Blending restorations into natural dentition following a trauma incident

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Introduction and main complaint

A 35-year-old male attended the practice as an emergency new patient in November 2015 with two damaged front teeth following facial trauma the night before. He complained that his damaged teeth were sensitive to cold drinks and the air and wanted to know what could be done to restore them back to their original appearance. While the teeth were sensitive, they were not causing him any pain and he was managing by avoiding eating and drinking on the affected side (*Figure 1*).

Medical, dental and social history

The patient was fit and well apart from some bruising to his right eye which was related to the incident of the previous night. He was not taking any medication.

He worked as a financial director and had a late night altercation after enjoying a business related dinner resulting in trauma to his face and teeth.

He explained that he had undergone some clear aligner orthodontic intervention a few years previous and had only had a few small fillings done. He was an irregular attender at a practice more local to his house and while our practice was quite a distance to travel to, he was keen to attend all appointments required to re-establish a natural and functional smile. His previous hygiene and dental appointments were approximately 12 months previous.

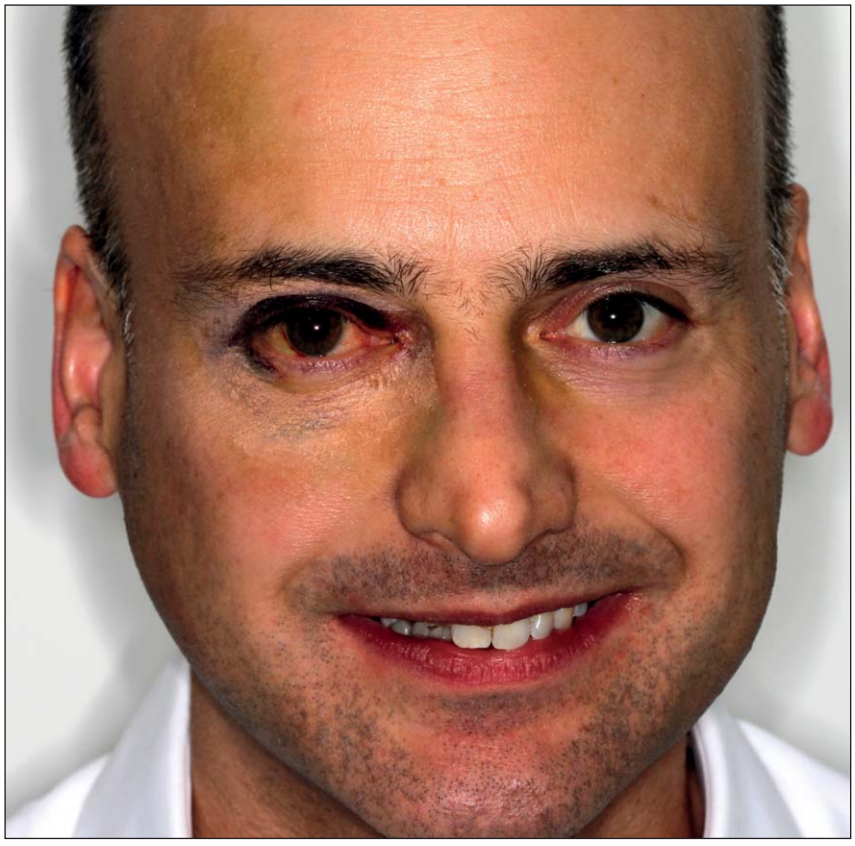


Figure 1

Clinical examination

Extra-orally the patient presented with a Class I skeletal base, average naso-labial angle, average lower face height and competent lips. The bruising to his right eye had apparently improved a lot since the incident and the slight swelling was also decreasing. There was no pathology related to the lymph nodes of the head and neck and the temporomandibular joint appeared normal without any clicking or crepitus.

Intra-orally the soft tissues appeared normal. Oral hygiene was moderate

and warranted improvement but there was no active periodontal disease with BPE scores of 1s and 2s (for supragingival calculus deposits). Caries was recorded occlusally on the lower right first molar and there were non-complicated enamo-dentine crown fractures related to both lower central incisors and upper right lateral incisor while the upper right canine had evidence of a small pulpal exposure thereby having a complicated enamo-dentine crown fracture. There was generalised gingival recession particularly of the buccal segments. Orthodontically the patient presented with a Class I div II malocclusion on a Class I skeletal base with a full unit Class II molar relationship on the right side and a half unit canine relationship. On the left side he had a Class I molar and canine relationship. There was no crowding on the upper arch and moderate crowding on the lower arch. An increased overjet and overbite were recorded as 5 mm and 8 mm respectively. No crossbites were present and there appeared to be no obvious occlusal interferences on lateral and protrusive movements.

The patient explained that he intended to get the caries and fractured lower teeth treated with his own dentist, and therefore only an intra-oral periapical radiograph of the fractured upper right lateral and canine teeth were taken. It was made clear to the patient that ideally a similar radiograph should be taken to assess for root fractures on the lower front teeth and possibly an OPT to assess for condylar and coronoid fractures. Only the upper right lateral and canine were sensitive to cold, and no teeth were tender to percussion or mobile. Pre-operative photographs were taken (*Figures 2-6*).

Figure 2

Figure 3

Figure 4

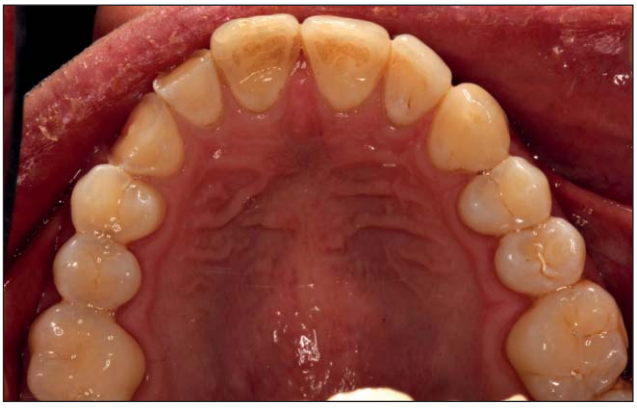
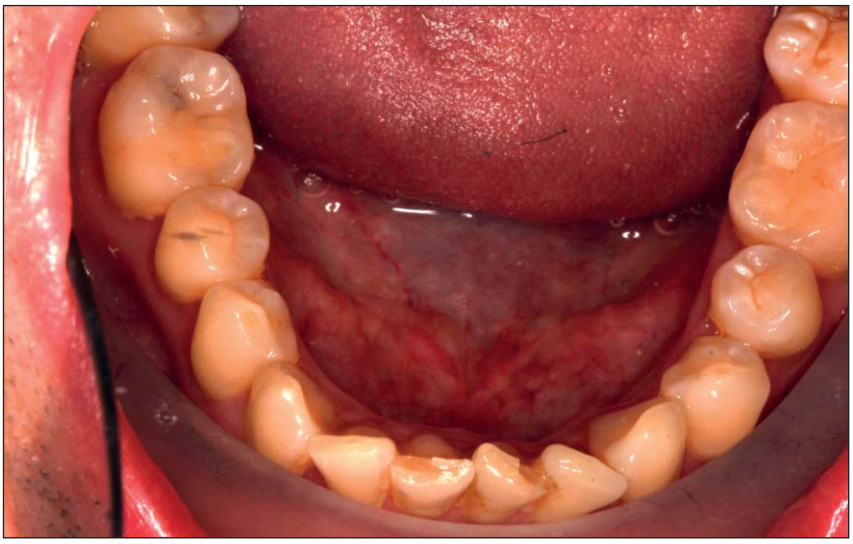


Figure 5

Figure 6



Diagnosis

It was recorded that the patient had:

- Complicated enamo-dentine crown fracture of the upper right canine
- Non-complicated enamo-dentine crown fracture of the upper right lateral incisor
- Non-complicated enamo-dentine crown fracture of both lower central incisors
- Caries on the lower right first molar
- Generalised gingival recession due to a thin gingival biotype and possible overzealous brushing.

There was no evidence of bone or root fractures.

Treatment options and discussion

As the patient's job meant that he was very busy with work and held many face-to-face meetings, his main priority on the day he attended was to be able to leave the practice with something reasonably aesthetic and functional so that he could go about his daily business. We discussed how maintaining pulpal vitality was key to providing definitive treatment, and the reaction of the pulps (particularly the upper right canine) to the trauma would be crucial in deciding what treatment would be required.

It was made clear that potentially any teeth in the area of the trauma could become non-vital, possibly cause toothache, become ankylosed or darken with time; necessitating root canal treatment or possibly removal. Having confirmed that the pulp was still vital in the two traumatised teeth, we agreed to place a lining material over the exposed area to help maximise the chance of maintaining tooth vitality. In this case Biodentine was used due to its biocompatibility and reparative dentine promoting properties.

Possibly MTA or traditionally Dycal could have been used; however Biodentine has been shown to induce more favourable effects on the reparative process during vital pulp therapy and significantly thicker hard tissue formation compared with other materials.[1] Due to time constraints and the patient's request to have something aesthetic provided there and then, the only real option was to rebuild the tooth in composite material. It was stressed that doing this might only work as a short term fix, as the remaining clinical crown height and reduced enamel to bond to might not support composite restorations in the long term and other options would need to be discussed.

Two main definitive restorative options were discussed. The first was for crowns on both of the teeth to maximise strength and maintain function. The second was for a crown on the upper right canine and composite bonding on the upper right lateral incisor. Root canal treatment was also discussed as a possible requirement prior to the coronal restorations being provided depending on how the pulps reacted over time. It was explained that the canine was involved in canine guidance and had more trauma to it and would therefore benefit from the strength a crown could provide.[2] Composite bonding to the lateral incisor however would likely last a while and be moderately predictable.[3] This led to a further discussion of shade and aesthetics, and it was explained that matching two crowns to adjacent natural teeth would be easier than matching up a crown, composite bonding and a natural tooth.[4] The patient opted for two crowns. Regarding the fractured incisal edges of the lower anterior teeth and carious lower right first molar, the patient confirmed that he would get these treated by his regular GDP.

After these discussions the final treatment plan was agreed to be:

1) Biodentine placement over the pulpal areas and immediate composite build-ups
2) Review period of six weeks to re-assess pulpal vitality (during this time composite bonding of the lower incisors and hygiene could be provided by the patient's own GDP)

Figure 7

Figure 8

3) Crown preparations of the upper right canine and lateral incisor (using the bonding as a core and assuming pulpal vitality)
4) Radiographic review and oral health maintenance.

Description of clinical stages of treatment

1) In the limited time available, Biodentine was placed over the pulps of both the upper right canine and lateral incisor. The exposed dentine and enamel was prepared using air abrasion and then etched appropriately. Bond was applied and light cured and Venus Pearl A3 was then used to build the teeth up and restore some function and aesthetics (*Figures 7, 8*)
2) A review appointment at six weeks showed that the teeth had not given any pain or problems, still had slight sensitivity to cold air being blown on them and were therefore deemed vital. An upper putty impression was taken at this stage to help construct the future provisional crowns
3) The upper right canine and lateral incisor were prepared for monolithic Emax crowns with labial layering, with the existing composites now used as cores. Retraction cord was placed. An upper Impregum impression was recorded, together with an opposing lower alginate. Provisional crowns were constructed using Luxatemp A3 and a stump shade was taken prior to fitting the provisionals using temporary cement
4) The provisional crowns were left in for a few weeks to allow the assessment of function and aesthetics. Admittedly the provisionals were too yellow but the patient liked the general shape of the teeth and wanted this copied in the final restorations. An alginate impression of the provisional crowns was taken to aid the ceramist.
5) Shade taking involved a sequence of photographs being taken alongside my in-practice technician with a number of shade tabs from numerous angles. Cross-polarised images were taken as they block out unwanted light and help identify internal effects and opacity.[5] My technician was able to use these images and change the contrast on Photoshop to further identify underlying features of the teeth and construct an accurate shade map (*Figures 9, 10*)

Figure 9

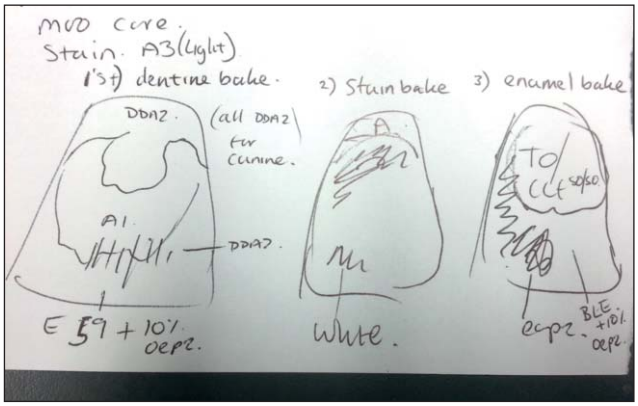


Figure 10

Figure 11

Figure 12

6) Both crowns were constructed using a B1 Emax core and then layered labially with a sequence of Emax tints and shades, involving three firings (*Figures 11, 12*)
7) The crowns were tried in with try-in paste to allow the patient and dentist to assess the aesthetics. All parties confirmed they were happy with the colour and shape and the contacts were all correct. The teeth were then cleaned and prepared for cementation using air abrasion[6] and the crowns were cemented in place with RelyXunicem. All excess cement was removed and the occlusion was refined to allow for lateral and protrusive movements while maintaining canine guidance (*Figures 13-20*).

Discussion

An excellent restorative result was achieved and it is satisfying that the patient was so pleased with his new smile. It was great to be able to provide an aesthetic and natural result knowing that the restorations are also strong and have a good long-term prognosis. While the underlying pulpal condition is still at risk, his symptoms thus far suggest that the restorations should be successful for many years to come.

I think that there were two keys to the success of this treatment. The first was that he attended so soon after the trauma and I was able to protect the exposed pulps with Biodentine. The second was good

Figure 13

Figure 14

Figure 15

Figure 16

Figure 17

Figure 18

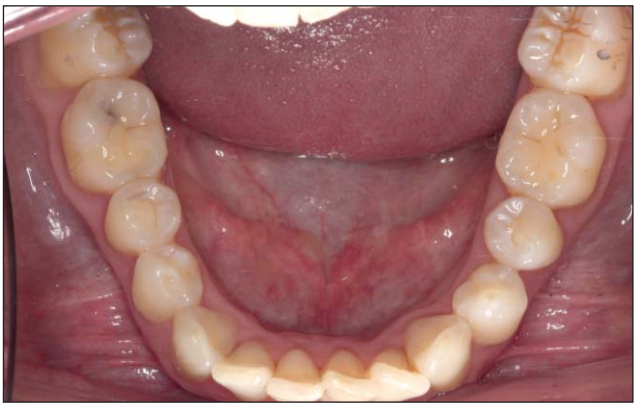


Figure 19

Figure 20

photography that enabled extremely effective communication with a talented ceramist resulting in an accurate and aesthetically natural shade and appearance match. I had warned the patient that multiple try-ins might be required to match the shade and features to the adjacent teeth, however we were able to get the crowns right first time. Had the patient not lived so far away I might have considered a few trial fits before the different firings to avoid the risk of multiple corrections. I think the cross-polarised images helped better assess the underlying dentine shade, and also helped show the white marks, striations and other internal features in the adjacent teeth. This photographic technique is definitely something I intend to do more of when matching restorations to adjacent natural teeth.

I also suggested that slight enamoplasty of the upper left central incisor be completed due to its increased length relative to the adjacent incisor. The patient however was happy with the appearance of the front teeth and did not wish to have this done.

Acknowledgement

I would like to thank my BACD Accredited ceramist Paul Gerrard for his excellent work and attention to detail.

References

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