

Predictable diastema closure using an innovative, indirect mock-up technique

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Fig. 1

Diastemas can vary in number and size (Fig. 1). Causative factors include periodontal disease; traumatic occlusion; abnormal fraenulum; habits, including tongue thrust, tongue biting, nail biting; missing teeth (owing to accident or the congenital absence of a tooth bud); and hereditary factors.¹

Treatment options for diastema closure depend on the number and size of the spaces and on the aesthetic demands of the patient. Orthodontic space closure should be considered, and is often the treatment choice, particularly for young patients.² However, there are many situations where orthodontic treatment is not an option. Restorative treatment modalities range from very conservative direct composite resin restorations, through less conservative porcelain veneers, to more invasive indirect full-coverage restorations.

Fig. 1_ Pre-op view of diastema.

_Diastema closure with direct composite restorations can be a conservative treatment modality to improve the appearance of a smile. However, without proper diagnosis and treatment planning even the simplest looking diastema can turn into a very disappointing situation for the patient, as well as for the dentist.

ment choice, particularly for young patients.² However, there are many situations where orthodontic treatment is not an option. Restorative treatment modalities range from very conservative direct composite resin restorations, through less conservative porcelain veneers, to more invasive indirect full-coverage restorations.

Fig. 2_ Photo-imaging technique to simulate space closure.

Fig. 3_ Diagnostic wax-up on a study model.



Fig. 2



Fig. 3



Fig. 4



Fig. 5

Direct composite resin bonding may lack the permanency of indirect veneers and full-coverage restorations. However, conservation of sound tooth structure, less treatment time, ease of repair and the low cost of the treatment compared with other treatment modalities are very distinct advantages of direct bonding.

Visualisation of the final result is an important factor in the patient's acceptance of the treatment of diastema closures. Prior to direct resin bonding, several diagnostic steps and communication tools are available to present the anticipated treatment outcome to the patient. The simplest method of assessing the final outcome of a diastema closure is by means of using photo-imaging techniques of before and after images of the space closure (Fig. 2). Patients can then appreciate the outcome by looking at the modified image. However, photo imaging may pose a challenge to the clinician to reproduce exactly the modified after-image clinically or the final restoration will result in patient disappointment.

A diagnostic wax-up on a study model is a commonly used method to assess the treatment

outcome and present it to the patient (Fig. 3). The technique is easy to use and helpful in evaluating the anticipated shape and anatomy of the tooth. Disadvantages of diagnostic wax-ups are lack of relevance of waxing technique to the composite application technique, inability to match colours and difficulty on the patient's side to relate it to the clinical outcome on his/her teeth.

An innovative indirect mock-up technique with composite resin on a vinyl-polysiloxane (VPS) model allows the clinician to practice the diastema closure case, and assess the final shape and colour of the restoration. The indirect mock-up can then easily be placed on the patient's teeth to present the anticipated outcome without taking too much clinical time. This indirect mock-up also allows the patient to truly appreciate the final outcome on his/her actual teeth. The procedure involves an alginate impression of the patient's teeth poured with a VPS material, upon which composite mock-ups of the anticipated restorations are done. These mock-up shells are then transferred to the patient's mouth for evaluation.

Fig. 4 Fast setting VPS material is poured into the alginate impression.
Fig. 5 Gingival contour is trimmed with a #12 blade to prevent formation of a black triangle in the gingival embrasure area.

Fig. 6 Application of composite material with an IPC instrument.
Fig. 7 Pull-through technique with a celluloid strip from facial towards lingual.



Fig. 6



Fig. 7



Fig. 8



Fig. 9

Fig. 8_ Smoothing of the surface with a #3 synthetic sable brush.

Fig. 9_ Careful removal of the butterfly-shaped indirect mock-up from the VPS model.

Step-by-step procedure for the indirect mock-up technique

1. Take an alginate impression of the patient's diastema during the initial visit. The impression needs only to be of the anterior quadrant containing the diastema and a quadrant tray may be used if desired.
2. Immediately pour the alginate impression using fast set VPS material (Aquasil Ultra XLV, DENTSPLY), taking care to avoid bubbles (Fig. 4).
3. Measure width and length of central incisors and the diastema space on the VPS model. Typically, central incisors should be mirror images of each other, with similar width.
4. Trim the gingival tissue contour with a #12 scalpel blade to prevent formation of a black triangle in the gingival embrasure area (Fig. 5).
5. Place and contour a sculptable composite resin on one central incisor with a Gold Microfil instrument or IPC instrument, and smooth the surface with a #3 synthetic sable brush. The contour of the placed resin should produce the desired facial and proximal contours and extend lingually to just beyond the contact. It should not extend over the lin-

Fig. 10_ Pre-op view of patient's smile.

Fig. 11_ Placement of indirect mock-up into the patient's mouth to evaluate the outcome of the proposed treatment.

gual marginal ridge. Light-cure the restoration (Fig. 6).

6. Continue the composite build-up on the opposite central incisor. Attach the resin material to the tooth and while maintaining a hold on the celluloid strip with a fingertip on the facial side, pull the strip from the facial towards the lingual to push the resin material through the proximal to form a smooth contour adapted properly in the gingival area of the tooth (Fig. 7). Use a #3 brush to shape the material to the desired contour proximally and to form contact with the adjacent tooth. Use a brush to refine the facial and gingival embrasures, and light-cure (Fig. 8).
7. Remove the polymerised resin restorations and transfer the butterfly-shaped indirect mock-up to the patient's mouth (Fig. 9).
8. The mock-up allows the patient to evaluate the aesthetic outcome of the proposed treatment (Figs. 10 & 11).

Step-by-step procedure for the direct build-up of composite resin

1. Isolate the operative field with a retractor (OptraGate, Ivoclar Vivadent) and place re-



Fig. 10



Fig. 11



Fig. 12



Fig. 13



Fig. 14

traction cords (Ultrapak Cord, Ultradent) on teeth #8 and 9 after thoroughly pumicing the teeth. The proximal surfaces may be carefully cleaned with a sandpaper disc (Sof-LexXT, 3M) or a contouring strip (Epitex, GC). Care must be taken not to damage the soft tissue and cause field control problems.

2. It is generally not necessary to prepare the teeth with a bur, but a Sof-Lex contouring disc can be used to roughen the enamel surface (Fig. 12).
3. The direct build-up of composite resin is performed according to the same sequence used on the VPS model (Fig. 13). The difference is that the portions of the restorations lingual to the contact and over the marginal ridge are established in a secondary step with the celluloid strip pulling the material from the lingual to the facial.
4. The final diastema closure with composite resin should have natural contours at the gingiva-tooth interface without a black triangle and smooth sub-gingival margins with no catch on flossing (Fig. 14).³

_Discussion

Presentation of the final treatment outcome is essential for proper communication with the patient. Several diagnostic tools are available; however, the illustrated innovative indirect mock-up technique with composite resin on a VPS model allows the patient to visualise the anticipated results in the mouth before agreeing to treatment. It also allows the clinician to actually practise the diastema closure case, and assess the final shape and colour of the restoration prior to performing direct bonding on the patient.

Since free-hand direct composite build-ups are often challenging to the clinician, this prac-

tice may help in providing a predictable and successful clinical outcome.

Editorial note: A complete list of references is available from the publisher.

Fig. 12 Roughening of enamel surface with a Sof-Lex disc.

Fig. 13 Direct build-up of composite resin on tooth #8.

Fig. 14 Final diastema closure with composite resin.

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