Where art meets science

Allan Matthews describes restoring an upper left first molar with durable composite filling, overcoming challenges presented by a deep cavity and thin palatal wall

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The flexing of cusps caused by excessive chewing force is one of the most frequent conditions I see in general practice, where loading under tension may ultimately cause the tooth to crack and break. In addition, ditched margins are commonly associated with creeping of amalgam restorations.

Such issues can be treated with a range of options, from the most minimally invasive composite filling restoration, through to indirect inlays, onlays and eventually a crown.

Only by removing the existing amalgam can the extent of the challenge be understood, and the most appropriate treatment plan considered.

Patient presentation and diagnosis

A patient in his early 30s attended Integrated Dentalcare in Edinburgh as he was experiencing intermittent pain on biting with his upper left first molar, which had previously been restored with amalgam.

There were no symptoms from thermal stimuli or sensitivity caused by sweet foods. The patient's oral health was generally good but it had been a while since he had been seen by a dentist.

The discomfort appeared to be caused by biting down in a certain way, which was highly indicative of a crack flexing. Left untreated, this might have led to a vertical root fracture.

A straightforward examination was carried out and it was determined that the gentleman was clenching his teeth and the load being applied to the molar was causing a flexing of cusps. The small portion of remaining distopalatal wall was translucent with a ditched margin.

There was a suspected crack underneath the distal portion of the filling, although this could not be confirmed without removing the amalgam.

There was no probing depth identified in this area and it was therefore unlikely that a crack had propagated down the root surface. A lateral excursive slide on the distobuccal cusp was also recorded (Figure 1).

Figure 1: The load applied to the upper left first molar was causing flexing of cusps and there was a lateral excursive slide on the distobuccal cusp

Figure 2: The amalgam was removed and a crack was found towards the buccal aspect of the distal margin

Figure 3: The filling was converted to class I, by initially using Venus Pearl A2 shade to restore the distopalatal wall, followed by a core of OMC to replicate the dentine

Figures 4 and 5: The composite offers high strength and polishability, and superior handling with a creamy consistency

Direct composite restoration

The treatment options were presented to the patient. Our considerations included a cuspal coverage restoration should this be indicated.

The amalgam was removed to reveal an extensive cavity. A crack was indeed found towards the buccal aspect of the distal margin.

Figure 2 shows the crack visible just beyond the contact point. The distobuccal wall was determined to be of adequate thickness to attempt a composite restoration with careful control of lateral excursive guidance.

However, the strict understanding was that ongoing symptoms or signs of further flexing of structures would indicate that a cuspal coverage onlay would be more appropriate.

The procedure was performed in a single, one-hour appointment, to permit investigation of any potential cracks. The preparation was refined for smooth margins and the crack was cleared to sound enamel.

Despite the depth of the amalgam filling, there appeared to be adequate dentine coverage of the pulp chamber.

Isolation was achieved with rubber dam, and air abrasion was carried out where no cracking was visible in the remaining tissues. I strongly recommend the use of air-particle abrasion to clean and roughen surfaces for all bonding procedures but it is also very effective for crack detection.

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Durability and resistance to chipping

In this case, a Bioclear posterior sectional matrix was used and the chosen composite was Kulzer Venus Pearl. This material is a staple in our practice due to its excellent handling properties, high filler content and resistance to chipping.

I have always been impressed with how difficult it is to remove a Venus Pearl restoration once it is fully set, and this highlights its exceptional durability and adherence to tooth structure.

A combination of Opaque Medium Chromatic (OMC) dentine shade and A2 universal shade was applied in a layered technique to give warmth to

the structure. The filling was converted to class I by initially using the A2 shade to restore the distopalatal wall, followed by a core of OMC to replicate the dentine (Figure 3).

The cusps were built and shaped one by one with A2 shade, assisted by the use of Kulzer Signum liquid modelling resin and a probe to create a more natural anatomical appearance. Compaction was carried out with a ball burnisher.

The composite filling was then covered with water-based KY Jelly and light-cured in accordance with the manufacturer's instructions, to set the oxygen inhibition layer. This is an absolute must when using any resin material.

No surface staining materials were applied in this case. Were I to do so, I would choose the lightest touch of an amber resin applied with an endodontic K-File.

The occlusion was checked and found to be favourable. Once fully cured, the restoration was polished using All Surface Access Polishers to produce a high lustre and smooth, glassy finish. The small fleck of excess composite on tooth UL5 was also removed.

Aesthetic and pain-free outcome

Following treatment, the patient reported slight sensitivity on chewing but no lasting pain. The initial sensitivity has subsequently diminished. The tooth will be regularly monitored to ensure it is symptom free.

Although an onlay may ultimately be needed, I am also confident that the Venus Pearl restoration will be as effective as a laboratory-made inlay.

I put this down to the robust nature of the composite, which offers high strength and polishability, and superior handling with a creamy consistency (Figures 4 and 5).

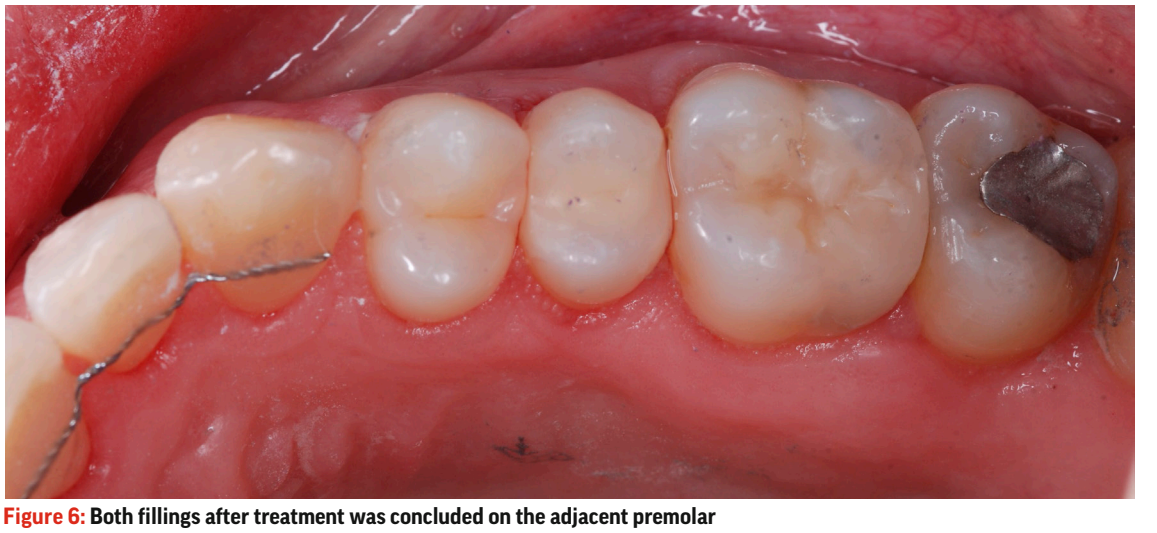

Figure 6: Both fillings after treatment was concluded on the adjacent premolar

Since the upper left first molar was restored, the patient has also had an amalgam filling replaced on the adjacent premolar (Figure 6).

The amalgam in the premolar was exceptionally flat and, as a clencher, the patient was hypersensitive to biting changes. This meant a loss of the fine anatomy in the restoration after adjustment. The restoration should function well, however, and fits the occlusal scheme, sealing the dentine while providing a more aesthetic result.

Technique mastery

This case highlighted for me the importance of mastering the technique and understanding the properties and characteristics of the composite material used for the restoration, in particular the oxygen inhibition layer. The use of Venus Pearl does not tend to lead to voids, especially when heated prior to application.

Producing a hard resistance surface is particularly helpful when creating margins and building up cusps. Venus Pearl does not stick to instruments and slumping can be avoided.

The composite is exceptional when used alongside a good quality modelling resin. It holds its form well, extending the time for manual manipulation to create the ideal anatomy, and, once fully set, the material comes into its own. D

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