

Direct composite restoration of 11 and 21

Dr Neil Gerrard BDS, RDT, BACD Accredited Member

Introduction

The patient was a 32-year-old male in good health who presented to the practice requesting replacement of existing restorations on the 11 and 21, along with general improvement to his smile regarding the shade. The 21 was previously restored with direct composite following trauma as a teenager, with subsequent restoration of 11 due to facial loss of enamel.

Diagnosis

On examination it was noted that his general dental health was good, with healthy periodontal tissues and no other restorations.

It was also determined from examination that the significant discolouration associated with the 21 was associated with micro-leakage of the existing restoration and the presence of two metal pins (presumably placed to aid mechanical retention of the restoration).

Radiographic examination and vitality testing of both 11 and 21 indicated absence of pathology, recording the normal responses of healthy vital teeth. Both teeth presented with pitting of the labial enamel with an aetiological cause

attributed to that of tooth erosion. No occlusal/functional issues appeared to be associated with either the anterior teeth, or the occlusion as a whole.

Treatment Plan

Aims of treatment were to complete general tooth whitening of the smile, followed by improvement to the form and shade of 21. Pitting of the enamel surfaces of 11/21 was also of concern, therefore a replacement restoration in the labial surface of the 11 was also deemed necessary.

In this situation a number of treatment options are available to achieve the patient's desired results, including:

1. Tooth whitening (at home or in-office) with direct composite restorations to 11 and 21
2. Tooth whitening followed with direct composite to the 11 and an indirect restoration to the 21
3. Minimal prep veneers to both 11 and 21 following tooth whitening.

After considering all options, the patient chose to proceed with a direct restorative approach for both teeth, aware that this may require replacement in a shorter time frame to that of ceramic. (*Figure 1a-f*).

Treatment sequence and description

Prior to any restorative treatment, the patient undertook a course of home tooth whitening, utilising custom made trays and 16% carbamide peroxide. The protocol followed was that of night time whitening until the desired shade had been achieved, plus an additional one or two weeks to compensate for re-bound.

Successful treatment was completed in around three weeks, followed by two weeks of no whitening to allow initial re-bound to stabilise¹ (*Figure 2a,b*). This period is also used to minimise any potential effects on resin bond strengths which may lead to premature bond failure.² The restorative phase of care was then initiated.

In preparation for the restorative phase a diagnostic wax-up on stone casts was completed, the laboratory instructed to mimic the general form of 11. This would enable the use of a putty stent for accurate replication of the anatomical form of 21, for which composite could be layered into and thus create a thin palatal shell/halo from which to aid an additive technique (requiring minimal contouring and adjustment post placement)³ (*Figure 3a-f*).

Figure 1: a-f



In order to compensate for a change in value as a result of desiccation of the teeth during treatment, a diagnostic composite mock-up (physical colour map) was completed at the very beginning of the treatment session on the labial surface of 21 in order to confirm shade and value accurately.

Once confirmed, this prescription would be followed regardless of the appearance of the contra-lateral incisor (which would likely increase in value through the treatment session as a result of dehydration).

Direct composite bonding to 12 and 11

The composite resin of choice in this case was HFO. The colour map indicated a basic chromacity of UD1 and UDo.5, with an enamel layer of medium high value GE3. Opalescent blue colours in the mamalon regions were also noted with an increase in value at the line angles OW (opalescent white incisal).

A moderately textured surface was noted on both lateral incisors, the aim was to simulate such texture to aid complete integration of the restorations.

Preparation of the tooth surface included the placement of bevelled margins (when possible) to the buccal and lingual surfaces with a finishing diamond bur (to aid integration of the restoration reducing appearance of marginal edges), followed with air-abrasion utilising 27 μ m alumina oxide to maximise bond strengths.

A partial etch technique using 37% phosphoric acid was employed to prepare the enamel (again where possible) for a maximum of 30 seconds.

Figure 2: a-b



Following this a self-etching bonding resin was used to complete bonding to the etched enamel surface, but also create a bond to the dentine

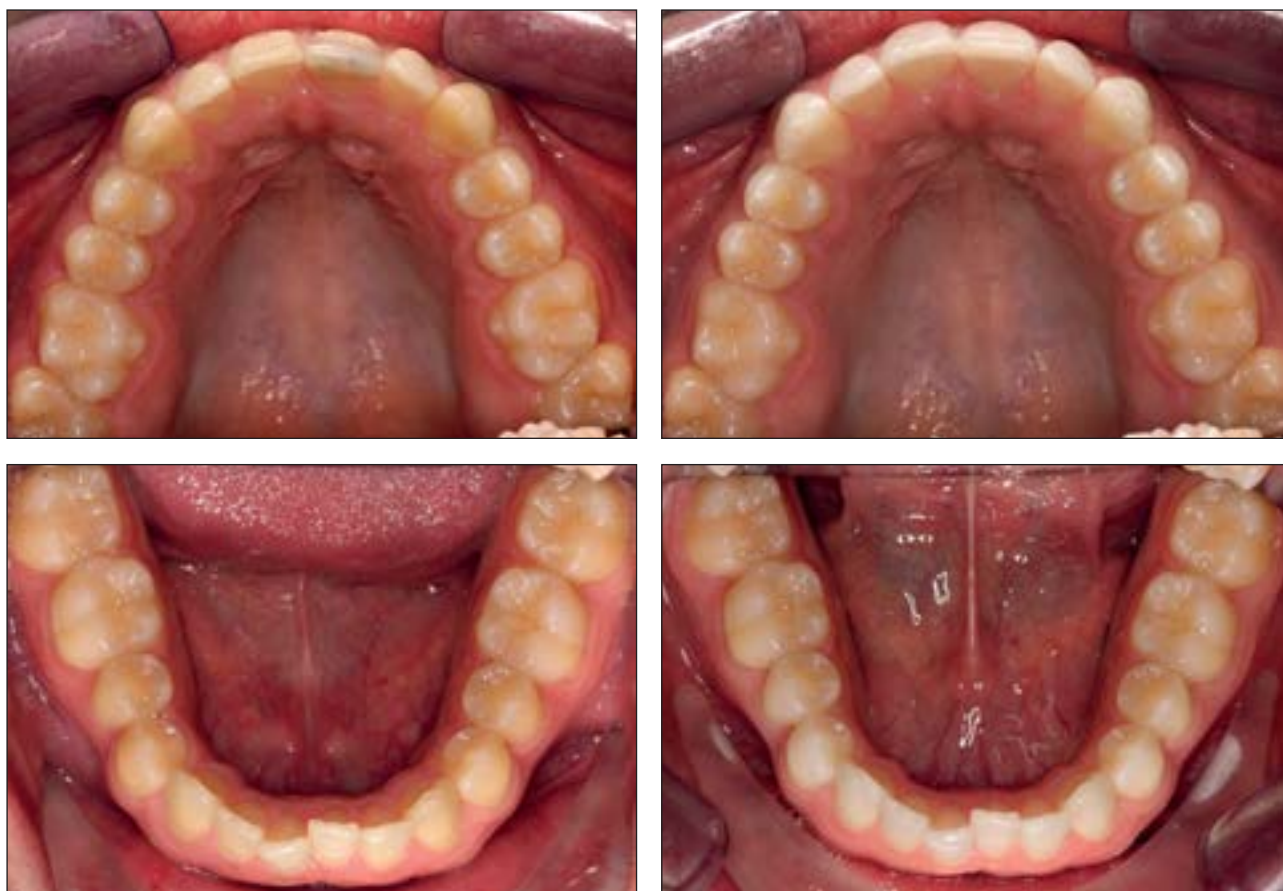
surface for improved dentine bond durability over time as a result of MMP reduction compared to total etch technique.^{4,5} A dual cure self-

etching cement was placed over the dentine to act as a restorative base and seal the dentine.



Figure 3: a-f

Figure 4: a-d



With the putty matrix in position HFO composite resin was incrementally layered to the correct anatomical form palatally. GE3 enamel was layered first into the matrix, then cured against the tooth. This was then followed by body composites UD1 and UDo.5 until the basic dentinal form was achieved. This included reproduction of mamalon structures mimicking those of the natural tooth in the incisal third of the restoration. Intensive OBN (blue) was layered in the incisal third to mimic the opalescent and translucent characteristics of the original tooth structures.

Even though the optical properties of enamel had been modified with pre-operative whitening, these layers still exist and thus require mimicking if an accurate shade match is to be achieved. A thin layer of opalescent white enamel (OW) was subsequently layered over the entire labial surface, effectively creating a direct veneer for good shade integration and protection of tooth

structures against further erosive factors.

Replacement of the labial restoration in the 11 followed the same treatment protocol, however, composite was layered in the cervical half of the tooth only (full coverage was not required) before polishing to final form and surface texture.

The utilisation of the putty matrix normally means that little finishing is required following placement of the composite resin. The minor finishing required for this case was achieved with abrasive discs, rubber wheels and fine diamond burs. To complete the restoration some minor secondary and tertiary anatomical features were created (in this instance erosive pitting).

Polishing was completed with 3µm and 1µm diamond pastes, followed by aluminium oxide to achieve a natural high lustre to the restoration. Convex surface anatomy was created

with flexi-discs to produce a smooth natural finish to the restoration and enamel-composite junction.

Occlusion was checked and adjusted with 100µm paper while seating the patient at a 45 degree angle, then asking him to chew. The aim being to detect any premature contacts on 21 within the functioning chewing envelope. Any contacts noted were removed, followed by final polishing (*Figure 4a-d*).

Conclusion

In this instance the shade/value match proved near perfect. The patient was delighted with the post-operative results; with completion of treatment, provision of a new whitening tray was provided to fit the new form of 11 and 21 for maintenance.

This case demonstrates that direct composite resin may be used to great effect in the restoration of a tooth/teeth when a conservative

restorative approach is preferred. It should be noted however, that long term success will only be achieved through the correct management between the bonding surfaces of enamel and composite and functionally through occlusion.

References

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Figure 5: a-b