Minimally invasive treatment of the single dark tooth with vital bleaching

Amit Patel[1] and Tanvi Bagtharia[2]

The most common reasons for discolouration of a single tooth tend to be local causes of intrinsic discolouration.

When it comes to treatment of the single dark tooth, guidelines suggest that there should be a logical order of treatment options to achieve a satisfactory cosmetic outcome, beginning with the least invasive. This is known as progressive smile design.

Vital tooth whitening is a popular and a non-invasive technique of treating single discoloured teeth.

Causes of discolouration

Most single-tooth discolouration tends to be due to local causes of intrinsic discolouration.

Trauma to teeth is one such cause. This may result in intrapulpal haemorrhaging, which leads to blood components flowing into dentinal tubules.

Initially this will appear as a pink discolouration, however with time, if pulp canal obliteration (PCO), also known as calcific metamorphosis, or necrosis occurs, this colour darkens and leads to a yellowish, then a grey-black shade.

PCO is defined by the deposition of secondary and tertiary dentine within the root canal space (McCabe and Dummer, 2011). The extent of the discolouration is directly associated to the duration of time that the pulp has been obliterated or necrotic (Barber and King, 2014).

Clinical and radiographic assessment

After a smile analysis, there are a few techniques that are currently used in order to clinically assess the colour and stain of a tooth. These can be divided into subjective (visual) and objective (instrumental) assessments.

Subjectively, the most common method is visual shade matching with comparison to a commercial shade guide.

Although this technique is simple and quick to use, the limitations of this method need to be appreciated.

Factors such as age, lighting, experience and eye fatigue can result in variations in results from assessors.

Instrumental methods of assessment include the use of colourimeters, reflectance spectrophotometers and digital image analysis but even these have their disadvantages, such as cost and the intrusive nature of equipment (Brook, Smith and Lath, 2007).

Sensibility tests should also be carried out. The most reliable method here is electric pulp testing.

[1] Dr Amit Patel BChD MJDF RCS (Eng) is an associate at Brickfields Dental Care. He is currently in his fourth year of his MClinDent in fixed and removable prosthodontics and has completed the diploma in implant dentistry at the Royal College of Surgeons London.

[2] Tanvi Bagtharia is a fourth year dental student at Plymouth University with a keen interest in restorative dentistry.

Figure 1: Patient presenting with a dark single central upper left central incisor due to trauma. We can see how this would be of aesthetic concern, especially for a young patient.

Figure 2: Retracted view demonstrating the preoperative Vita shade for the single tooth.

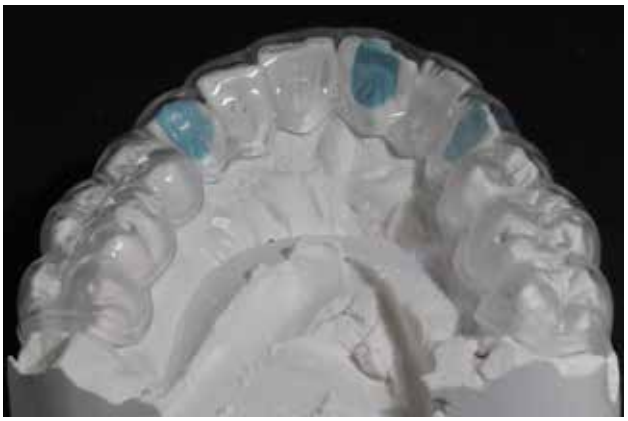

Figure 3: The palatal reservoirs on individual teeth with recommended bleaching tray.

The high specificity of this test means that it is more likely to identify vital teeth correctly in comparison to cold pulp testing. It is important to use a control of a contralateral tooth when doing sensibility testing to allow the patient to compare the sensation of a known vital tooth with the tooth that is being tested.

If the clinician suspects that the discolouration is due to PCO or necrosis then a periapical radiograph is essential.

However, in the case of pulp necrosis, there may be an absence of any radiographical change.

Data shows that only about 7-27% of teeth with PCO will progress into pulp necrosis with periapical disease showing on a radiograph (McCabe and Dummer, 2011).

Figures 1 and 2 show the appearance of a patient that suffered dental trauma in her teens.

Consent

Other than in certain ethical situations, tooth whitening is only permitted for 18-year-olds or older.

The consent procedure with this treatment needs to be extremely robust: patients need to be very aware of the possible outcomes and associated risks, and expectations must also be carefully managed.

The patient must be told that the result cannot be guaranteed, that the time taken to complete the treatment can be variable and that relapses can occur.

Treatment options

When it comes to treatment of the single discoloured tooth, guidelines suggest there should be a logical order of treatment options, beginning with the least invasive. This is known as progressive smile design.

Pink discolouration sometimes found after trauma is still reversible and therefore monitoring and review may be the only requirement.

Scaling and polishing are also good initial steps to take so that any extrinsic stains can be removed and the true colour of the tooth can be assessed.

Vital tooth whitening is a popular and non-invasive technique of treating single discoloured teeth (Barber and King, 2014).

However, if the whitening does not prove to be effective, minimally invasive composite veneers can aid in masking

Figure 4: Postoperative result after six weeks of bleaching.

Figure 5: Postoperative shade. Note we have bleached past Vita shade B1.

Figure 6: Before treatment with vital bleaching.

Figure 7: After treatment with vital bleaching.

residual darkness of the tooth, or more invasive procedures such as ceramic veneers or full coverage crowns can be placed instead.

Clinical techniques

There are a few techniques that can be performed when whitening single dark teeth. The method the authors use most frequently is where the discoloured tooth is bleached first, followed by the rest of the arch.

Impression taking

The teeth are dried thoroughly with a three-in-one tip and impressions are taken using perforated metal trays with Hydrogum 5 alginate (Zhermack). Assistance from the dental nurse is required during this stage to hold cheek retractors to allow easy insertion of the loaded tray. Impressions should be examined for the presence of all the teeth and for any air blows or drags.

Laboratory prescription

The lab prescription should request super-sealing, scalloped, silicone upper- and lower-whitening trays with palatal and labial reservoirs on the discoloured tooth.

Figure 3 shows the custom super-sealing trays produced by the lab.

Both canines in the arch should also have buccal and labial reservoirs as these teeth are generally darker than the rest of the arch. While waiting for the whitening trays, the patient should take home Tooth Serum paste (Enlighten) to use which reduces the risk of sensitivity with this procedure.

Fitting the trays

Once the trays have arrived, accuracy of fit and the seal at the cervical margin is checked. Ensure there is no bubbling in this area, which would suggest a leaking margin. The patient should be shown how to remove and insert the trays.

Patient compliance and instructions

The patient should use 10% carbamide peroxide (CP) gel nightly for one to four weeks on the discoloured tooth.

A reassessment of the tooth colour should be planned with the dentist.

If the single discoloured tooth still requires further whitening then the patient can continue to do so but if not, the rest of the buccal surfaces of the arch can be bleached at the same concentration.

Another reassessment should take place where the patient can be given a 16% CP gel to use for another two weeks on the trays. Finally, a last reassessment to determine the outcome of the treatment should be scheduled.

Postoperative instructions must be given for maintenance as there is some risk that the newly-whitened teeth may rebound and become discoloured again. A top-up regime should therefore be established for around every six months, although for some patients this can reach up to three years (Greenwall, 2018).

Figures 4 and 5 show the same patient after treatment with Enlighten tooth whitening. Figures 6 and 7 show a dramatic improvement in the shade of the single dark tooth.

We can see here how this can greatly improve the confidence of our patient while avoiding more invasive treatments such as veneers.

Risks

As the treatment of discoloured teeth is done for cosmetic reasons, it should have more benefits than harmful effects and the consent procedure must be thorough.

Although the use of 10-16% carbamide peroxide strives to have the best results with the minimum amount of side effects, there are still some that occur.

The most common risk that occurs with vital tooth bleaching is tooth sensitivity.

The patient must be warned about this as it can affect compliance and therefore a dentist should always aim to keep this to a minimum. The use of Tooth Serum paste (Enlighten) helps this.

Gingival irritation is also an issue that is frequently reported and so it is important to ensure that the tray has a good, secure fit and is scalloped and free from sharp edges and flashes of resin (Pretty et al, 2006).

Discussion

Vital bleaching is a safe, minimally invasive and cost-effective method for improving the appearance of dark single teeth.

Patient assessment and managing expectations is key.

Your treatment plan is case dependent and patients must be informed of ongoing maintenance and the costs associated with this.

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