

Direct composite restoration of a class IV fracture

Accreditation Case Type 4

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Introduction

The ability for a dentist to successfully restore a heavily fractured tooth is relatively easily learned when following a layering protocol. This article describes the restoration of a class 4 fracture in a central incisor achieved using the Vanini technique.

History

The patient attended the surgery as an emergency with a fractured central incisor following a blow to the face with a bottle.

Clinical examination

A medical and dental history was taken which was not significant in relation to this case. The patient had little pain from the tooth. Clinical examination revealed a class 4 fracture of 21 with no nerve involvement.

On examination the TMJ and periodontium were healthy. The occlusion was examined and good anterior guidance from the remaining teeth was present, allowing some protection from functional forces for the new restoration. Vitality testing on the fractured tooth proved positive. A periapical radiograph showed no changes in lamina dura, with no signs of root fracture. The fracture showed no signs of pulpal exposure. The exposed dentine was protected with a layer of glass-ionomer.

Treatment Plan

Treatment options were discussed which included composite and porcelain restorations. The patient wished for the least tooth preparation possible and the least expensive option. It was decided that composite would be used to rebuild the tooth.

The patient was warned of the possibility that the tooth may require future root canal treatment if the

tooth showed signs or symptoms of irreversible pulpitis despite an apparently healthy pulp from the diagnostic vitality tests previously carried out. These tests frequently give false positives and should not be taken as a definitive indication of pulpal health. Future fracture of the restoration was also discussed. An informed consent was given in writing by the patient.

A colour mapping was done of the adjacent teeth, impressions were taken for study models and the patient rebooked for the definitive restorative appointment.

The models were cast up in fast setting stone. The fracture was restored on the model using wax to correct form and function and a putty matrix made to allow transfer of this information to the mouth.

Armamentarium

- Nikon D70 digital camera
- Surgical loops (Orascoptic 2.6L)
- Gloves (Aloecare Unodent)
- Glass-ionomer (3M ESPE)
- Stone (Kerr Lab, Pastel Rock)
- White Presentation Wax (Great Lakes Orthodontics Ltd)
- HFO hybrid composite (Optident)
- 37% phosphoric acid (Optident)
- Prime and bond NT (Dentsply)
- Brushes (Unodent)
- Burs (Komet)
- Tpens composite modelling brushes (Micerium group)
- Sil-Tech (Ivoclar Vivadent)
- Soflex discs (3M)
- Rubber dam heavy blue (Optident)
- Bend-a-brush (Centrix)
- Brasseler polishing strips (Komet)

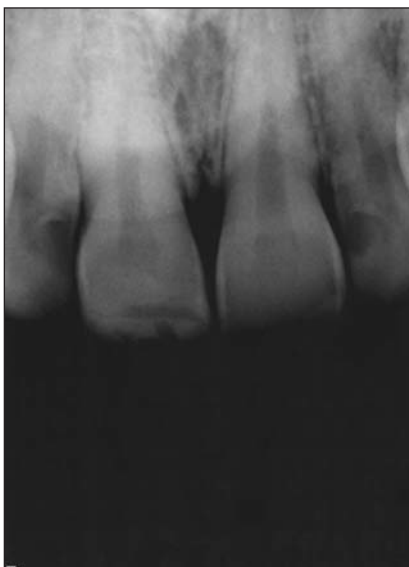


Figure 1: X-Ray of the case

Figure 2a: a-b – Before (left) and after (right) images of the case



- Diamond polishing paste, Luminescence (Abrasive Technology)

A 5th generation bonding agent Prime and Bond NT was applied for 40 seconds and set for 20 seconds with a halogen light on all surfaces.

adjacent tooth detail. A second layer of glass connector was placed followed by the final enamel composite layer.

Clinical stages

HFO hybrid composite was to be used to recreate the lost tooth structure using the Vanini technique. The tooth was anaesthetised using 1ml of 4% articaine. Rubber dam was placed and the temporary glass-ionomer removed. The enamel and dentine were lightly abraded with a bur to remove the pellicle layer that would have formed. A fine bevel was prepared 2mm from the fracture margin on the facial surface in an irregular pattern to allow blending of the composite margin into the surrounding tooth.

Split dam was placed for isolation and lip control. The enamel and dentine were totally etched with 37% phosphoric acid for 15 seconds and blot dried to leave the surface moist.

The putty matrix was placed against the palatal surface of the incisors and the palatal enamel positioned using rubber composite adaptors and set. This thin shell of palatal enamel shaded composite was set for 20 seconds using a halogen light. As each layer was placed it was set for a further 20 seconds using the halogen light. The putty matrix was removed, acetate strips placed interdentally and the missing interidental enamel reformed. A thin layer of glass connector was placed and set to mimic the light properties produced by the proteus layer present between enamel and dentine. The dentine was now formed using A4 through to A2 composite shades, forming incisal mamellons. Fine amounts of amber shaded composite were placed within the mamellons to match the

The surface was covered with glycerine to ensure complete polymerisation of the oxygen inhibition layer and underlying composite. The final restoration was set for a further 60 seconds per surface.

The rubber dam was removed and final recontouring completed with micro-fine diamond burs. The occlusion was checked in centric, lateral and anterior guidance in the supine and upright position. Finally the restoration was polished with sofex discs and diamond polishing paste on felt cylinders.

Conclusion

By following a relatively simple protocol a highly aesthetic restoration can be achieved. Provided the anterior guidance is evenly distributed through the other incisors the restoration has a high chance of long term success.

References

1. Vannini L, De Simone F, Tammora S. Indirect composite restorations in the anterior region: a predictable technique for complex cases. *Pract Periodontics Aesthet Dent* 1997 9: 795-802; quiz 804.
2. Smith E, Dickson M, Evans AL, Smith D, Murray CA. An evaluation of the use of tooth temperature to assess human pulp vitality. *Int Endod J* 2004 37: 374-380.



Figure 2b: a-d – Before (above) and after (below) images of the case