Realizing efficient and predictable posterior quadrant restorations

Efficiency and long-lasting stability of the result are important requirements that are placed upon direct restorative procedures with composite. In this context, a system of well-coordinated materials is the definite key to success

By Michael R. Sesemann, USA

It is not uncommon for middle-aged and older patients to present with multiple failing amalgam restorations in a single quadrant. Many such restorations can be replaced conservatively with direct composite. Unfortunately, however, many of the placement and accompanying adhesive protocols required for predictability can be time-consuming and technique sensitive. Therefore, it is important to understand the historical development of adhesive dentistry when considering today's etching and adhesive protocol options.

In the beginning

Conceptualized more than 50 years ago, Buonocore proposed bonding to enamel and dentin by first treating those surfaces with phosphoric acid before applying resins. Although he considered resin tag formation in the micro-porosities of etched enamel to be principally responsible for adhesion to enamel, bonding to dentin was less predictable due to dentin's composition, water content and smear layer. Not surprisingly, the first dental adhesives were resins that only bonded to enamel; there was little to no dentin bonding. Ongoing changes in material composition, adhesive mechanism, application method and overall adhesive techniques fuelled the evolution of adhesive dentistry and the introduction of increasingly esthetic restorative materials. They also led to different adhesive etching products and protocols.

"Total-etch" or "etch-and-rinse" technique

In "total-etch" or "etch-and-rinse" techniques, both enamel and dentin are etched with phosphoric acid to remove the smear layer and condition the preparation prior to bonding, with enamel being etched longer than dentin. The etchant and smear layer are then rinsed off with water and dried. Because dentin should remain moist and slightly glossy in appearance, care must be taken to not over-dry the dentin. This prevents collagen fibrils from collapsing, which would create a less permeable surface for hydrophilic monomers in the adhesive, as well as a weak interface, potentially leading to a poor bond and postoperative sensitivity. Although wellestablished and clinically proven, total-etch adhesives and their associated multi-step techniques are often considered to be technique sensitive.

Selective-etch technique

With selective etching, only the enamel edges of the preparation are etched with phosphoric acid and then rinsed with water. The dentin is conditioned afterwards with either a primer or all-in-one self-etching adhesive; the smear layer is only modified, not removed by rinsing with water after primer application. This over-etching of the dentin could result in reduced bond strength and postoperative sensitivity.

Self-etch technique

Intended for adhesive bonding without separate etching, the self-etch technique relies on adhesive materials containing acidic monomers that etch and prime enamel and dentin. Demonstrating a milder pH level than total-etch products, self-etch adhesives pose less risk for excessive dentin demineralization, and because the technique sensitive step of precisely drying the dentin is eliminated, collagen-fibre collapse is prevented. Combined, these attributes reduce the likelihood of postoperative issues.

Realizing predictable efficiency today

Manufacturers have successfully increased the adhesive portfolio by introducing universal adhesives that promote high bond strength to enamel and dentin, and which can be used on both dry and moist dentin. Because they are designed to work with or without phosphoric acid, universal adhesives (e.g. Adhese® Universal) are suitable for selective-etch techniques, without fear of over-etching the dentin.

Materials of choice

When replacing multiple failing amalgam restorations in a single quadrant using direct composite, I prefer using the selective-etch technique because it delivers the "best of both worlds". It provides strong micro-mechanical retention at the enamel margin with less probability of postoperative sensitivity, since the dentinal tubules are not completely opened.

My preferred adhesive for such techniques is Adhese Universal, which is available in traditional bottle and unique VivaPen® delivery. For me, the ergonomic, pen-like VivaPen design and angled brush cannula enhance comfort, control and speed during direct intraoral application while reducing material waste. Containing 2 millilitres of adhesive, the VivaPen can accommodate approximately 190 single-tooth applications, which is almost 3 times the applications per millilitre compared to conventional bottle delivery. As a result, the Adhese Universal VivaPen cost per application is considered to be lower than that of all other leading universal adhesives.

Also contributing to more cost-effective and time efficient direct posterior restorations is the use of a bulk-filled composite (e.g. Tetric EvoCeram® Bulk Fill, Tetric EvoFlow® Bulk Fill). Because they can be placed in a single increment or layer of up to 4 mm, then fully cured, they help eliminate time consuming techniques.

Case presentation

A 51-year-old male patient presented with multiple failing amalgam restorations (teeth 14 through 17) that exhibited marginal leakage and required replacement (Fig. 1). Rubber dam isolation was established. The existing amalgam restorations and any decay was removed using a carbide bur and the preparations were refined using a diamond bur. Following this, the preparations were cleaned and disinfected with 2 % chlorhexidine gluconate antibacterial scrub.

First, tooth 17 was restored. A segmented matrix set-up with two 3D-XR rings (Garrison Dental Solutions) and 5.5-mm Slick Band was placed to facilitate predictable and ideal interproximal contacts. The preparation enamel was selectively acid-etched with 37 % phosphoric acid for 20 seconds. After a universal adhesive (Adhese Universal) had been applied and light-cured, a layer of Tetric EvoFlow Bulk Fill in shade IVW was placed, then light-cured for 10 seconds. The cured Tetric EvoFlow Bulk Fill layer exhibited dentin opacity (Fig. 2).

The restoration for tooth 17 was completed with a capping layer using Tetric EvoCeram Bulk Fill, which was smoothed with a modelling instrument designed for composite materials and light-cured for 10 seconds. Next, the restoration was contoured using a fine diamond and polished using discs and points. The cavity of tooth 14 was also conditioned with universal adhesive (Fig. 3). Then a single increment of Tetric EvoCeram Bulk Fill composite in shade IVA was

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Fig. 1: Preoperative view showing multiple failing side-by-side amalgam restorations in the maxilla

Fig. 2: View of the completed Tetric EvoCeram Bulk Fill direct composite restoration for tooth 17

Fig. 3: Adhese Universal adhesive was applied to the preparation for tooth 15. Due to hygienic reasons, the manufacturer recommends using the VivaPen Protective Sleeve for intraoral application.

Fig. 4: A single increment of Tetric EvoCeram Bulk Fill composite was placed in the tooth 14 preparation ...

Fig. 5: ... and free-hand contoured utilizing a thin, long-bladed instrument.

Fig. 6: Post-cure contouring of the restoration was completed using a fine diamond.

Fig. 7: Interproximal polishing was completed using a finishing strip.

Fig. 8: The preparation enamel in tooth 16 was selectively acid-etched.

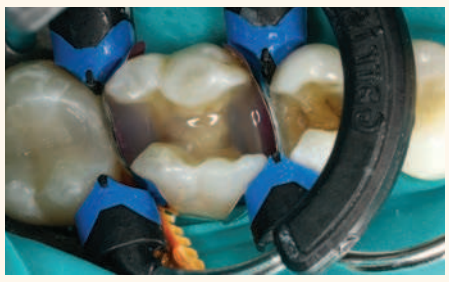

Fig. 9: An initial layer of Tetric EvoFlow Bulk Fill was placed into the cavity.

Fig. 10: Finishing of the tooth 15 restoration

Fig. 11: Polishing of all restorations in the quadrant using a silicone brush and diamond paste

Fig. 12: The occlusion was checked after occlusal adjustments had been made.

Fig. 13: Postoperative view of the completed composite restorations

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placed (Fig. 4) and free-hand contoured utilizing a thin, long-bladed composite instrument (Fig. 5). The composite was then cured for 10 seconds, after which it was contoured using a fine diamond (Komet Brasseler, no. 8368-016) (Fig. 6). Initial post-curing polishing of the restorations was completed using a silicon dioxide disc (3M Soflex), followed by polishing with a Brownie point (Komet Brasseler). Interproximal areas were polished using a finishing strip (Epitex Medium, GC America) (Fig. 7).

Then restoration of tooth 16 began by placing a segmented matrix set-up with two 3D-XR rings and 5.5-mm Slick Band, after which the preparation enamel was selectively acid-etched (Fig. 8). A layer of Tetric EvoFlow Bulk Fill in shade IVW was placed up to the promixal box and to the pulpal floor and then light-cured for 10 seconds (Fig. 9). Then Tetric EvoCeram Bulk Fill composite in shade IVA was extruded into the preparation as the second layer. The restoration was contoured using a fine diamond and polished using discs and points. Restoration of the quadrant continued by conditioning the tooth 15 preparation. Also for this restoration, Tetric EvoFlow Bulk Fill in shade IVW was applied as the initial composite layer and supplemented with Tetric EvoCeram Bulk Fill composite as the capping layer. After light-curing, the restoration was finished and polished using a carbide finishing bur (no. 7408-023, Komet Brasseler) (Fig. 10).

Polishing of all restorations in the quadrant was completed with a silicone brush and diamond paste (Fig. 11). After removing the rubber dam, the occlusion was checked (Accufilm Red/Black, Parkell) (Fig. 12).

Conclusion

The combination of selective etching using a universal adhesive and placing bulk-fill composite facilitates restoring various teeth in the posterior region. This method allows virtually invisible restorations to be achieved that are indistinguishable from surrounding dentition (Fig. 13). As Tetric EvoFlow Bulk Fill changes its translucency during polymerization and obtains a dentin-like opacity, the natural translucency of teeth can be more easily mimicked and small stains are even masked.

The restorations are also permanently stable and esthetic, yet completed in less chair time, which makes practices more efficient and saves patients time and money. Because the conventional technique-sensitive procedures associated with adhesive direct composite restorations are eliminated, so are the potential complications. DT

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Clinical Endo Diploma Starting in Dubai with Fundamentals of Endodontics

By Dental Tribune MEA / CAPPmea

CAPP-Tipton Dental Academy and the British Academy of Restorative Dentistry (BARD) are launching the Clinical Endodontics Dentistry Certificate and Diploma programme in Dubai, UAE on 20 April 2017 with faculty lead Prof. James Prichard, UK. The organisers will welcome 24 delegates from Bahrain, Hong Kong, India, Iran, Iraq, Oman, Pakistan, Saudi Arabia, Qatar and UAE for the first module which will take place in the CAPP Training Institute between 20-23 April 2017. The four days will cover "Fundamentals of contemporary endodontics" which will include "Understanding of instrument design and its effect on prevention of iatrogenic errors" and a hands-on training on "hand filing and lateral compaction techniques."

The programme prepares the delegates to threat complex and challenging cases such as retreatment which have higher failure rates when performed by dentists who have not receive specialist training. The programme will employ several methods of delivering education.

The core of the course falls in to two areas of training: academic and hands-on training skill enhancement with traditional and contemporary endodontic techniques. In the academic part, the education will be delivered via didactic lectures, seminars and student presentations. This format would allow for delivery, assimilation and cementation of knowledge based on scientific evidence. In the hands-on training the delegates will be trained in access, shaping, irrigating and obturating techniques that are widely commercially available within the Middle East.

The structure of training will move students from learning classic hand-filing to contemporary hand-filing with NiTi instruments and subsequently move onto rotary NiTi and Reciprocating NiTi. This will work hand in hand with learning classic obturation with cold techniques to thermal techniques and single cone techniques. Prof. James Prichard as faculty lead brings with him a team of teachers with vast knowledge in Endodontics such as Prof. Paul Tipton from UK, Dr. Antonis Chaniotis from Greece, Prof. Edward Lynch from UK, Dr. Adam Toft from UK and Dr. Justin Dinley from UK.

The Certificate consists of three modules which will take place every three months. Each module is four days long. The course offers the participants a chance to obtain a Certificate in Clinical Endodontics from the British Academy of Restorative Dentistry (BARD). After a successful completion of the Certificate course, the participants will have the chance to sign up for the Diploma course which will lead to Post-Graduate Diploma in Clinical Endodontics from the British Academy of Restorative Dentistry (BARD). The Diploma consists of additional three modules which will take place every three months. Each module will be four days long.

Prof James Prichard, UK, Visiting Professor and Programme Leader, MClinDent in Endodontology at BPP University working with the City of London Dental School.

After completion of the Diploma, there is an option for delegates to take the pathway to Masters in Clinical Dentistry (MClinDent) in Endodontology with City of London Dental School (CoLDS) and BPP University. Registration is now open for group 2 which will start later in 2017.

For more information about the programme visit:
www.cappmea.com/endo

This is the second programme that CAPP-Tipton Dental Academy and the British Academy of Restorative Dentistry (BARD) have started in Dubai, UAE. There are two groups totaling 57 delegates already participating in the Restorative & Aesthetic Dentistry Diploma which started in 2016 and a third group starting in October 2017. DT

For more information about the programme visit:
www.cappmea.com/capptipton