Creating natural-looking composite restorations

Dr Daniel H. Ward, USA

Improved materials and instruments help us to produce restorations that are natural looking. Composite systems have been developed that have optical qualities similar to the tooth structure they are replacing.[1] Composite materials with dark opacity and fluorescence are useful to recreate dentine.[2] Enamel replacing materials with added translucency and opalescence give the outer surface of the tooth a realistic appearance.[3] Layering multiple shades with differing hue, chroma and value can give the tooth a more three-dimensional look.[4]

Composites have been developed with differing approaches using two, three, or more layers. Having multiple systems can be beneficial. Recently, a new laser (LiteTouch, AMD LASERS) has been introduced at a significantly lower cost allowing it to be incorporated into more dental offices. Being able to quickly prepare teeth often without anaesthesia has been a significant advantage of using hard tissue lasers.[5] Small to medium sized restorations can often be prepared without the use of local anaesthetics. Let's examine how these new materials and technologies can be used.

Layered restorations

Layered restorations are helpful in the anterior area to emulate the appearance of natural teeth. Restorative materials should mimic the tooth structure they replace. The deepest part of the restoration should be dark, more opaque and very high in chroma. Unfortunately, there are few dentine shaded composites that truly match dentine. Very intense yellow/brown materials are needed.[6] One system which is excellent for matching tooth structure is aura (SDI).

The system originally had two materials, a dentine and an enamel replacement material, but an optional middle layer has been added. This helps to block the intense chroma of the dentine and blend the restoration colour better. It also helps to make the exact thickness of the dentine and enamel shade layers less critical. The dentine shades do not coincide with any standard shading system but differ in the intensity of the chroma, ranging from Db, C1 to C7.

Literature

As you build up the restoration, the material should become lighter, more translucent, opalescent and have smaller filler particles. The aura system has an optional intermediate layer which is a multi-purpose composite MC2 to MC5. The final enamel layer is a microfill and it comes in three shades. It is translucent and polishes well.

Case presentation

A 15-year-old male presented to the office with peg lateral incisors and twisted maxillary canines (Fig. 1). His mother was interested in closing the spaces between his teeth. The sizes of the teeth were measured and it was determined that the central incisors were of normal size relative to the face. The widths available for the lateral incisors were deemed to be 70 % of the frontal view widths of the central incisors. The widths of the maxillary canine teeth were also deemed to be 70 % of the frontal view widths of the lateral incisors.

This follows the recommendations of proportional smile design using the RED proportion which states that the frontal view width proportions of the anterior teeth should remain constant as you move distally.[7] The photograph with template demonstrates the ability to add to the lateral incisor and the canine and give a well-proportioned smile that matches the face (Fig. 2).

The surface of the maxillary right canine was lightly roughened using a very fine diamond to areas to be bonded (201.3VF, Premier Dental). The entire surface was etched with phosphoric acid for 20 seconds, washed and dried thoroughly. A universal dentine bonding agent was brushed onto the surface for 20 seconds, the solvent evaporated and the area light cured (All-Bond Universal, BISCO Dental). The first increment added was the dentine layer. This layer is darker than the desired restoration but more opaque in order to block light from shining through the entire restoration and prevent a grey appearance. Dentine shade 6 was used since it mimics the shade of the natural dentine (aura, SDI; Fig. 3).

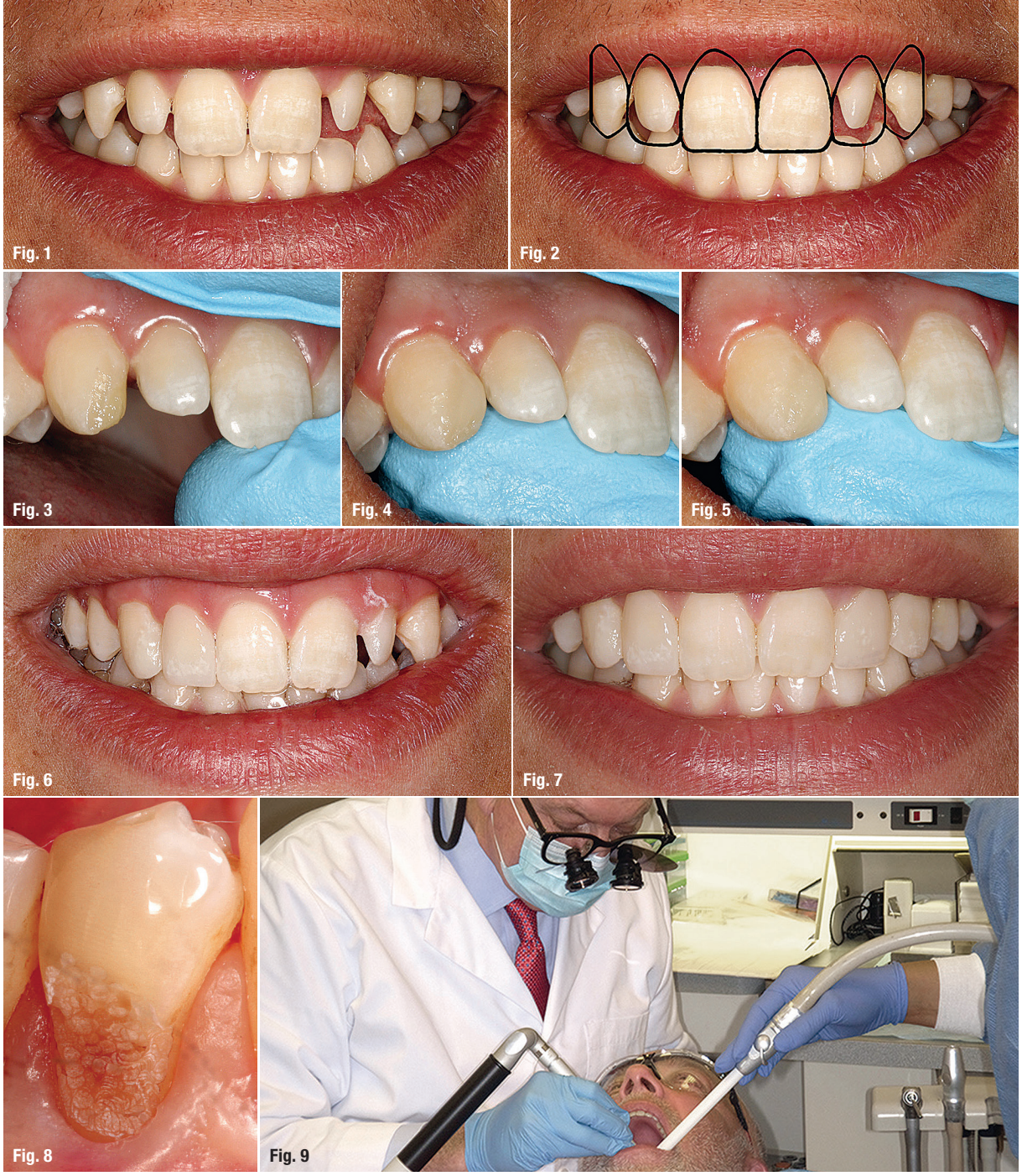

Fig. 1: A 15-year-old male presented with peg lateral incisors and twisted maxillary canines. **Fig. 2:** Photograph with template. **Fig. 3:** Dentine shade 6 was used to mimic the shade of the natural dentine. **Fig. 4:** Multi-purpose composite shade MC3 was added. **Fig. 5:** Enamel shade layer E1 was added. **Fig. 6:** Finished restoration for the right maxillary lateral incisor. **Fig. 7:** Finished restoration for the left canine and lateral incisor. **Fig. 8:** Preparation is accomplished by a series of pulsed energy emissions resulting in multiple small dot-shaped areas of tooth removed on the surface of the tooth. **Fig. 9:** The handpiece is constantly moved and the resulting tooth shaping is observed.

The second increment added was multi-purpose composite shade MC3 (aura, SDI; Fig. 4). White, orange and brown tints were painted over the second increment to characterise and mimic the shade patterns of the adjacent teeth (shade modification tints, SDI). Finally, an enamel shade layer E1 was added to cover the entire restoration and build to full contour (Fig. 5). The restoration was shaped using diamonds and finishing carbides. Finishing and polishing was completed for the canine. The process was completed for the right maxillary lateral incisor (Fig. 6). Then the left canine and lateral incisor were restored in a similar fashion (Fig. 7).

Er:YAG lasers

Erbium lasers deliver pulsed energy onto the water, containing surface of the tooth and the water is vaporised ablating the surrounding tooth structure. Preparation is accomplished by a series of pulsed energy emissions resulting in multiple small dot-shaped areas of tooth removed on the surface of the tooth (Fig. 8). The effect is very superficial with less vibration and heat.[9] A primary advantage of tooth preparation with Er:YAG is often preparation can be achieved with little or no anaesthesia.

It is important to start with very low energy for the first minute to condition the pulp so that there is no discom-

Fig. 10: A 27-year-old male presented with pitted and stained incisors. **Fig. 11:** Composite from a new two-component general purpose and enamel system. **Fig. 12:** Preparation of the affected areas of the facial surfaces of both central incisors and the left lateral incisor. **Fig. 13:** The right central incisor was built up first using the general purpose shade A3 composite. **Fig. 14:** Enamel shade ET composite was used. **Fig. 15:** Restoration was shaped, finished and polished.

fort during preparation. The lowest energy to accomplish the preparation is best and is controlled by the pulsing frequency and the power setting. The laser handpiece does not touch the tooth during preparation. The optimal distance from the tooth is best determined by listening for the pulses to be the loudest. The handpiece is constantly moved and the resulting tooth shaping is observed (Fig. 9).

Preparation parallel to the tooth surface is best. Though actual preparation time may be longer than with a traditional high-speed handpiece, the time saved by not waiting for anaesthesia often allows small restorations to be placed at recare appointments rather than having to reappoint. Lasers are suitable for use in most direct restorative preparations but are best suited in Class I, III, and V restorations.

Pitted incisors

Several companies produce composites designed to be used in a dual-layering technique. Some use a high chroma dark dentine and translucent enamel; others use an opaquer general purpose layer which is layered with a translucent enamel. One material which uses the later approach is Mosaic (Ultradent).

A 27-year-old male presented to our office with pitted and stained incisors (Fig. 10). He was getting married in a few months and was concerned about the appearance of his smile in the wedding photographs. Composite from a new two-component general purpose and enamel system was tried in and layered to determine the appropriate shades to be used (Fig. 11). The laser was used to prepare the affected areas of the facial surfaces of both central incisors and the left lateral incisor (Fig. 12).

The left incisors were restored using two layers. The surface was shaped using a very fine flame shaped diamond (NeoDiamond 3512.10, Microcopy), a finishing carbide (NeoCarbide ET9, Microcopy), a finisher (Enhance, DENTSPLY Caulk) and two polishers (DiaComp Feather Lite Medium and Fine Composite Polishers, Brasseler). The right central incisor was built up first using the general purpose shade A3 composite (Mosaic, Ultradent; Fig. 13) and then the enamel shade ET composite (Mosaic, Ultradent; Fig. 14). The restoration was shaped, finished and polished in a similar manner (Fig. 15).

Class V abfraction lesions

Sometimes different composites from different manufacturers can be layered to best achieve a more natural appearance. A 52-year-old male presented to our office with severe abfraction lesions (Fig. 16). Several composite materials were tried in and three layers of different brand composites were selected. The molar was first prepared using the laser and restored. Then the two premolars were prepared using the laser (Fig. 17).

The first layer of dentine material was used (aura Dentine D7; Fig. 18). Then a layer of regular all-purpose shade A3 composite was used (TPH Spectra, Dentsply; Fig. 19). Finally, a spherical composite shade A2 was used for the enamel layer (Estelite Sigma Quick, Tokuyama; Fig. 20). The composites were shaped, finished and polished (Fig. 21).

Fig. 16: A 52-year-old male presented with severe abfraction lesions. **Fig. 17:** Two premolars were prepared using the laser. **Fig. 18:** The first layer of dentine material was used. **Fig. 19:** A layer of regular all-purpose shade A3 composite was used. **Fig. 20:** A spherical composite shade A2 was used for the enamel layer. **Fig. 21:** The composites were shaped, finished and polished.

Summary

Teeth are comprised of different components. In order to match the original appearance, restorative materials should be used that exhibit similar optical qualities as natural teeth. Selecting composite materials for each individual situation, based on physical properties as well as their opacity/translucency, gives the best results. The hard tissue laser can be very useful and comfortable for the patient. Often not having to anaesthetise is a big advantage allowing more efficient use of time. Incorporating new technology and materials into the practice can enhance productivity, increase self-satisfaction and better please our patients.

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contact

Dr Daniel H. Ward
Private Practice
1080 Polaris Parkway Suite #130
43240 Columbus, USA
Tel.: +1 614 430 8990
dward@columbus.rr.com
www.drward.com

Author details

Kurz & bündig

Zähne bestehen aus verschiedenen Komponenten. Um dem ursprünglichen Aussehen zu entsprechen, sollten Restaurationsmaterialien verwendet werden, die ähnliche optische Eigenschaften wie natürliche Zähne aufweisen. Für die Vorbereitung der betroffenen Areale eignet sich der Hartgewebslaser. Er ermöglicht eine effiziente Bearbeitung der Zähne unter weitgehendem Verzicht auf eine lokale Anästhesie. Im Artikel beschreibt der Autor die Verwendung unterschiedlicher Schichttechniken und Materialien sowie den Einsatz des Er:YAG-Lasers zur Zahnrestauration anhand von drei Patientenfällen. Ein 15-jähriger Patient wurde vorstellig mit kleinen seitlichen Schneidezähnen und verdrehten Eckzähnen im Oberkiefer. Unter Einsatz des Restaurationssystems aura wurden die Lücken zwischen den Zähnen geschlossen und ein wohlproportioniertes Lächeln passend zum Gesicht hergestellt. Im zweiten Fall wurden die löchrigen und fleckigen Schneidezähne eines 27-jährigen Patienten mit einem Verbund aus einem Zwei-Komponenten-Allzweck- und Lacksystem restauriert. Der Laser wurde verwendet, um die betroffenen Bereiche der fazialen Oberfläche vorzubereiten. Der dritte Fall beschreibt die Behandlung eines 52-jährigen Mannes, der mit schweren Abfrakturen vorstellig wurde. Zur Restauration wurden drei verschiedene Kompositschichten aufgetragen. Vor der Präparierung wurden die betroffenen Zähne mit dem Laser behandelt und restauriert. In allen drei Fällen konnte mittels unterschiedlicher Schichttechniken und Laseranwendung ein ästhetisch zufriedenstellendes Ergebnis erzielt werden.