention for rebuilding fractured cusps in the lateral segments of the mouth Diagram 1; for reinforcing fractured incisal edges in anterior teeth Diagram 2; and for gaining retention for Class V resin modified glass ionomer cement restorations where high stress abfraction lesions have occurred. Diagram 3.


Fig 6

The fractured incisal edge on a left central incisor has been reinforced with a small section of woven fibre inserted into the tooth prior to placing the restoration. Fig. 6. The completed restoration has better retention than a direct bonded composite resin with a much reduced possibility of pulp involvement, tooth fracture or future staining of the tooth or restoration if pins had been used. Fig. 7.


Fig 7

Fibres have applications in reinforcing both indirect and direct bonded composite resin bridges and the strength that can be generated over thin sections at the abutment areas often means that little if any tooth preparation is required. These materials were originally introduced as an inexpensive means of stabilizing periodontally involved teeth, however, their clinical applications are limited by the imagination of the practitioners who use them. □