The treatment of sensitivity during home bleaching

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Linda Greenwall presents a guide to managing patient sensitivity during bleaching procedures

Tooth sensitivity is one of the most detrimental side effects experienced by patients during bleaching procedures. It is very common to experience some type of sensitivity while bleaching teeth and during home bleaching it affects up to 80% of patients. These symptoms range from mild awareness of the teeth to an actual throb or toothache on one or all teeth. This can often lead to the patient terminating the bleaching procedure prematurely without achieving the expected results. There are numerous new products available to treat sensitivity and to prevent it from occurring. This article aims to discuss techniques for avoiding sensitivity, and the treatment options available for it, enabling bleaching programmes to be more successful and predictable.

Why does sensitivity occur during bleaching?

There are several possible reasons why patients develop sensitivity during bleaching and this area has been researched extensively (Greenwall LH, 2001) (Table 1).

The factors that determine whether or not a patient will suffer from sensitivity are not established. A study conducted at the University of North Carolina School of Dentistry (Leonard RH Jr et al, 1997) found that, of those patients that changed the bleaching solution more than once per night, 55% had sensitivity. This factor was found to be significant. Two-thirds of the patients who demonstrated tooth characteristics such as gingival recession, defective restorations and enamel-centum abrasion reported sensitivity, but when these characteristics were statistically evaluated, they were not found to be significant risk factors

It is thought that sensitivity originates in the dentinal tubules. Microscopically, dentine shows as a vast number of round tubules. Movement of fluid in these tubules is triggered by temperature changes, differences in osmotic pressure between different oral solutions and tactile pressure acting on the exposed dentine surface (Bartlett DW, Ide N, 1999) and is detected by pain fibres. The sensitivity of dentine occurs when the dentinal tubules are open and exposed to the oral cavity. The presence of open tubules has been related to increased activation of the pain fibres within the pulp by cold stimuli, when applied to the tooth surfaces (Bartlett DW, Ide N, 1999).

It is thought that the movement of the bleaching material through the dentine tubules can create pain sensations (this is similar to the hydrodynamic theory of fluid movements through the tubules). The bleaching material can enter the pulps of each tooth within 15 minutes of the application of the bleaching material to the tray. We also know that the bleaching tray's presence on the cervical parts of the tooth can cause a placebo

Table 1. Causes of tooth sensitivity and gingival irritation

- Addition of carbopol and other thickening agents into the bleaching gels
- Age: patients under 40 experience more side-effects
- Anhydrous-based whitening products
- Chemical by-products of carbamide peroxide
- Chemical interaction of the tray
- Concentration of whitening solution
- Exposure times
- Flavours added to the whitening solution (a problem in the first generation of bleaching materials)
- Frequency of application
- Pre-existing patient sensitivity
- Medical status of the patient
- pH of the whitening solution
- Gender: women appear to experience more side-effects than men
- Tray design and material used
- Tray rigidity.

Adapted from data from Leonard, 1998; Leonard et al 2004 and Knight et al 1997

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reaction to occur. Treatment is aimed at blocking the tubules.

Managing the sensitive patient pre-bleaching

When taking a history from patients, question them about existing tooth sensitivity before making the impressions for the bleaching trays. Patients with pre-existing sensitivity can then be pre-treated, using the trays created for the bleaching procedure. Instruct the patient to apply a small amount of fluoride gel or a proprietary desensitising gel directly into the tray and to wear the tray for half an hour daily, in the week before treatment. If the patient has deep cervical lesions, these should be sealed with glass ionomer prior to making the trays to prevent undercuts. This ensures a better fitting tray.

Amorphous calcium phosphate (ACP) can also be used to desensitise the teeth prior to bleaching treatments (Griniger M et al, 2005) (Table 2).

ACP, when used in a carbonate solution to crystallize and form hydroxyapetite, creates crystals that fill in the microscopic surface defects, closing the tubules. This absorption method can repair early carious defects and make the teeth smoother, stronger and less sensitive. In the UK, ACP is found in tooth mousse (GC UK). As with the fluoride gel, it can be placed directly in the bleaching tray and worn for 10-15 minutes daily, for one week prior to commencing bleaching treatment. This regime can also aid in desensitising patients during the procedure.

Table 2. Properties of amorphous calcium phosphate (ACP)*

- Originally used to remineralise teeth and reverse early enamel carious lesions
- Can reduce sensitivity if professionally applied or as a dentifrice
- ACP, in carbonate solution, works in a unique method by crystallising and forming hydroxyapetite. These crystals fill in microscopic surface defects, repair early carious defects and make the teeth smoother, stronger and less sensitive

* Gringer et al, 2005

Table 3. Treatment options for reducing sensitivity

Active options	Passive options
• Fluoride gel in the tray	• Modify bleaching technique
• 5% potassium nitrate	• Remove any excess bleaching material
• Desensitising toothpaste on teeth	• Use a lower concentration brand
• Sensitivity reduction material (neutral sodium fluoride gel).	• Reduce treatment time
	• Reduce quantity of bleaching material
	• Apply only every second or third night
	• Trim back bleaching tray.

Managing sensitivity during home bleaching

Prior to commencing home bleaching treatments, it is important to explain to patients that they may experience some type of sensitivity during the procedure. If you explain that this is normal and give details of how to treat it, it prevents the patient panicking should sensitivity occur. The patient should be informed that sensitivity is transient and that they will not be left with permanent sensitivity once the bleaching procedure has concluded. It is also prudent to explain that teeth are often most sensitive on day three, when there is maximum saturation of the bleaching product within the pulp. If forewarned, many patients will accept a mild degree of sensitivity and continue with treatment.

I recommend providing the patient with detailed instruction sheets and an outline of possible side-effects at the first home bleaching appointment. Patients should also be provided with a separate log sheet and asked to document sensitivity levels, allowing you to track the degree of discomfort experienced.

Managing extreme sensitivity

If the sensitivity is severe, firstly reassure the patient that it is temporary. Advise the patient to suspend treatment that night, and to then resume bleaching, using the tray, on alternate nights. Suspending bleaching for one night will relieve severe sensitivity. Application of desensitising products for one hour, via the bleaching tray, will also calm down extreme sensitivity. On occasion, it may be helpful to trim the tray by approximately 1-2mm, to prevent direct contact with the sensitive cervical area. Studies have shown that the procedure still works effectively in a shortened tray, as bleaching works from the incisal part upwards and the solution passes osmotically through the tooth (Oliver TL, Haywood VB, 1999).

It may also be useful to change the brand of bleaching material completely. On occasion, despite containing the same concentration of hydrogen peroxide, using a different brand of bleaching material can relieve sensitivity. It is prudent to stock a variety of brands for this reason. Always consider lowering the concentration of the bleaching material to reduce sensitivity, as the higher the concentration of bleaching material, the higher the incidence of discomfort.

Treating sensitivity: active and passive methods

There are two methods to consider for the treatment of sensitivity during bleaching treatment. The passive method consists of altering the bleaching time, frequency or concentration to find a comfortable solution for the patient. The active method employs the use of fluoride or potassium nitrate applied to the tray as a pre-treatment, or at the onset of symptoms (Table 3).

The use of fluoride and potassium nitrate to treat bleaching sensitivity has been clinical researched and works well (Haywood VB, 1999). The fluoride reduces sensitivity by blocking the tubules. This restricts the ingress of fluids in accordance to the hydrodynamic theory of pain (Bartlett DW, Ide N, 1999). A neutral fluoride (Leonard RH Jr et al, 2004) has been recommended for treatment use, such as Prevident 5000 Plus (Colgate Pharmaceuticals). The potassium nitrate reduces sensitivity via chemical interference from repolarizing after initial depolorization (Leonard RH, 1998; Leonard RH Jr et al, 2004), or it aids the release of nitric oxide (Haywood, 1999). The effect works directly on the nerve, resulting in a calming effect on the tooth. Many desensitising toothpastes contain potassium nitrate (the FDA permits a maximum concentration of 5%) and will reduce sensitivity after two weeks of use. Care should be taken, as some patients may

experience a tissue burn as a result of placing the desensitising toothpaste in the tray (due to sodium lauryl sulphate within the toothpaste).

Active treatment

For patients with normally sensitive teeth:

- Fluoride gel can be placed in the trays and worn for one hour (Haywood VB et al, 2001). The newer generation of bleaching agents contain fluoride and potassium nitrate to counteract the likelihood of sensitivity (for example, Opalescence F by Ultradent).
- A desensitising toothpaste can be brushed on the teeth or massaged into the cervical margins (Haywood VB et al, 2005). Alternatively, a specific sensitivity reduction material that contains potassium nitrate (Leonard RH Jr et al, 2004), such as products Ultra-eze (Optident) or Pola Sooth (SDI Industries) can be placed in the bleaching tray. It should be worn for one to two hours, depending on the amount of sensitivity, or applied in the tray for 10-30 minutes before or after whitening.
- A desensitising whitening toothpaste can be used to brush the teeth during bleaching to reduce the likelihood of sensitivity (Walsh TF et al, 2005).

Passive treatment

To reduce sensitivity the bleaching technique can be modified:

- It has now been recommended that bleaching trays are designed without reservoirs. This results in a closer fitting tray and ensures less bleaching material is needed.
- Demonstrate to patients the quantity of bleaching material required. The amount of gel placed on the incisal surfaces of the trays should be the size of a pinhead; a single proprietary tube should last between three to four nights. The gel does not have to cover the entire buccal surface when placed in the tray, it only has to reach the incisal surface and will travel via osmosis up the tubules. Using less material will result in less sensitivity.
- Use a bleaching gel with a lower concentration. If using a 20% carbamide peroxide gel the patient can change to 15%, 10% or 5% gel.
- Reduce daily treatment time (Leonard RH, 1998) or bleach every other night.
- Patient should not replenish the bleaching solution more than once per day.
- Ensure that the tray is not overextended - trim to ensure it is not impinging on the gingivae (Oliver TL, Haywood VB, 1999).

Single tooth sensitivity

If a patient presents with sensitivity during bleaching from a single tooth, simple measures can be applied directly to the tooth. A bonding agent (Bartlett DW, Ide M 1999), fluoride varnish, hema or oxylate preparations can be applied directly to the tooth surface. If necessary, the restoration can be replaced. It is important to ensure that there are no open carious lesions prior to bleaching. It may be useful to place a provisional filling, such as a glass ionomer restoration, into the open cavity to reduce single tooth sensitivity. If a filling has been dislodged, it is best to place a glass ionomer or temporary filling during the bleaching procedure. These approaches will help only if sensitivity can be isolated to one accessible area.

Sensitivity from one particular tooth can be the result of the patient bruxing onto the tray in a particular way during the night. It is useful to assess the occlusal excursions on such a patient to assess whether nocturnal grinding is taking place. The tray

CASE STUDY

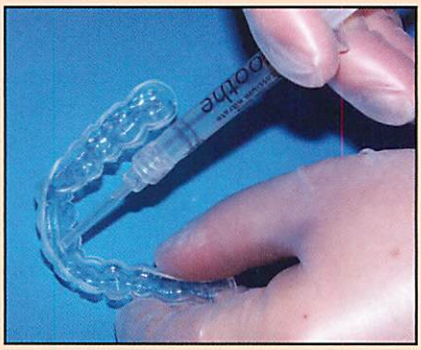

Figure 1. Demonstrate to the patient exactly how much bleaching gel to apply directly into the tray. This ensures that the patient doesn't experience sensitivity due to overfilling the tray. You can also utilise this demonstration to illustrate the amount of desensitising material to apply

Figure 2. A pre-loaded tray containing fluoride gel, packaged in a blister pack for single use application. These should be dispensed to patients, alongside guidelines, when commencing bleaching treatment for swift treatment of sensitivity

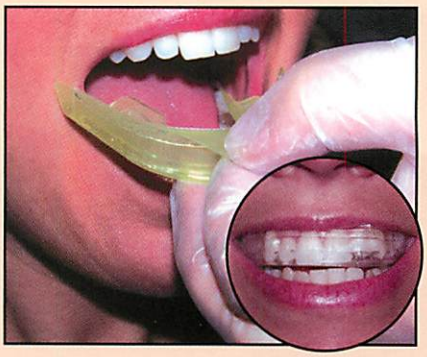

Figure 3a & Figure 3b. Demonstrate to the patient how to place the tray comfortably. Ensure that the outer tray is seated evenly. After removal of the outer tray, the fluoride gel strip remains on the teeth for 30 minutes or more, to reduce generalised sensitivity

Figure 4. Examination before treatment. The patient has toothbrush abrasion on the upper central incisors but, despite this, only experienced severe sensitivity in the lower premolar area

Figure 5. This patient is reviewed after two weeks of bleaching on the upper teeth. Patients tend to experience less sensitivity on the upper teeth than on the lower teeth. The patient experienced only mild sensitivity on the upper left central, which may be more related to bruxing

should be examined for signs of grinding.

Conclusion

Senstivity occurs in 80% of home bleaching patients. It is vital that clinicans provide clear guidelines for the procedure and supervise bleaching closely; determining the best approach to combat sensitivity, should it arise.

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Q1 Research indicates patients under which age experience more sensitivity from bleaching treatment?

- ☐ a) 20 years old
- ☐ b) 30 years old
- ☐ c) 40 years old
- ☐ d) 50 years old

Q2 Bleaching material enters the pulps of each tooth within how many minutes following application to the tray?

- ☐ a) Two minutes
- ☐ b) Three minutes
- ☐ c) Six minutes
- ☐ d) 15 minutes

Q3 Patients with pre-existing sensitivity should be pre-treated with a desensitising gel.

- ☐ a) True
- ☐ b) False

Q4 What should a dentist use for sensitivity, according to Van Haywood (1999)?

- ☐ a) Gutta percha
- ☐ b) Fluoride and potassium nitrate
- ☐ c) Chlorhexidine

Q5 Desensitising whitening toothpastes can be used to brush the teeth during bleaching to reduce the likelihood of sensitivity?

- ☐ a) True
- ☐ b) False