Clinical

# Durable restorations are value for money

**Nadeem Younis** describes how he repaired the fractured ceramic of a porcelain-fused-to-metal bridge with Venus Pearl composite

**Figure 1:** The fracture was to the porcelain on the upper right canine abutment

**Figure 2:** The metal substructure of the abutment was roughened and small grooves were created with a diamond bur to provide macro- and micro-mechanical retention

**Figure 3:** The luting cement was applied to the exposed metal and light cured

**Figure 4:** A gold stain was applied to tone down the opacity and reduce the 'shine through' effect

A middle aged female patient presented to Bridge Dental Practice with fractured ceramic on a porcelain-fused-to-metal (PFM) three-unit bridge. On examination, the fracture was to the porcelain on the upper right canine abutment (Figure 1). Apart from the porcelain fracture, the abutments were undamaged.

There are a number of reasons why the porcelain on a PFM bridge might fracture. Damage can result from a poor bond of the ceramic to the underlying metal substructure. Durability can also be affected by the development of micro-cracks in the ceramic during fabrication of the bridge in the laboratory.

An underlying occlusal parafunction, not identified during the planning and preparation stages, or during the fitting of the restoration, might also result in a fracture.

## Treatment options

I discussed several restorative options with the patient. These included a composite repair of the fractured ceramic, a ceramic veneer to cover the fractured portion of the bridge, or the removal of the fractured bridge and the fitting of a replacement.

The patient decided to have the ceramic fracture repaired with a direct composite resin restoration. She chose a ceramic repair because it was the most economical option.

## Preparing the metal and the porcelain

Following composite shade selection and anaesthesia, a retraction cord was placed around the abutment cervically. The retraction cord provides moisture control from the gingival crevicular fluid, which could jeopardise the success of the restoration.

The metal substructure of the abutment was roughened and small grooves were created with a diamond bur to provide macro- and micro-mechanical retention for the overlying composite restoration (Figure 2).

The glaze from the remaining porcelain was removed with a diamond bur. The porcelain was then etched with a buffered hydrofluoric acid for 90 seconds, and then washed and dried. It was etched again with 37% orthophosphoric acid for 10 seconds. This process removes the residue of the hydrofluoric acid, which creates a frosty appearance on the porcelain surface and

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reduces the strength of the bond.

It is important to have a clean and chemically reactive surface for the next step. After further washing and drying, silane was applied to the porcelain, left for 20 seconds and then gently air dried.

## Bonding to metal and porcelain

A metal primer was used to condition the metal substructure and air dried. A self-etching universal resin cement was applied to the metal and the conditioned porcelain.

The luting cement was applied to the exposed metal and light cured (Figure 3). The luting agent bonds effectively to the metal substructure because it contains the active ingredient 10-methacryloyloxydecyl-dihydrogen-phosphate (10 MDP). An opaque shade of cement was used to mask the colour of the metal.

A gold stain was applied to tone down the opacity and reduce the 'shine through' effect (Figure 4). This helps to prevent the opaquer showing through the final restoration.

**Figure 5: A Kulzer Venus Supra polishing kit was used to give the restoration a high lustre**

**Figure 6: The composite provided an economical repair to the fractured bridgework and remains fully intact after four years**

## Composite build-up

The fractured ceramic abutment was built up using Heraeus Kulzer Venus Pearl dentine and enamel composites in Opaque Medium Chromatic (OMC) and A3 shades. The dentine range contains the least translucent of the Venus Pearl shades. They mask any unwanted discolouration that may show through and compromise the final aesthetic outcome.

A final 1-1.5mm layer of A3 shade enamel composite was placed. The Venus Pearl enamel shades are also opaque and can, therefore, be used in slightly thicker increments without affecting the value of the restoration. A Kulzer Venus Supra polishing kit was used to give the restoration a high lustre (Figure 5).

**The new generation of Kulzer composites are also totally free from bisphenol A, which scientists believe mimics oestrogen activity in the body**

Venus Pearl is a nanohybrid composite with good chameleon properties and polishes well to a high shine with minimal effort. Venus Pearl composites are long lasting and durable with minimal chipping and fracture due to the presence of tricyclodecane urethane dimethacrylate (TCD-UDMA) and a high monomer conversion. The new generation of Kulzer composites are also totally free from bisphenol A, which scientists believe mimics oestrogen activity in the body.

The patient was very happy with the final result. The composite provided an economical repair to the fractured bridgework and remains fully intact after four years (Figure 6). D

**Dr Nadeem Younis BDS (Sheff) DGDP (UK) DPDS (Bristol) has a special interest in orthodontic and cosmetic dentistry. He is a partner in the Bridge Dental Practice in Burnley. He is a clinical assistant in orthodontics at Burnley General Hospital and has been accepting referrals for orthodontic treatment for the last 20 years. Nadeem is a full member of the British Academy of Aesthetic Dentistry. He is involved in training newly qualified dentists and currently lectures widely on aesthetic dentistry. Dr Younis qualified from the University of Sheffield in 1993.**

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