Minimally invasive, functional restoration

Nadeem Younis presents a case study for the management of anterior tooth wear using composite resin

Non-carious tooth surface loss, also known as tooth wear, is becoming more prevalent and an increasing factor affecting the long-term health of dentition. The diagnosis and management of tooth wear is a growing concern for general dental practitioners (Kelleher and Bishop, 1999).

It has been well documented that the main mechanisms of non-carious tooth surface loss are attrition, abrasion and erosion, which are linked to diet, bruxism and parafunction.

The adverse effects of tooth wear are becoming more evident both in young and older patients, as more people retain their teeth into old age.

One study showed that 29% of European adults aged between 18 and 35 years old presented with non-carious tooth surface loss (Bartlett et al, 2013).

In the UK, the incidence of tooth wear increased from 66% in 1998 to 76% in 2009 when comparing surveys conducted respectively (White et al, 2012).

CONSERVATIVE TOOTH WEAR MANAGEMENT

Non-carious tooth surface loss can be managed following the principles of minimum intervention dentistry.

The European consensus on tooth wear highlighted a conservative, minimally invasive approach.

An additive method is preferred as it preserves the remaining tooth structure, but this depends on the adhesive and type of composite used (Loomans et al, 2017).

Composite is a versatile material and can be applied successfully for the treatment of a range of tooth wear cases.

The use of composite resin to treat worn dentition was first described in 1994 by Bevenius and colleagues.

A rim of enamel – known as the gingival ring – is usually present at the gingival margins of severely eroded teeth, which enhances the predictability of bonding hard tissue to resin composites (Briggs et al, 2007).

It is recommended that direct resin composite materials must be placed at a minimal thickness of 1.5 to 2.0mm in stress-bearing areas to ensure appropriate longevity (Poyser et al, 2007).

COMPOSITE RESIN ADVANCEMENTS

Composite restorations offer a viable medium-term strategy for the management of tooth wear, as they are less destructive compared to conventional indirect restorations and are easier to repair (Gulamali et al, 2011).

There are several techniques that have been documented when restoring worn dentition with direct composite resin restorations.

Palatal silicone indices of a wax-up can be used to restore the palatal surfaces of teeth, followed by freehand labial build-up. Full coverage clear stents can be used to build the teeth in bulk increments, for example, injection moulding.

Different techniques have pros and cons and the preference of the method used is operator dependant.

Significant advances in resin composites have been made in recent years. Due to the physical and optical properties of these materials, it is possible to provide restorations that are both aesthetic and mechanically stable.

The following case report describes how the use of composite resin, applied using a range of techniques, improves function and confidence.

The patient had moderate to severe tooth surface loss of the upper and lower anterior teeth with no anterior guidance on excursive movements.

The aim of the treatment was not only to establish aesthetics, but also restore function at an increased vertical dimension that could be tolerated by the patient.

CASE PRESENTATION

A 47-year-old male presented to Bridge Dental Practice in Burnley because he was unhappy with the appearance of his upper and lower anterior teeth (Figures 1 to 3).

A clinical examination revealed severe tooth wear of the upper and lower anterior teeth extending into the dentine (Figures 4 to 6).

The wear was due to a combination of bruxism and dietary habits.

Reduced clinical crown heights of the upper and lower anterior dentition was noted, with secondary compensatory over-eruption of the lower incisors.

A lack of posterior support – due to missing molars on the lower right quadrant, the upper left premolars and upper left first molar – had exacerbated the anterior tooth wear (Figures 7 and 8).

The upper right lateral incisor and the upper centrals had received root canal treatment with good obturation.

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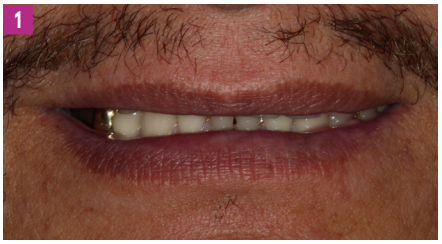
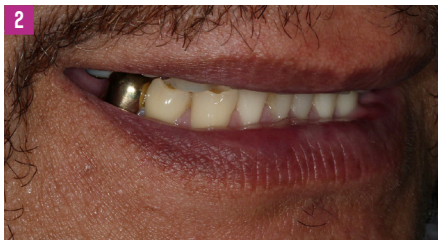
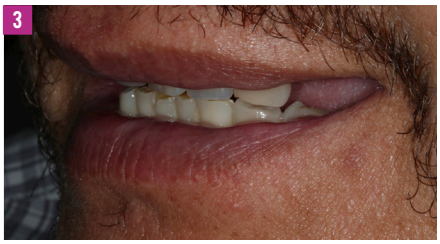
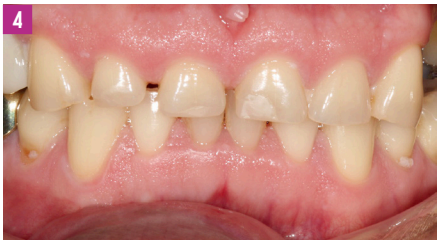
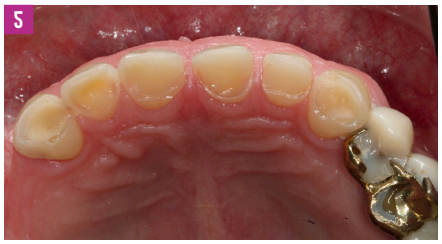
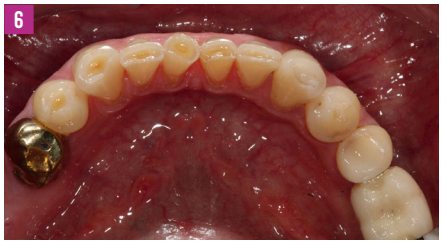




FIGURES 1, 2 and **3:** *The patient was unhappy with the appearance of his upper and lower anterior teeth*

FIGURES 4, 5 and **6:** *A clinical examination revealed severe tooth wear extending into the dentine*


FIGURES 7 and **8:** *A lack of posterior support exacerbated the anterior tooth wear*


FIGURE 9: *Small composite buttons using different shades of Venus Pearl composite were placed*

FIGURE 10: *B1 shade was selected and verified with a polarised filter*


FIGURES 11 and **12:** *The lower anterior teeth were prepared lightly by bevelling the labial enamel and removing any sharp edges*

TREATMENT OPTIONS AND PLANNING

Direct composite resin and indirect ceramic restorations were discussed to restore the upper and lower anterior teeth at an increased vertical dimension, followed by implant restorations to restore the posterior occlusion.

The patient opted for direct composite restorations because they would be more cost-effective, conservative and easy to repair.

The lack of invasive alteration to the tooth surface also leaves the option open for ceramic restorations in the future.

He also planned to have dental implant treatment, at a later date, to address the lack of posterior support.

Impressions were taken for duplicate study models as well as a facebow registration. A centric relation bite was taken with the aid of a leaf gauge. The models were mounted on an articulator and a functional wax-up completed on the models at an increased vertical dimension to establish a mutually protected occlusion.

Full coverage and palatal indices were fabricated chairside using silicone putty to help with the verification of the wax-up and placement of the composite resin restorations.

Small composite buttons using different shades of Kulzer Venus Pearl composite were placed on the dry, unetched tooth surface and light-cured (Figure 9).

B1 shade was selected by mutual agreement and verified with a polarised filter (Figure 10).

COMPOSITE BUILD-UP

The lower anterior teeth were prepared lightly by bevelling the labial enamel and removing any sharp edges (Figures 11 and 12).

The teeth were etched with 37% phosphoric acid gel, washed, dried and bonded. Kulzer Ibond Universal is my adhesive of choice due to ease of use, low viscosity and good dentine penetration. Ibond Universal provides a reliable bond strength because it contains the active ingredient 10-methacryloyloxydecyl dihydrogen phosphate (10-MDP).

A silicone index was used to build the lingual surfaces with Venus Pearl B1 shade (Figure 13). The labial surfaces were placed using a freehand technique (Figures 14 and 15).

Following adjustment of the composite restorations with fine diamond burs, the restorations were polished using the Kulzer Venus Supra polishing kit.

The twist discs are ideal for polishing anterior teeth as they are impregnated with microfine diamonds and impart a high gloss with relative ease, without generating excessive dust, which

FIGURE 13: *A silicone index was used to build the lingual surfaces*

FIGURES 14 *and* **15:** *The labial surfaces were built using a freehand technique*

FIGURE 16: *A methacrylate temporary material was placed to create a trial smile*

FIGURE 17: *The occlusion was checked and adjusted*

can be associated with finishing and polishing composite restorations.

At a subsequent visit, the upper wax-up was verified by placing a methacrylate temporary material in the full coverage anterior silicone index and allowing it to cure on the unprepared upper anterior teeth (Figure 16).

The shape and size of the anterior teeth were approved by the patient. Once the occlusion was checked and adjusted (Figure 17), a palatal silicone index was taken of the acrylic to aid fabrication of the palatal surfaces with Venus Pearl composite resin.

The labial surfaces were placed using a freehand technique. For ease and predictable composite build-up of the anterior teeth, the acrylic shells were removed one by one (Figures 18 to 20).

STRONG, DURABLE RESTORATIONS

I prefer to use Venus Pearl composite for tackling tooth wear cases because the material is long lasting and durable with minimal chipping and fracture.

The presence of tricyclodecane urethane dimethacrylate (TCD-UDMA) and a high



FIGURES 18, 19 *and* **20:** *For ease and predictable composite build-up, the acrylic shells were removed one by one*



FIGURES 21, 22 *and* **23:** *Kulzer Signum liquid was used to sculpt and adapt the last layer of composite to the tooth surface*



FIGURES 24, 25 *and* **26:** *The patient was very happy with the outcome and his confidence was restored*

monomer-to-polymer conversion rate renders the material strong in thin sections.

The Venus Pearl enamel shades are opaque and work well as monochromatic restorations. The adaptability of the material when using indices is good and the composite does not stick to hand instruments.

Kulzer Signum liquid is useful to sculpt and adapt the last layer of composite to the tooth surface using brushes (Figures 21 to 23).

The occlusion was checked and adjusted to ensure a mutually protected occlusion. Finally, the anterior composites were polished with Venus Supra polishing discs to achieve a long-lasting lustre. A splint for night-time wear was provided to protect the composite restorations.

The patient was very happy with the outcome and his confidence was restored

CONFIDENCE RESTORED

The patient was very happy with the outcome and his confidence was restored (Figures 24 to 26). The posterior teeth over-erupted into occlusion at the new increased occlusal vertical dimension after 12 months.

The patient was discharged back to the referring dentist for the provision of implant-retained restorations in the posterior segments.

This was a challenging case; restoring function and occlusion with composite at an increased vertical dimension.

The Dahl concept was explained to the patient, and he adapted to the new occlusal scheme with relative ease. The key here was to use a sufficient thickness of composite with predictable durability to withstand the occlusal forces. CD

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PRODUCTS USED

Venus Pearl, Ibond Universal, Venus Supra, Signum Kulzer

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