## aesthetic update



Compiled by Geoffrey M Knight

# THE GOOD OIL on adhesive dentistry

**Practitioners are aware** of the oil plume that streams from sterilized high and low speed handpieces (Fig 1). Slow speed handpieces are often used without water spray for caries removal during the final stages of cavity preparation that results in oil contamination over a wide area (Fig 2).

The saturation of cavity preparations with oil prior to placing an adhesive restoration is disregarded by manufacturers who assume that washing and drying a preparation will create a tooth surface suitable for application of their particular adhesive system.

Furthermore, clinical trials on the longevity of adhesive bonding are conducted on cervical erosion lesions that require no preparation and are not contaminated by handpiece oil.

Handpiece lubricating oils consist of about 45 per cent lubricant oil in an evaporative solvent to enable penetration into the moving mechanisms of the handpiece. This results in excellent penetration into both handpieces and tooth structures. As the oils are clear, practitioners may have difficulty detecting their presence in a preparation prior to application of an adhesive material.

Dissolving a small amount of pigment into handpiece oil prior to application to a tooth enables identification under a dental microscope of any residual oil following manufacturer's recommendations on the application of their adhesive materials.

#### SELF ETCHING ADHESIVE SYSTEMS

Manufacturer's recommendations for self etching bonding systems require preparation by 'standard techniques'. Some manufacturers recommend the use of rubber dam that further serves to concentrate the oil over the preparation. This is followed by washing with water and drying the preparation or drying the preparation, presumably without prior rinsing with water.

When a small amount of red pigment was dissolved into handpiece oil and applied to a sectioned tooth surface then washed with water and dried (with oil free air) there was an observable surface contamination of pigmented oil over the entire tooth surface (Fig 3).



Fig 1. Oil plume clearly visible from sterilized handpiece



Fig 2. Handpiece oil contamination over teeth and gingival tissues on previously dry preparation.

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Proceeding with manufacturer's instructions and applying the self etching adhesive agent did not appear to remove the red pigment from the underlying tooth surfaces (Fig 4).

Included in their technical information sheets, manufacturers of self etching adhesive systems should state the bond strength of their self etching adhesives to oil contaminated dentine and enamel surfaces.

#### **GLASS IONOMER CEMENTS**

#### CONDITIONING

Manufacturers of glass ionomer cements prescribe the application of a poly acrylic acid conditioner prior to placement of their particular product. When placed on the surface of the oil contaminated tooth the conditioner was not miscible in handpiece oil (Fig 5). Following manufacturer's recommendations, the surface was scrubbed with a micro brush for 10 seconds (Fig 6) followed by washing and drying with oil free air. Examination of the dried surface shows remnants of red pigment where handpiece oil remained the tooth surface (Fig 7).

#### ETCHING

When a 37 per cent phosphoric etching gel was placed onto the oil contaminated tooth surface there was no evidence of pooling (Fig 8). The gel was scrubbed with a micro brush over the tooth surface for five seconds (Fig 9) followed by washing and drying with oil free air. Examination of the dried surface showed no evidence of remaining red pigment suggesting that all the oil contamination had been removed (Fig 10).

#### **ETCHING Vs CONDITIONING**

Glass ionomer manufacturers suggest that etching will remove calcium and phosphate salts from tooth surfaces and reduce



Fig 3. Oil and pigment contamination on tooth previously saturated with pigmented handpiece oil following washing and drying with oil free air.



Fig 4. Application of a self etching adhesive showing presence of remaining pigment on the tooth surface.



Fig 5. Pooling of conditioner applied to oil saturated tooth surface.

the bond strength of the glass ionomer cement. Certainly small amounts of salts are removed with even a five second etch. However, once the glass ionomer cement has been placed calcium and phosphate salts present in the dentinal tubular fluid and the fluoride from the glass ionomer cement remineralizes the existing carbonated apatite (demin pH 5.5) to fluor apatite (demin pH 4.5) creating a caries resistant tooth layer at the base of the glass ionomer cement.

#### **SUMMARY**

This is not a scientific article but a pilot study conducted within the confines of a dental operatory and the findings may require further investigation, i.e., the pigment may affect oil miscibility.

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Fig 6. Tooth surface after scrubbing conditioner for 10 seconds with a micro brush.



Fig 7. Pigment contamination of conditioned surface after washing and drying with oil free air.



Fig 8. Application of etching gel to oil saturated tooth surface.

Dentists can satisfy their curiosity by repeating this experiment using oil paint pigment from an art supply shop.

There is however a clear message for manufacturers to confirm that:

• Self etching adhesive systems are not compromised by the presence of handpiece oil on teeth surfaces.

• Poly acrylic acid conditioner can be used on tooth surfaces contaminated with handpiece oil prior to placing a glass ionomer cement restoration without compromising the glass ionomer bond.

Dentists who are currently etching with 37 per cent phosphoric acid for five seconds followed by washing and drying with oil free air can continue placing adhesive restorations with the knowledge that handpiece oil contaminates have likely been removed from tooth surfaces prior to proceeding with the placement of the restoration.



Fig 9. Tooth surface after scrubbing etch for five seconds with a micro brush.



Fig 10. Etched surface without apparent contamination following washing and drying with oil free air

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