Introduction

Discolouration of teeth is a common aesthetic problem and bleaching is the most conservative treatment option when compared to other restorative techniques used to change tooth colour. The mechanism of the bleaching process is based on the penetration of different oxygen radicals, which occurs during the decomposition of hydrogen peroxide ($H_2O_2$) into discoloured dentine, thus modifying the dentine colourant molecules through an oxidation reaction.1 Most of the in-office bleaching gels contain hydrogen peroxide and these agents are frequently used with an activator such as heat or light. Light sources accelerate the bleaching procedure by heating the bleaching gels to increase the decomposition rate of oxygen to oxygen-free radicals and raise the release of stained molecules.2 The Er:YAG laser wavelength has been described as a safe and effective light source option for office bleaching treatment.1–4

TouchWhite patented tooth whitening makes use of the fact that the Er:YAG laser wavelength has an absorption peak in water, which is the major component of aqueous bleaching gels. This eliminates the need for any additional absorbing particles in the bleaching gels. More importantly, taking into account thermal burden considerations, the TouchWhite procedure represents the most effective and least invasive laser whitening
method possible. Due to its high absorption in bleaching gels, the Er:YAG laser beam is fully absorbed in the gel and does not penetrate to the hard tissue or the pulp. All of the laser energy is thus effectively used for the heating of the gel. There is no direct heating of the dental tissue and the pulp, as is the case with other laser-assisted whitening methods. There is also no risk of accidentally damaging the hard dental tissue as the laser fluence of every laser pulse is set significantly below the ablation threshold for dental tissues. As a consequence, the procedure can be performed with a minimal undesirable thermal burden on the tooth and the tooth whitening speed can be safely increased by 5 to 10 times.1, 4

Case report

A male patient in his late thirties suffered a sporting accident some fifteen years ago that left his upper left central incisor with necrotic pulp, which discoloured after root canal therapy. The aim of treatment was to lighten the tooth colour in preparation for a ceramic veneer using the TouchWhite protocol (LightWalker laser system, Fotona).

Treatment

The palatal resin restoration was removed. The GP was removed to the cervical dentine level. A layer of GIC lining was placed to protect the cervical dentine. Clear hydrogen peroxide (35%) was used as the bleaching gel. The Fotona TouchWhite protocol was used to activate the bleaching process. We used the R16 handpiece with the following parameters: VLP, 0.75 W, 10 Hz. The gel was placed in the pulpal chamber and on the labial surface. The laser beam alternatively activated the gel for 20 seconds on the labial surface and on the pulpal chamber (three applications on each side). The gel was washed off and replaced with a fresh gel coating before administering another three applications. The discoloration subsided significantly after six activations. Before the session ended a cotton pellet soaked with bleaching gel was placed in the pulp chamber. It was activated three times, each time for 20 seconds with 20 seconds rest in between activations. A temporary restoration was placed with the cotton pellet remaining in the chamber.

Result

The treatment was reviewed after 18 days showing a complete recovery. The palatal composite resin was placed and the patient no longer needed a ceramic veneer. Many factors contributed to a successful result:

1. A high concentration bleaching gel with higher pH.
2. The optimum level laser energy provided.
3. Adequate removal of the lining/GP (to the cervical dentine).
4. Activated bleaching gel left in the pulpal chamber to continue working.3

TouchWhite Er:YAG teeth bleaching can be a safe and effective teeth whitening method for vital and non-vital tooth discoloration.

References