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## No shot, no drill dentistry!

Most restorative dentistry is applied to restoring the failures of previous restorative dentistry. Clearly, many of the materials and clinical techniques in current use leave plenty of room for improvement.

The advent of the high speed air turbine coincided with a massive increase in tooth preparation for restorative procedures. Unfortunately, teeth were prepared beyond their capacity to maintain their internal integrity and use of non adhesive restorative materials assured increasingly complex and invasive restorative procedures.

Reducing the cycle of iatrogenic repair calls for substantial reductions in the amount of tooth preparation being carried out. This in turn requires the diagnosis of caries at the earliest levels, where either remineralization procedures can be applied or else minimal amounts of tissue removed to a point where remineralization becomes a predictable procedure.

The current use of rotary cutting instruments does not fit well into a minimalist philosophy of tooth preparation as clinicians have limited abilities to identify the remineralizable boundaries of a lesion. Tooth preparation usually extends well beyond this point.

Air abrasion enables dentists to preferentially remove demineralized enamel and accurately contain tooth preparation to minimize the access required to carious dentine underneath. The fiscal cost of air abrasion technology has substantially reduced over the past few years. A far greater acceptance amongst dentists will occur once management of the particle plume has been achieved.

Air abrasion will not remove softened carious dentine and an

alternative means of tooth removal is required. The use of an excavator to remove carious dentine is far more controlled than rotary preparation. Although this process tends to leave residual carious dentine behind. The addition of Carisolv<sup>®</sup> solution to hand excavation facilitates caries removal and enables clinicians to more accurately determine the non remineralizable, remineralizable interface with the lesion. While this technology is time consuming and the cost remains relatively high, advantages of painless caries removal and accurately identifying the boundaries of the lesion, along with improving delivery systems affords many benefits over rotary tooth preparation.

Resin based bonding systems require removal of tissue to sound dentine. Glass ionomer cement will adhere to remineralizable dentine and eventually initiate tissue repair, a substantial benefit over resin based systems.

### A case study

The following clinical case demonstrates the restoration of two initial lesions on lower molar teeth based upon the principles of 'minimal intervention dentistry'.

The patient is a young adult who presented after several years of 'post pubescent independence'. In other words, his mother ceased some time ago to make his dental appointments.

There were clearly two occlusal cavities present on teeth 36 and 36 (Fig. 1).

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Fig. 1. Two occlusal cavities present on teeth 36 and 36.

A Diagnodent was used to confirm the visual appearance of the cavities giving a reading in the low twenties on both stained areas (Fig. 2). The Diagnodent is a valuable diagnostic instrument. Readings below 14 indicate with a high degree of certainty that caries are not present within the tooth. Readings above this require careful diagnostic investigation to confirm the presence of caries. An increased reading after cleaning out the fissures indicated caries present and a reduced reading suggests that the reading was due to contaminants in the fissure.

Initial tooth preparation was carried out without local anaesthetic using air abrasion (Fig. 3). Air abrasion will preferentially remove demineralized enamel but also enables precision enamel removal to expose carious dentine underneath.



Fig. 2. A Diagnodent was used to confirm the visual appearance of the cavities giving a reading in the low twenties on both stained areas.



*Fig. 3. Initial tooth preparation was carried out without local anaesthetic using air abrasion.*

A small amount of Carisolv solution was activated using the manufacturer's instructions and applied to the lesions with a micro brush (Fig. 4). Once activated the Carisolv solution has a limited active phase and no more should be mixed than the specific amount required for each application.

To facilitate caries removal the walls and floor of the cavity were 'scraped' with a special non-cutting excavator supplied by the manufacturer (Fig. 5).

In principle, the use of a non-cutting excavator will remove non-



*Fig. 4. A small amount of Carisolv solution was activated using the manufacture's instructions and applied to the lesions with a micro brush.*



*Fig. 5. To facilitate caries removal the walls and floor of the cavity were 'scraped' with a special non-cutting excavator supplied by the manufacturer.*

remineralizable dentine and leave the remineralizable dentine intact. A motorized non-cutting rotary excavator is available from the manufacturer.

After several applications of Carisolv, (the actual number required dependent upon the size and extent of the lesion) the cavities were washed and dried and a sharp instrument passed over the cavity surfaces to confirm a hard surface although still bearing



*Fig. 6. After several applications of Carisolv, the cavities were washed and dried and a sharp instrument passed over the cavity surfaces to confirm a hard surface although still bearing some staining at the base.*

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some staining at the base (Fig. 6). The manufacturers of Carisolv maintain that only the non remineralizable dentine is removed during this application enabling the glass ionomer to bond to the cavity surface and assist with the remineralization of the remaining softened dentine.

Prior to placement of a glass ionomer restoration, the cavities may be etched for 10 seconds with phosphoric acid or conditioned with poly acrylic acid (Fig. 7). Etching or conditioning is rather an esoteric argument as the



*Fig. 7. Prior to placement of a glass ionomer restoration, the cavities may either be etched for 10 seconds with phosphoric acid or conditioned with poly acrylic acid.*

clinical outcome of either procedure is essentially the same.

After washing and drying the preparations with oil free air, wear resistant glass ionomer cement was placed into the cavities and tamped down with a micro brush (Fig. 8). Unlike resin based bonding systems, glass ionomer cements may be used clinically at the unremineralizable, remineralizable dentine interface.



*Fig. 8. After washing and drying the preparations with oil free air, wear resistant glass ionomer cement was placed into the cavities and tamped down with a micro brush.*

The glass ionomer cement was contoured into the fissures and a light activated resin applied to protect the maturing cement prior to



*Fig. 9. The glass ionomer cement was contoured into the fissures and a light activated resin applied to protect the maturing cement prior to removal of the rubber dam and final occlusal adjustment before the patient was dismissed.*

removal of the rubber dam and final occlusal adjustment before the patient was dismissed (Fig. 9).

This minimal restorative procedure affords the teeth every chance of not requiring further intervention throughout the patient's life.

Minimal cavity preparation assures the integrity of the tooth. Placement of a glass ionomer restoration that does not encroach upon centric stops will remain functionally in place for many years. □