

Aesthetic layering technique

Juergen Manhart describes an anterior composite restoration.

Today, aesthetic needs play a crucial roll in dentistry. In June 2002, an Emnid (a German marketing research organisation) survey revealed that 85 per cent of the people surveyed think healthy and beautiful looking teeth belong to being attractive. The Bengerno Institute/Counseling Centre conducted a similar survey where 52.2 per cent of the Germans polled found that an aesthetically flawless smile is very important and important for another 39.7 per cent. The patients have been made sensitive to the topic of

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aesthetics by both advertising and press reports regarding beautiful teeth. The majority of the population is very conscious of the impact of a healthy smile and even ready to pay co-charges for the cost of restoring/creating a beautiful one.

In order to create a restoration that practically cannot be distinguished from the tooth substance, a composite system is needed which offers the shades in sufficient levels as well as multiple opaque and translucent shades.

Highly aesthetic restorations can be achieved with opaque, body (intermediate opacity) and translucent shades using a multi-

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● Fig 1: Initial situation: defect composite filling in the mesial area of the right central incisor (tooth 11).



● Fig 3: Checking the silicon index for imperfections.



● Fig 5: Isolation of the treatment area with a rubber dam.

shade (polychromatic) layering technique. Some composite systems consist of over 30 different shades and translucencies for fabricating highly aesthetic restorations. Plenty of experience is required for working with these materials which are applied using a layering technique with two or three different opacities /



● Fig 2: Fabricating a silicon index.



● Fig 4: Situation after removal of the old composite filling and expanded bevelling of the preparation margins ('long bevel').



● Fig 6: Verification that the silicon index fit is free from tension and gaps.



● Fig 7: Using an explorer to mark the palatal filling contour on the key.

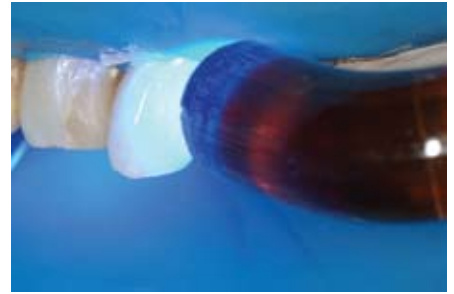
restorations



● Fig 8: Conditioning the tooth surface with phosphoric acid.



● Fig 9: Application of a generous amount of adhesive.



● Fig 10: Light polymerisation of the adhesive.



● Fig 11: Layering the silicone index extra-orally with the enamel shade along the marked points.



● Fig 12: Carefully applying the composite-loaded silicon index to the tooth from the palatal side.



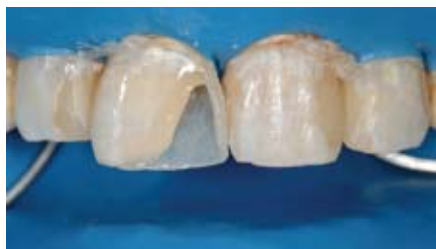
● Fig 13: Completed palatal surface and incisal edge with enamel composite. A transparent matrix band is inserted into the interdental space to prepare the proximal area build-up.



● Fig 14: Building up the proximal surface with the enamel shade.



● Fig 15: Light polymerisation.



● Fig 16: After the matrix has been removed, the result is a three dimensional enamel composite mould.

translucencies. The practitioner will usually have to endure a more or less difficult learning process to be able to anticipate the effect of the individual shades and opacities in varying layer thicknesses in different situations of natural tooth structures. Within the group of dental manufacturers which produce highly aesthetic composites, there are ambitions to offer such restoratives in a reduced set of shades and translucency levels for which the application technique is simple, not prone to errors and accomplished with a modest amount of inventory stocked in the dental surgery.

In addition to the correct choice of base shade, the shade effect of the finished restoration mainly depends on the layer thickness ratio of the different opaque/translucent composite shades. It is generally recommended to apply the very translucent enamel shades rather sparingly; otherwise, the restoration may have an overall grey and excessively transparent appearance. The main application of the highly aesthetic polychromatic layering technique is the restoration of

defects in anterior teeth.

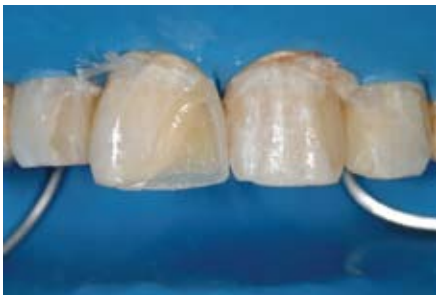
Direct tooth-coloured composite restorations permit the conservative treatment of even large defects in anterior teeth in one appointment. They are also currently used – with a suitable indication, correct application of the aesthetic analysis, a careful polychromatic layering technique and conscientious, skilled work by the practitioner – in many demanding situations in competition with laboratory fabricated all-ceramic restorations (veneers, crowns).

Clinical case

The following clinical case represents the step-by-step procedure for placing a multi-layered polychromatic composite restoration. In this case, a simple one-shade layered composite restoration was not an aesthetically sufficient possibility.

A 33-year-old patient presented at our surgery requesting replacement of the partially fractured mesial class IV composite build-up on the right central incisor (tooth 11; FDI notation) (fig 1). The patient reacted

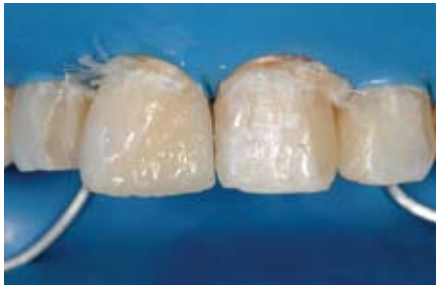
restorations



● Fig 17: First increment of the dentine shade with build-up of the internal tooth structure including mamelons.



● Fig 18: Light polymerisation.



● Fig 19: Further build-up of the internal tooth structure with the dentine shade.



● Fig 20: Light polymerisation



● Fig 21: Areas of demineralisation are imitated with a flowable white-opaque composite.

● immediately when the tooth's vitality was thermally tested and there was no reaction to the percussion test. All other upper incisors already had been conservatively treated with multiple composite fillings as well, the entire anterior tooth situation exhibited considerable aesthetic deficiency. The patient, however, did not want any other treatments.

Tooth 11 was to be restored with a direct composite restoration using a polychromatic layering technique. At the beginning of the treatment, the aesthetic analysis was conducted on the moist tooth with the selection of opaque dentine shade O3 and the translucent enamel shade TN from the Amaris (VOCO, Germany) composite system. Amaris is a two-translucency composite system which consists of five graduated opaque dentine and three translucent graduated enamel shades in addition to the flowables shades highly opaque (HO) and highly translucent (HT).

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The right central incisor was considerably wider than the left one because of its mesial composite filling. According to the patient, a pre-existing slight diastema had been closed several years ago on one side with the existing composite filling. After we explained the aesthetic results would be more pleasing if we used this opportunity to close the diastema from both sides, thus achieving two central incisors with identical width, the patient rejected the proposal and restated his request for replacing the defect filling in tooth 11 with closing the diastema.

Afterwards, the fractured area of the composite filling in tooth 11 was temporarily replaced with new composite so that a complete palatal and incisal contour could be registered with a silicon index (fig 2). With this moulding aid, the palatal and incisal contour of the tooth could easily be recreated when fabricating the definitive restoration. A time-consuming

adjustment of premature contacts and interferences in the area of the palatal guidance surfaces of the definitive restoration is elegantly avoided. The silicone index provided a boundary for the outer contours of the restoration in the incisal and palatal direction, giving the opportunity that the individual shades of opaque and translucent composite can be applied in the correct layer thickness on the appropriate position using a polychromatic layering technique. The silicone index is extended to a minimum of one neighbouring tooth on each side to guarantee adequate support. The impression must be perfect in the area of the tooth being restored (fig 3).

After fabricating and checking the silicone index, the old composite filling was removed. Both the preparation margins and the incisal edge are subsequently bevelled on the aesthetically important labial surfaces with a fine-grained finishing diamond bur to provide a long bevel (approx. 2.5mm) (fig 4). The long bevel enables a harmonious shade transition from composite to tooth substance. Only a short bevel (0.5mm–1mm) is carried out on the palatal side which is not visible.

After isolating the treatment area with a rubber dam (fig 5) and trimming the silicone index with a scalpel to exclude interference with the rubber dam, the silicone index is checked to ensure there is no tension or gaps when repositioned on the teeth (fig 6). Simultaneously the silicone index is marked with an explorer along the length of the palatal preparation margin in order to later determine the correct amount of composite to place as well as the correct dimensions (fig 7). By separating the operation field from the oral cavity, the rubber dam facilitates effective, clean work and guarantees the adhesive working area is free from contaminating substances such as saliva, blood and crevicular fluid. ●



● Fig 22: Light polymerisation.



● Fig 23: The restoration is completed by applying a labial veneering layer of enamel composite.



● Fig 24: Completed restoration after finishing and polishing at the follow-up appointment. The aesthetics and function of the tooth could be completely restored.

☞ The result of a long-term successful clinical treatment with perfect marginal integrity is acutely jeopardised by the contamination of the etched tooth substance.

Afterwards, the tooth substance is conditioned with 37 per cent phosphoric acid (fig 8), thoroughly cleaned with an air-water-spray, with the excess water being carefully removed from the tooth surface with compressed air. A generous amount of adhesive (Solobond M, VOCO, Germany) is then applied to the tooth surface with a microbrush (fig 9). After the solvent has been carefully evaporated from the adhesive system, the bond is polymerised with a light-

curing device (fig 10).

The silicon index loaded with a thin layer (approx. 0.5mm) of the enamel shade (TN) from the Amaris composite system (VOCO, Germany), which has been applied extra-orally (fig 11), is carefully pressed against the palatal side of the prepared tooth. The gap-free adaptation is verified on the neighbouring teeth (fig 12) before the first layer of composite is cured with a polymerisation light. After removing the silicone index, the palatal guidance surfaces and correct position of the incisal edge, both made of enamel shade, are easily recognisable. As preparation for building up the mesial proximal area, a transparent matrix is placed in the interdental space along with a wooden wedge to secure it (fig 13). The proximal surface is built up in the accurate 3D contour with enamel shade TN in approx. 0.5mm layer (fig 14) and then polymerised (fig 15).

The matrix can be removed after curing the proximal area of the restoration to facilitate application and shaping of further increments. A 3D enamel composite mould has been formed now which subsequently must only be filled with the dentine shade and enamel-veneered labially (fig 16). At this juncture, the appropriate dentine shade (O3) is applied in layers and polymerised to form the internal tooth structure. Dentine mamelons are added to match the natural tooth features (fig 17 and 20). White-coloured demineralisation spots are imitated on the surface of the cured dentine shade with a flowable, white-opaque composite (Grandio Flow, shade WO, VOCO, Germany) using a small endodontic instrument (size ISO10) (fig 21). When the tooth and neighbouring tooth (tooth 21) were analysed before the treatment, this was determined to be necessary to create a direct composite restoration which cannot be differentiated from adjacent natural tooth substance. After light-curing the individual characteristics created with the flowable composite (fig 22), the restoration is completed with a

labial veneering made from the enamel shaded (TN) composite (fig 23).

The restoration is finished with fine-grit diamond burs after removing the rubber dam. A modest surface texture has been integrated into the composite restorative before the final polishing procedure with an Occlubrush polisher and afterwards polishing paste. A slight enamel contouring (enameloplasty) was conducted on the distal contour of the right central incisor tooth with a finishing diamond bur to soften the discrepancy in the width of the two central incisors after first consulting with the patient. As a final step, a fluoride varnish was applied to the tooth with a foam pellet to protect the enamel that was unavoidably touched during conditioning and finishing. At the one week follow-up visit, the polychromatic multi-layered composite restoration could hardly be differentiated from the surrounding tooth substance. The aesthetics and function of the tooth were completely restored (fig 24).

Conclusion

Today an aesthetically ideal composite restoration can be achieved with appropriate material selection, the polychromatic layering technique, correct finishing and surface composition. Many challenging treatment situations in discriminating patients allow restoration using the direct composite technique. Direct composite restorations can be completed in one appointment without taking an impression or providing a temporary. Moreover, direct composite restorations are conservative as well as gentle to the tooth substance in comparison to indirect restorations (eg veneers, crowns). Direct composite restorations circumvent technician costs and the practitioner is independent from the uncertainties associated with restorations fabricated in a laboratory. ■

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