

Contraindicated internal bleaching – what to do?

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Before the reconstruction of a root canal-treated anterior tooth, the walking bleach technique should always be considered.

In the past, a lot of root canal-treated teeth were routinely reconstructed with metal posts and crowns. Today, more conservative strategies such as internal bleaching, fibre posts, composite restorations or minimally invasive porcelain veneers represent alternative treatment options (Zarow et al, 2009).

In the case of porcelain veneers or crowns used in order to mask the dark colour of the tooth, the dental laboratory requires more tooth reduction, which significantly reduces the mechanical and adhesive properties of restorations. For longevity of porcelain veneers, the presence of enamel is crucial. The less enamel used, the lower the adhesion value of the porcelain veneer is to the tooth structure, making the final veneer restoration less predictable. Therefore, instead of reducing the tooth structure, the aim should be to try to change the colour as much as possible by bleaching internally (Meyenberg, 2006).

If the treatment plan includes a prosthetic crown, the aim of internal bleaching is to improve the colour around the cervical area and coronal portion of the root. These details will determine the final aesthetics within the gingival area. The walking bleach technique is therefore the procedure of choice in such cases. The protocol of internal bleaching was carefully described in the literature (Plotino et al, 2008; Nutting and Poe, 1963; Zarow, 2016).

The most popular and safest material for this purpose is still that which has been used routinely in clinical practice for several decades. This is a paste, prepared ad hoc, composed of sodium perborate and 3% H₂O₂ or distilled water. (Editor's note: EU legislation has banned the use of sodium perborate due to its foetotoxic and cytotoxic properties [Scientific Committee on Consumer Safety, 2010].)

This article presents a case report of the aesthetic treatment in a case of a severely discoloured root canal-treated tooth, where there was a contraindication for internal bleaching.

Contraindications for internal bleaching

The most important factor in bleaching effectiveness seems to be precise removal of all restorative materials from the access cavity without additional dentine elimination.

Dentine has to be cleaned in order to facilitate diffusion of the bleaching agent through the dentinal tubules (Plotino et al, 2008; Zarow, 2016). If a fibre post was cemented in the root canal and the pulp chamber was filled with composite resin, removing the restorative material and post can compromise the amount of sound dentine. Therefore, such a case calls for careful evaluation of aesthetic benefits versus structural sacrifice.

Other contraindications for internal bleaching include (Madison and Walton, 1990; Rotstein et al, 1991; Lado et al, 1993; Buchalla and Attin, 2007; Lin et al, 1998; Zarow et al, 2013; Baba, 2013):

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Figure 1: The patient's smile.



Figure 2: Upper and lower anteriors during static occlusion.



Figure 3: Palatal view of upper central incisors.



Figure 4: Lips in the rest position.

- Discolourations caused by amalgam or other metallic materials (not bleachable)
- Significant dentine loss in the cervical portion (risk of fracture and leakage of bleaching agent)
- Extensive restorations
- Visible cracks, especially with subgingival extension (risk of bleaching agent penetrating towards periodontal ligaments)
- Young patients (<19 years old).

Case report

A 31-year-old male patient presented to our dental clinic in order to improve the aesthetics of a severely discoloured root canal-treated right central incisor (Figures 1-4). Discolouration had been present for more than 10 years, and previous treatment had included fibre post placement.

The discoloured tooth had two old composite resin class III restorations – a mesial one, and a distal one – and also a slightly worn incisal edge (Figure 3).

The patient was deprogrammed using the Kois Deprogrammer for four weeks. Minor premature occlusal

interferences in posteriors were removed (the patient was occlusally equilibrated).

The root canal obturation performed in the past was acceptable. The treatment plan did not consider internal bleaching, as the fibre post had been cemented in the past. The walking bleach technique would, in this case, require the removal of sound structure, thus creating structural risk. Therefore, the aesthetic treatment without intervention into the pulp chamber was planned.

External bleaching with 6% hydrogen peroxide (Novon Technology, Optident) was carried out on the upper and lower arch (Figures 5-8). Three weeks after external bleaching, the composite restorations were replaced and two porcelain veneers were considered to be the best possible treatment option in this case.

It can be concluded that four main benefits arose from the above-mentioned treatment plan:

1. It is easier to mask severe discolouration using laboratory techniques
2. It is much more aesthetically predictable to perform two symmetrical veneers on two central incisors



Figure 5: Upper and lower anteriors in static occlusion after bleaching therapy.



Figure 6: Anterior guidance after bleaching therapy.



Figure 7: Upper anteriors after bleaching therapy.



Figure 8: Radiograph of tooth UR1.

3. Performing two symmetrical veneers with slightly increased buccal volume we are able to reduce the amount of tooth reduction (without exposing the dentine and without compromising the long-term adhesion)

4. We could improve the symmetry of anterior guidance with the veneers, benefitting function.

A digital smile design (DSD) plan was created and sent to the laboratory so that a wax-up could be created (Figure 9). Then the temporary resin mock-up was made, and presented to the patient in order to discuss the final outcome (Figure 10).

After the patient's acceptance, two upper central incisors were prepared for porcelain veneers with the use of a silicone index in the horizontal and vertical planes (Figures 11-13). An impression was taken using polyvinyl-siloxane material (Flexitime, Heraeus Kulzer), and the dental laboratory created two feldspathic porcelain veneers.

At the next appointment, the porcelain veneers were tried-in by means of glycerin gel (Figure 14). The porcelain was then etched with 10% hydrofluoric acid for 90 seconds and cleaned in an ultrasonic bath for five minutes (Magne and Belser, 2002).

Finally, silane was applied to the dried porcelain surface in several layers, and one coat of adhesive resin was

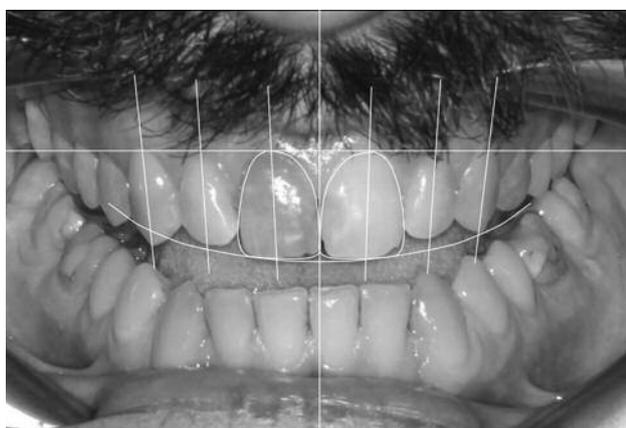


Figure 9: Digital smile design plan before wax-up.



Figure 10: Mock-up procedure (on the right) made based on Digital Smile Design and wax-up.



Figure 11: Teeth preparation with silicone guide (horizontal plane).



Figure 12: Teeth preparation with silicone guide cut at different levels.



Figure 13: Teeth preparation with silicone guide (vertical plane).



Figure 14: Porcelain veneers try in (with glycerin gel).

applied followed by gentle thinning with air. After rubber dam isolation, the porcelain veneers were cemented simultaneously with the composite resin cement (D'Arcangelo et al, 2012) (Figures 15-18).

Conclusions

1. In cases where the internal bleaching technique compromises the remaining tooth structure, other options (such as porcelain or composite veneers) should be considered

2. It is much easier and more predictable to perform two symmetrical porcelain veneers than a single, asymmetrical one
3. Although it may seem counterintuitive, performing two symmetrical additive veneers results in a more conservative approach. Simultaneous increase of buccal volume results in decreased enamel reduction.

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Figure 15: Porcelain veneers after cementation. Dental lab: Artur Nyga.



Figure 16: Porcelain veneers after cementation – profile view.



Figure 17: Patient's appearance after cementation of two porcelain veneers.



Figure 18: Upper central incisors after porcelain veneers cementation – palatal view.

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Figure 19: Patient's smile before (left) and after (right) treatment.