Beware occult caries

Richard Field describes an incremental build-up technique for composite restoration

TEETH THAT appear otherwise sound to the eye can show extensive decay on radiographs. One of the reasons is remineralisation of the superficial enamel caries while the dentine is decaying underneath. This can sometimes be accredited to surface remineralisation from fluoride. Occult caries is often seen when teenagers move away from home and, for the first time, have control of their own diet. The case below demonstrates the importance of radiographic examinations of suspicious lesions in diagnosing this type of caries.

Case study
A 20-year-old male presented for his annual dental examination. In the past year, he had moved away and begun his studies at university. The patient’s LL7 (lower left second molar) showed some staining in the fissure system (Figure 1). As two years had elapsed since the patient’s last set of bite-wing radiographs, it was appropriate to take new ones.

Radiographically, the caries in the lower left second molar was extensive and very close to the pulp (Figure 2). Early mesial demineralisation was also noted. It was decided to treat this with daily interproximal flossing with 2,800ppm sodium fluoride toothpaste and further radiographic review in six months’ time. The LR7 (lower right second molar) had a similar deep occlusal lesion.

Vitality testing of the lower left second molar showed a positive reading. The tooth displayed no symptoms of either reversible or irreversible pulpitis. The consultation highlighted several recent changes in the patient’s diet. This included regular consumption of non-diet, fizzy soft drinks, as well as an increased intake of sports drinks containing high levels of sugar. Reducing the quantities of these was discussed to increase prevention, especially given the patient’s age.

It was decided, with the patient’s consent, to treat this tooth with the placement of a composite restoration. Heraeus Venus Pearl was my choice of material for this case, as its properties are very well suited to incremental build up. It handles like a heated composite even at room temperature and does not stick to instruments.

The method below advocates incremental build up of the composite restoration. This method involves as few cavity surfaces as possible, placing very low stress on the walls upon curing. This means that normally there is no postoperative sensitivity.

Treatment
The patient was warned that there was a chance of pulpal exposure and the subsequent need for root canal treatment, if direct or indirect pulp capping proved unsuccessful.

Prior to treatment, a high-chroma shade A3.5 was selected as the dentine replacement material and a translucent shade CL was chosen for the enamel. The patient was anaesthetised with an inferior dental nerve block and the lower left quadrant was isolated with non-latex dam. Dental dam improves access to the cavity. It also ensures adequate isolation for optimum composite bonding. The technique has been shown to be compromised through contamination with blood and saliva.

The decay was removed and the margins of the cavity were bevelled. The cavity was then checked with a straight probe, and any remaining soft dentine was removed. Hard stained dentine may be left at the cavity floor, but care must be taken to completely clear the amelo-dentinal junction (ADJ). Note the size of the resulting preparation, compared with the initial clinical presentation (Figure 3).

The restoration was etched with 37% phosphoric acid (enamel for 20 seconds, dentine for 10 seconds) and washed thoroughly. Care was taken not to over etch or over dry the dentine, which can cause problems with bonding and sensitivity. A single-stage prime and bond was used and cured for 40 seconds.

A flowable composite (Heraeus Venus Flow) was applied to the base and walls of the cavity and cured for a full 30 seconds (Figure 4). The flowable layer helps to reduce the stress on the cavity. This also helps to fill in any micro voids into which it would be difficult to adapt a more viscous composite.

The high-chroma dentine shade was adapted to the base of the cavity, taking care to increase prevention, especially given the patient’s age.

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not to contact the walls. Prior to curing, small channels were moulded into the base to act as a reservoir for the composite tints (Figure 5). A dark brown tint was added to the base layer. A slightly lighter dentine shade was used to begin building up the cusps of the restoration.

Care was taken to finish the dentine shade at the level of the ADJ. Room was left for a more translucent enamel layer, which is important with this technique. The composite is placed in increments no larger than 2mm, involving as few cavity walls as possible (Figure 6). In combination with the flowable baseliner, this minimises contraction stresses. It reduces the risk of postoperative sensitivity, marginal failure and tooth fracture. The remaining cusps were built up and a light brown tint was placed in the occlusal fissure (Figure 7). This is carried out with a fine probe or endodontic file.

The translucent enamel shade was then adapted to the individual cusps, ensuring it overlapped the restoration margins onto the enamel (Figure 8). A disposable flat-headed sable brush was used in combination with an unfilled resin, as it leaves a very smooth margin. It is important to use a designated modelling resin for this stage, as the presence of HEMA (hydroxyethyl methacrylate) can discolour the restoration margins over time. A final cure under a glycerine oxygen barrier was then carried out to ensure correct polymerisation to the surface of the restoration.

**Figure 8:** The Heraeus Venus Pearl translucent enamel shade was then adapted to the individual cusps ensuring it overlapped the restoration margins onto the enamel

**Figure 9:** Post-operative result. The restoration was polished using rubber cups with diamond paste

**Finishing**

Since the original anatomy of the restoration was followed through incremental build up, and the final enamel layer was adapted precisely with the sable brush, it was not necessary to carry out any gross reduction of the restoration with composite finishing burs. This technique saves an incredible amount of time when finishing, as the shape and contours are already defined. The restoration was polished using rubber cups with diamond paste (Figure 9). There is an obvious difference in value due to tooth dehydration during the procedure.