

SINGLE VITAL TOOTH WHITENING

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Many patients, more than ever, are requesting tooth whitening. There are several reasons for this. Patients are adopting a more healthy lifestyle and thus want to whiten their teeth to give the appearance of being more healthy. White teeth are equated with youthfulness and many patients would like to look younger. The continued interest by the media in this subject has led to more information being available about tooth whitening and thus patients are requesting these services from dentists. Patients have started researching tooth whitening on the internet and are starting to gain a basic working knowledge about the subject.

When requesting whitening treatments, some patients are concerned that their teeth will become too white as they have seen comedy television programmes about this occurrence. These patients request natural enhancement of their existing shade, only a few shades lighter. Others request to have the whitest teeth and want the "Hollywood White" look. It is thus important to ascertain from patients what they are trying to achieve with whitening and what is a realistic whitening goal. Patients who have tetracycline staining have such dark discolouration that any improvement will be a bonus for them. These patients have a threshold of acceptability to be able to accept any minor improvements in the shade.

Certain patients have just one discoloured tooth, which could be the result of calcific metamorphosis (West 1997). The colour may vary from being subtly different from the adjacent tooth or there can be a marked contrast in the colour of the adjacent tooth. Patients may not even be aware of the colour difference and it is important for the dentist to detect these colour differences.

History and diagnosis

Some patients, when questioned as to the history of the discolouration will report some type of minor trauma that occurred some years previously. The trauma could have been as simple as knocking the front tooth on the handle of a bicycle 10 years previously. The patient does not normally experience any pain from this discoloured tooth and the normal progression is that the tooth gradually became more yellow than the adjacent tooth over a period of time. The patient may not be able to give a history of the tooth or may have forgotten any traumatic episode on the tooth. At the second appointment they may report that they vaguely recollect an incident of trauma.

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Intra oral inspection of the tooth will normally reveal a yellow tooth with the colour either being uniform or slightly darker at the cervical margin. The tooth is not normally tender to percussion or palpation.

Vitality testing

These teeth are normally vital but, due to trauma, the pulp chamber may be calcified or reduced in size. As a result, there will be a slower response from the electric pulp tester. Normally, the dial would be turned up to the end reading before the patient reports that they can vaguely feel the electric current. It is important to take time in testing the response of the patient, as the patient will take time to register the reading. The same is true for the cold or ice test when placed on the tooth. It will eventually respond and the patient will report that they can feel the cold cotton wool on the tooth.

Radiographic assessment

A periapical radiograph will normally demonstrate the presence of pulp chamber and canal calcification or obliteration. The whole tooth is present and there is no evidence of any type of fracture in the tooth in either the crown or the root of the tooth. There is normally no periapical area present. The root of

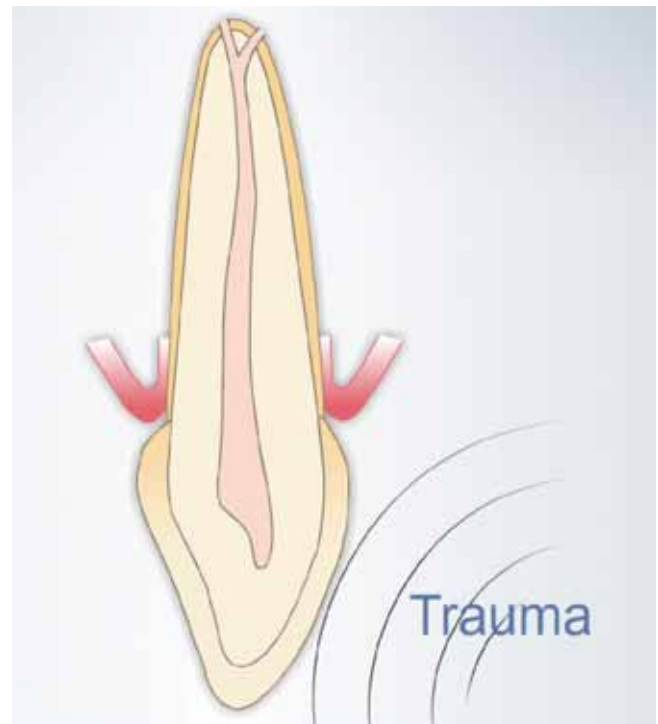


Figure 1. Mild trauma hitting the tooth

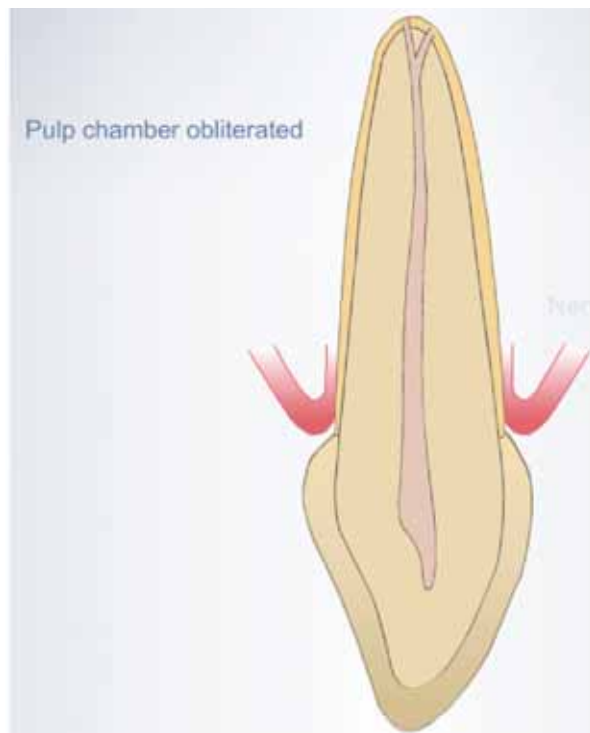


Figure 2. Tooth yellowing laying down of secondary dentine

the tooth is intact and there is no evidence of external or internal root resorption.

The pathological process

The usual process is that the minor trauma caused some type of bleeding within the tooth. This bleeding causes the formation of secondary and tertiary dentin to be laid down within the pulp canal. The secondary dentin is laid down regularly along the dentinal walls as a response to the trauma to protect the sensitive pulp tissue from further damage. This causes the pulp chamber and canal to gradually diminish in size until only a narrow root canal remains. It becomes calcified or sometimes even obliterated. Histologically, the pulps increase in the amount of collagen and varying cell sizes (Lundberg and Cvek 1980). There seems to be no justification for root canal treatment of these teeth (Cvek 2007).

Periapical radiolucencies have only been reported in 13-16% of teeth with traumatically induced pulp canal obliteration during observation periods of up to 20 years according to Jacobsen and Kerekes (1977). According to Cvek (2007), the periapical radiolucency which occurs later is associated with caries, inadequate crown restoration or new trauma.

Calcific metamorphosis (CM) can also be known as a dystrophic calcification. It is seen commonly in the dental pulp after traumatic tooth injuries and can be recognised clinically as early as three months after injury. Calcific metamorphosis is characterised by deposition of hard tissue within the root canal

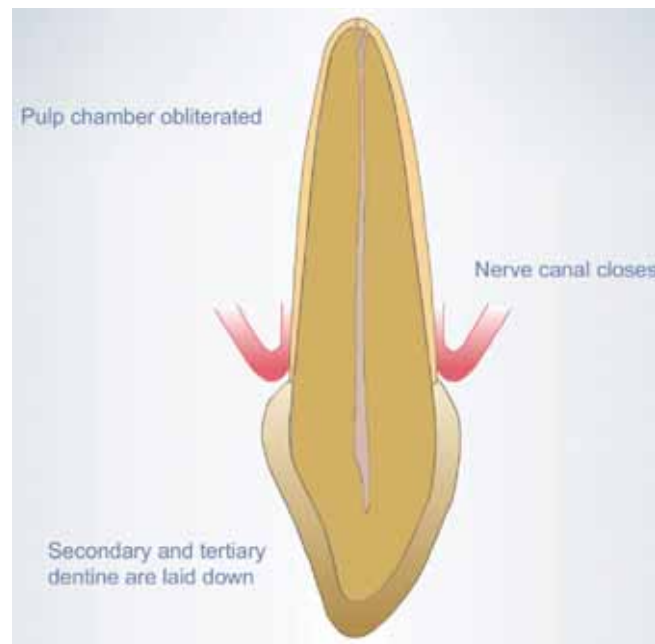


Figure 3. Single dark tooth: pathological process. tertiary dentin being laid down

space and yellow discolouration of the clinical crown. According to Amir et al (2001), opinion differs among practitioners as to whether to treat these cases upon early detection of CM or to observe them until symptoms or radiographic signs of pulpal necrosis are detected.

It is normally unnecessary to perform root canal treatment on these teeth. Most of the literature does not support endodontic intervention unless periradicular pathosis is detected or the involved tooth becomes symptomatic (Amir et al 2001). It may

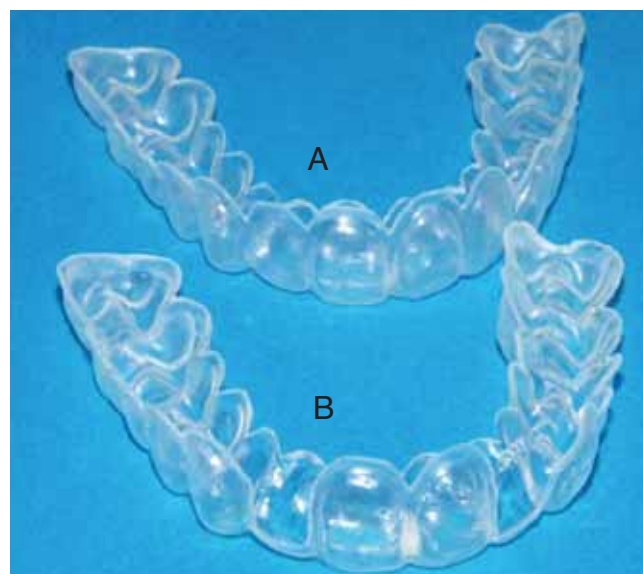


Figure 4. Bleaching tray design. A: Full arch tray. B: Single tooth bleaching can be undertaken in a full arch tray. C: Depending on the location of the single yellow tooth, windows can be cut adjacent to the dark tooth to prevent the adjacent teeth from getting too light, before the single dark tooth has managed to lighten sufficiently.

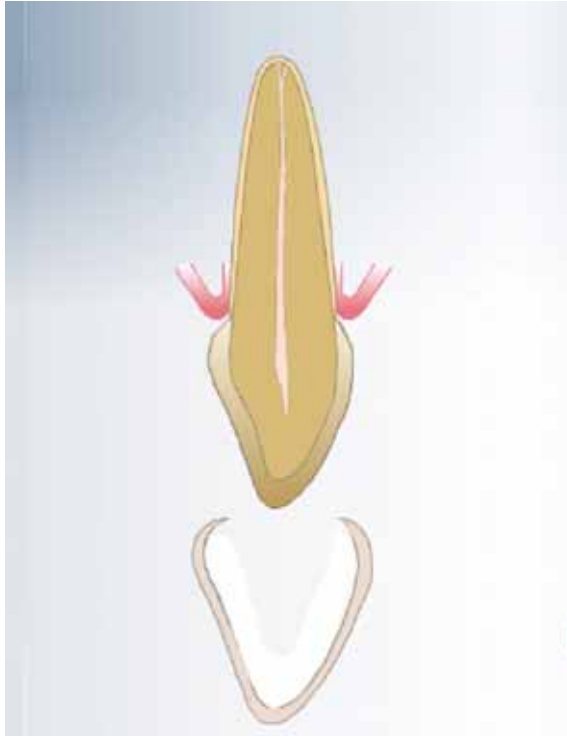


Figure 5. Start of bleaching treatment

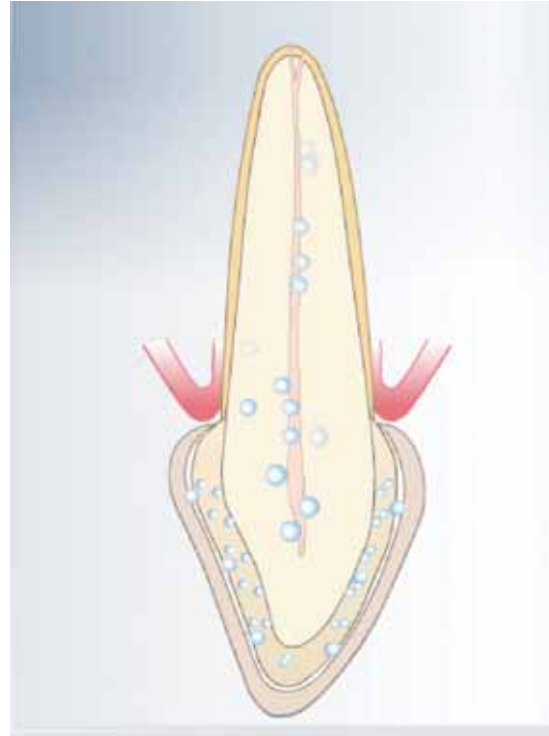


Figure 6. This figure shows the process of whitening as the oxygen moves through the tooth and through the pulp canal which has been narrowed due to the formation of secondary and tertiary dentin being laid down. After a period of about six weeks, the tooth starts to lighten.

be advisable to manage cases demonstrating CM through observation and periodic examination and radiograph as necessary.

However, the discolouration in teeth with obliterated pulp chambers is not always caused by pigments from the blood degradation products, but from the presence of the secondary and tertiary dentin which has been laid down after the trauma (according to Dahl and Pallensen 2007). It may be said that the light being transmitted through such a tooth gives the appearance of being darker.

The research and incidence of the occurrence

The response to minor trauma many years previously can result in 3.8% - 27% of traumatised teeth developing Dystrophic calcification (Amir et al 2001). Up to 16% of cases can develop pulp necrosis (Amir et al 2001). 51% responded to Electric Pulp Testing and 40% were clinically and radiographically sound (Robertson et al 1996) with Tertiary dentin formation occurring (Torneck 1990).

The treatment

It is important to decide whether only the single dark tooth is to be bleached or whether the entire arch is to be bleached. It is more difficult to bleach the single dark tooth to get it to match, as it is easier to bleach the entire arch using a special protocol. Should it be decided that only the single tooth is bleached, a specially designed bleaching tray needs to be

made. A full arch tray is made first, after which a window is cut on either side of the tooth to be bleached. If this is not done, the adjacent teeth will lighten quicker as the bleach moves rapidly to the adjacent tooth, resulting in uneven bleaching. Although some authors have suggested removing the coronal sclerotic dentin and utilising internal and external bleaching as necessary (Pedorella et al 2000), such extreme methods are not deemed to be necessary.

Protocol for bleaching the single tooth and the full arch

Normally a full arch scalloped bleaching tray is made. The upper 5 teeth are bleached for two weeks using 10% carbamide peroxide to evaluate the speed and progress of the bleaching of the whole arch. Thereafter 20% carbamide peroxide gel is placed in the tray adjacent to the single tooth for a period of four to six weeks or until the single tooth matches all the upper teeth and they are all the same shade. Sometimes it may be necessary to continue whitening for a further two weeks. The progress of whitening the single tooth can be slow because of the nature of the dentin, which had been packed very densely from the secondary and tertiary dentin depositions. However, there is little or no sensitivity experienced on this vital tooth during the whitening treatment.



Figure 7 and 8: Case Number 1: This patient had two central incisors that were traumatised due to minor trauma from a swimming pool incident. See the radiograph which shows obliteration of the upper right central incisor and dentine bridge formation on the upper left incisor. The treatment involved using 10 % carbamide peroxide for a period of two weeks on all the upper teeth and then 20% carbamide peroxide on the two central incisors for a period of three weeks. The patient experienced very little sensitivity during the bleaching treatment. Figure 8: Case Number 1: The result after three weeks



Figure 9: Case Number 2: This patient reported receiving a minor blow to the jaw due to a bicycle incident. She noticed over two months that the lateral incisor started yellowing, although she had initial pain for a week, the pain resolved. She visited her dentist who said no treatment was needed. She had naturally dark canine teeth present. Figure 10: The result after whitening

Follow up and monitoring

It is important to undertake appropriate monitoring at intervals which are deemed necessary to follow the progress of the whitening. This may be at two or three weekly intervals or until the patient and dentist are satisfied with the result. Normally the shade of the single bleached tooth will retain well and regression is unusual and slow. It may be necessary to do maintenance treatment for the full arch approximately three years later.

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