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WHITE WASH



EXCELLENCE IN DENTAL COSMETICS

DENTAL BLEACHING MANUAL

FROM WHITEWASH
LABORATORIES

whitewash
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IVAN ILIC' srl - Via L. Muratori, 46/11 - 20135 Milano - T (+39) 02 36512990 - F (+39) 02 55016646 - ilic@ilicdental.com

www.ilicdental.com

INTRODUCTION

The public's awareness regarding the different types of dental procedures available is ever increasing as more dentally related information is accessible online. This makes it easy for patients to research treatments and make an informed decision about what procedures they would like.

As the demand from patients looking for preventative and aesthetic improvements increases, dental bleaching is one of the most desired aesthetic treatments.

A study from The British Academy of Cosmetic Dentistry showed that over a quarter (26%) of the UK population have had some type of cosmetic dental procedure, with teeth whitening being the most popular treatment (Mintel survey).

Dental bleaching is a non-invasive procedure that allows patients to achieve a whiter smile, disregarding the need for a restorative or prosthetic approach. The treatment can be split into three main types: in-surgery, at-home supervised with bleaching trays or at-home supervised with teeth whitening strips. All are easy to use and provide excellent results.

This guide aims to introduce the clinician to key tooth whitening principles and discuss some important topics regarding dental bleaching, such as the indications of different methods, substances available, mechanisms of action, directions, etc.

WhiteWash Laboratories hopes this guide may support the clinician to enhance their skills to perform both comfortable and safe dental bleaching procedures.

SECTION 1

DENTAL BLEACHING

HISTORY

Demand for dental bleaching is not recent. The first dental bleaching procedure was reported in 1860 in vital and non-vital teeth with the combination of several products based on chloride, sulfur dioxide and oxalic acids. Home use dental bleaching sessions first took place in the 80's, when it was observed that patients under treatment with carbamide peroxide as an oral antiseptic resulted in whiter teeth.

Nowadays bleaching has greatly evolved, being performed on vital and non-vital teeth both in-surgery and at-home, with products that guarantee safety and comfort, available in different concentrations and protocols.

INITIAL CONSIDERATIONS

Dental bleaching is a non-invasive procedure that has been proven safe for clinical application.^{1, 2, 3, 4, 5, 6} It is a method of improving the aesthetics of the smile through the application of chemical substances to the teeth to make them whiter. As patient demand for aesthetic treatment increases, and dentistry shifts towards more minimally invasive techniques, there has been a search for less invasive dental bleaching procedures leading to great improvements throughout the years. Nowadays, the treatment is also an initial step for patients who search for restorative and prosthetic treatments.

INDICATIONS FOR DENTAL BLEACHING

- Teeth darkened by ageing
- Naturally yellow teeth
- Teeth darkened by smoking
- Teeth stained due to dietary factors
- Prior to restorative treatment
- Non vital teeth
- Tetracycline staining (or its derivatives)*
- Teeth affected by fluorosis*

*mild cases

The type of bleaching treatment and bleaching products depends directly on the type of tooth discoloration diagnosed.

TYPES OF STAINING

Staining can be due to extrinsic and intrinsic factors. Extrinsic pigments are related to the formation and deposition of pigmented substances on the tooth surface that might penetrate the tooth through the enamel and dentine. Normally these stains are caused by diet, smoking, some dental materials (eugenol, metallic alloys, etc.), mouthwashes such as chlorhexidine and also accumulation of plaque.

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Intrinsic staining is frequently related to pulp alterations (internal bleeding, necrosis) and the use of drugs such as tetracycline and its derivatives. Fluorosis caused by excessive ingestion of Fluoride during tooth development can also result in intrinsic staining.

Pigments inside the dental structure are known as chromophores. They have long and complex molecular chains that cause higher light absorption which gives the effect of a darkened tooth.

BLEACHING SUBSTANCES AND MECHANISM OF ACTION

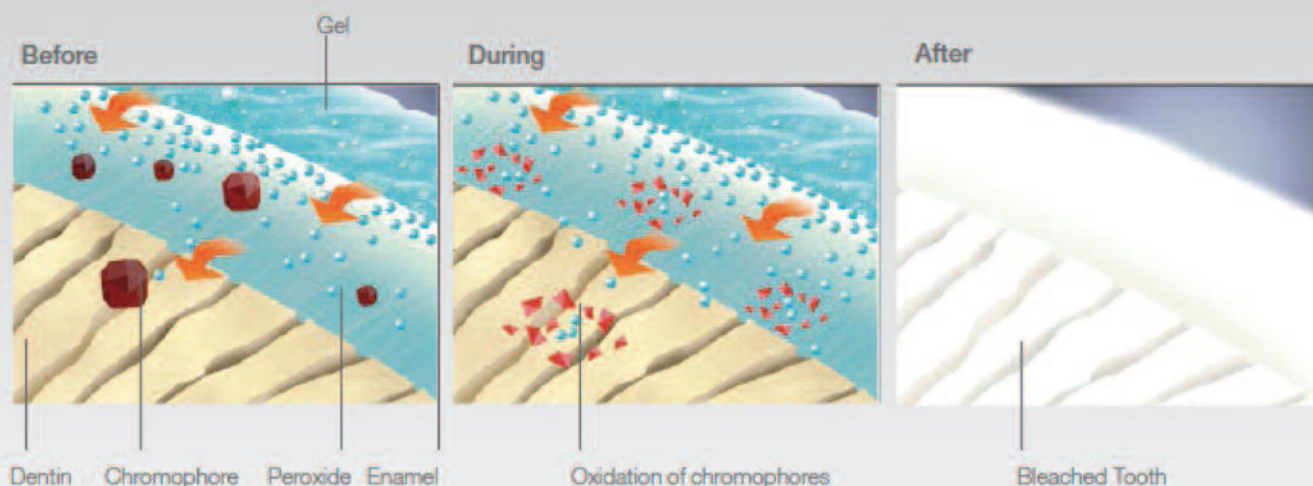
The main bleaching agent used for dental bleaching is hydrogen peroxide (HP) in concentrations normally ranging from 3 to 35% and carbamide peroxide (CP) ranging from 10 to 37%. Within the EU, due to recent legislative changes, the maximum HP concentration allowed is 6% which translates to a maximum concentration of CP of 17%.

The CP acts as a carrier for HP, the active agent responsible for bleaching. During its decomposition, CP releases HP and other by-products such as urea and ammonia. Due to this reaction CP provides a slower bleaching action. In general, 3% CP approximately equals 1% HP that breaks down to form oxygen and water.

HP and CP are applied in different protocols according to their concentration.

These substances are indicated for different treatments; however, they act through the common mechanism of the action of HP. This powerful oxidising agent releases reactive oxygen radicals that, due to their low molecular weight, penetrate the tooth structure to reach pigmented areas within the enamel and dentine. Through an oxidising process, these reactive radicals break the molecular chains of the chromophores (chemical groups responsible for colour) into smaller chains that are more soluble and mainly colourless, which can be eventually eliminated by diffusion. Peroxide diffusion and the break down of pigments depend on factors such as; the nature of dental structure, levels of permeability of tissues, exposed surface, thickness of the dentine tissue, power/concentration of the bleaching agent, length of product application. Different individuals may react differently to treatment, which is due to the varying factors that can influence success listed above. A good history and examination will ensure the dentist advises the most effective protocol for each individual patient to ensure success.

Mechanism of Action of Hydrogen Peroxide on dental bleaching process



INITIAL EXAMINATION AND BLEACHING TECHNIQUES

Dentists must always perform an accurate clinical examination³ to ensure that the patient is a suitable candidate for dental bleaching.

During oral examinations dentists should make sure that the patient is free of caries or failing restorations, fractures exposing dentine, periodontal disease, receding gums or cervical lesions (abfraction, erosion or abrasion). If any of these are diagnosed, they should be treated prior to the bleaching process (by means of provisional restorations, periodontal treatment, etc.). Radiographic examination such as periapical and/or interproximal radiographs are also important to provide further details of oral health. It is important to test the vitality of teeth to assess the pulp health prior to bleaching.

Another important step is registering the patient's initial teeth shade. Using a shade guide with intra-oral photography is a good way to compare before and afters. They also play a vital role medico-legally.

Regarding bleaching techniques, there are five different options: a) in-surgery bleaching; b) at-home bleaching with individual trays; c, i) at-home bleaching with teeth whitening strips c, ii) at-home bleaching with dissolving teeth whitening strips; d) internal bleaching – specific for non-vital teeth; and e) combined techniques.

a) In-surgery bleaching:

With no need for using dental trays, this technique consists of coating the teeth with bleaching gels in sessions that last for 1-2 hours. For patients more prone to hypersensitivity, it is important to combine the use of desensitising agents before bleaching sessions and then monitor the patient closely.

Some systems use external light/heat sources aiming to accelerate oxygen liberation, in an attempt to shorten sessions or increase efficiency. However, studies show that depending on the type of energy source and how long the exposure time is, this may increase the tooth temperature which could lead to pulp irritation and dental hypersensitivity.^{10, 11} The effectiveness of the in-surgery bleaching with the use of light or heat sources compared to without the light or heat is of some debate, as studies show there is no additional benefit.¹⁰⁻²⁵ With the recent EU legislative changes meaning that the HP is limited to 6%, many practitioners will always follow a session of in-surgery bleaching with home bleaching to ensure better results. The in-surgery technique is frequently used in patients who want results in a shorter period of time and dislike wearing dental trays.

b) At-home bleaching (with individual tray):

This technique requires a mould of each arch and the construction of custom trays that are made by the lab technician. These trays are loaded with bleaching gel (one small drop in each tooth position of the tray) and then worn for a specific period, according to the concentration and version of the gel. WhiteWash provides carbamide peroxide at 10% and 16% and hydrogen peroxide at 6%. Carbamide peroxide gels are to be worn over night for 2-3 weeks. It is useful to start the course with a few days of progressively longer treatment periods working up to overnight. Hydrogen peroxide is to be worn for 1-1.5 hours daily for 2-3 weeks. A patients' daily routine and schedule might influence which of these types to go for.

c, i) At-home bleaching (with Teeth Whitening Strips)

This technique does not require any impressions and the patient doesn't need to manually add whitening gel as the strips already come pre-coated with 6% hydrogen peroxide gel. Each patient is provided with a box containing mouldable plastic strips with 6% hydrogen peroxide pre-applied that they wear for 1 hour per day for 14 days. Each box contains 14 upper strips and 14 lower strips which are shaped for easy application to teeth. Teeth whitening strips can be used as a stand alone treatment or they can be combined with tray whitening for quicker and longer lasting results; for example if the patient has a limited time to achieve their desired results, they can begin whitening with strips immediately whilst the trays are being made.

c, ii) At-home bleaching (with Dissolving Teeth Whitening Strips)

As with the above whitening strips, this technique doesn't require any impressions and the 6% hydrogen peroxide gel is already included within the dissolving strip. Each patient is provided with a box containing dissolving strips with 6% hydrogen peroxide that they apply to teeth and allow to dissolve. The strips take around 15-20 minutes to dissolve. Each box contains 56 dissolving strips meaning 28 can be applied to upper teeth and 28 to lower teeth. Dissolving teeth whitening strips can be used as a stand alone treatment or can be combined with tray whitening for quicker and longer lasting results. They are particularly suitable for top-ups and maintenance due to the relatively short application times and ease-of use.

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d) Internal Bleaching Technique:

This technique is performed on non-vital darkened teeth that have a good root filling and good periodontal health. The pulp chamber is accessed, a cervical barrier is created and then the bleaching agent is placed into the pulp chamber. The cavity is sealed provisionally for a period of about five days, and then the patient returns to the surgery for a review.

e) Combined Techniques:

Another effective option to consider is a combination of any of the previously mentioned techniques – the two most common are:

- In-surgery followed by at-home tray whitening as part of a single treatment, when a shorter treatment time is needed
- At-home bleaching with teeth whitening strips (that the patient can take away immediately whilst the trays are being fabricated), followed by at-home bleaching with trays

The techniques combined offer greater initial speed and provide long lasting results. By using this combined protocol, it is possible to get results in a faster time if compared to the techniques performed separately.

(Please note; in-surgery whitening is now limited in its effectiveness due to recent changes in EU Legislation limiting the level of hydrogen peroxide to 6%)

SAFETY IN DENTAL BLEACHING

Dental bleaching has become popular and has been performed with the same protocol since 1989, when Dr. Haywood and Heymann published an article about at-home dental bleaching. Since then, the treatment has been studied ext in order to assess safety and effects on dental tissues. Nowadays, after more than twenty years of clinical practice, dental bleaching can be considered a safe, conservative and effective procedure.

CLINICAL EXAMINATION

The first step and one of the most important is the initial clinical examination, which should be conducted carefully to establish the correct treatment plan. Dental disease or pathology needs to be addressed prior to bleaching to ensure safety. The bleaching must only be conducted when the oral and systemic condition of the patient is healthy. If required, x-rays should be taken to help diagnosis.

FOLLOW-UP AND PROFESSIONAL INSTRUCTIONS

Once the patient is able to undergo the treatment, they should be reviewed periodically. The dentist must provide patients with clear instructions and directions as well as restrictions during treatment such as having acidic food/drink, heavily coloured food/drink, smoking, etc. During treatment, the patient must know the dentist is available in case of side effects. The dentist is responsible for ensuring comfort throughout the treatment and must recognise and treat any side effect that the patient may present. Performing a comfortable bleaching session increases patient's satisfaction and helps with the positive image of the dentist.

DENTAL HYPERSENSITIVITY

This is the most common side effect observed during and post treatment in vital teeth. Most of the cases are usually mild and easily controlled with simple management and should disappear without reoccurrences after the end of the treatment. The mechanism of the sensitivity is not totally understood yet, however it is known that the movement of hydrogen peroxide into enamel and dentine is responsible for reversible pulp reactions. In cases of higher hypersensitivity (rarer), the reaction could lead to local arterial vasodilatation, increase of capillary hydrostatic pressure, increase of pulp tissue pressure, etc., leading to higher hypersensitivity, but this should subside.

The incidence and intensity of hypersensitivity varies from patient to patient and depends on factors such as pain tolerance, volume of the pulp chamber and presence of cracks or leaking restorations. In cases of moderate hypersensitivity, the discomfort may last for one or two days after the beginning of home bleaching, regressing as the treatment progresses. When the hypersensitivity occurs after in-surgery bleaching, it generally lasts for four to six hours after gel application. It is known that the level of hypersensitivity is influenced by the concentration of the gel.

Whenever the discomfort persists or worsens, the patient should be evaluated for any factor that was not previously detected [cracks, wear, recession, caries, etc.]. Where nothing is found, the following guidelines are suggested:

a) At-home bleaching:

- Discontinue treatment and apply desensitising agent daily in the custom tray, for as many days as needed or when symptoms are reduced. Using a desensitising agent prior to the bleaching reduces the level and incidence of hypersensitivity
- Use a sensitive toothpaste
- Reduce the concentration of the gel
- Perform the bleaching alternating days
- In extreme cases, discontinue treatment and advise analgesics

b) In-surgery technique:

- Apply desensitising agent in-surgery for ten minutes just before coating the teeth with the bleaching gel. Using a desensitising agent is advisable²⁶ to maximise comfort during treatment
- Discontinue use of light sources that may heat teeth, in cases where it is being used
- Reduce the concentration of the gel
- Consider changing techniques: at-home bleaching may be more comfortable to the patient
- In extreme cases discontinue treatment

SOFT TISSUE IRRITATION

During home bleaching, mild levels of irritation may be observed due to the hydrogen peroxide contacting the soft tissues. This side effect presents as slight burning and redness, generally on the gingival margin. It is a transitory effect (normally regresses and disappears after discontinuing the treatment) and it is generally associated with a poorly made tray, the presence of pre-existing gingival irritation and excess gel used in the tray. In cases of irritation, instruct the patient to follow the directions precisely – avoiding excess that may overflow the tray – and perform a new clinical examination to identify any gingival problem as well as correct the fitting of the tray.

EFFECTS OF BLEACHING GEL ON THE TOOTH STRUCTURE

Studies show that bleaching agents may affect enamel microhardness and surface roughness, depending on the type of bleaching agent, concentration and length of sessions. Reduction of enamel microhardness and increase of enamel roughness should be considered as temporary effects and are easily reverted by the action of saliva and by polishing the teeth with felt disks, respectively. WhiteWash offers bleaching gels that contain fluoride, which may support the mineral recovery of the enamel and consequently accelerate recovery of the microhardness.

RECOMMENDATIONS TO PATIENTS DURING DENTAL BLEACHING

There are some important instructions to give patients to improve treatment effectiveness:

- Avoid acid food or drinks that may increase dental hypersensitivity
- Avoid food saturated in pigments (soft drinks, sauces, red wine, etc.)
- Avoid smoking
- In case of hypersensitivity, patients must seek advice from their dentist

Guidelines for patients under at-home treatment:

- Brush the teeth thirty minutes prior to applications
- Apply the right amount (small drop) of gel on the tray as indicated by the dentist
- Remove any excess gel that overflows the tray with a finger or a toothbrush
- Trays are to be worn according to the directions on each product
- After use, wash mouth with water
- Store in a clean and dry place
- Attend the dental review visits for supervision

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QUALITY OF WHITEWASH PRODUCTS

WhiteWash Laboratories is committed to developing high quality products and our dental bleaching gels come to market backed by years of experience and research. We pay particular attention to every characteristic and component of our bleaching gels to offer dentists a top quality product.

a) Incorporation of Potassium Nitrate and Fluoride: results in better patient comfort

Potassium Nitrate desensitises nerve fibres in the dentine, and therefore reduces potential hypersensitivity. Likewise the fluoride acts through a mechanism of tubule obliteration to offer a more comfortable process to the patient.

b) Incorporation of Calcium: preserves dental microhardness

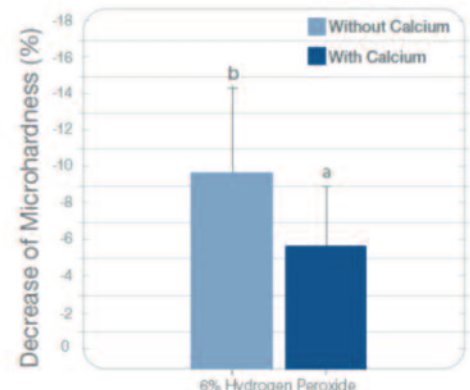
The calcium gluconate added to WhiteWash 6% Hydrogen Peroxide Gel provides a dental remineralising effect that was observed in microhardness tests (GlannInI, M., 2008). This suggests that calcium containing gels minimise the reduction of microhardness during bleaching sessions. Calcium preserves the integrity of enamel by reducing the loss of mineral (see adjacent graph).

c) High water content

Our at home bleaching gels have a high water content, which maintains tooth hydration throughout bleaching process. Therefore reducing fade-back.

d) pH Stability

Dental bleaching gels should have a non-acidic pH²⁷, which prevents the demineralising effects on dental structures. Our at-home bleaching gels are pH neutral.



Source: Prof. Dr. Marcelo Gianinni - Unicamp - SP/Brasil.

SECTION 2

DENTAL BLEACHING TECHNIQUES

STEP ONE MEDICAL, DENTAL AND SOCIAL HISTORY

Identification of the following:

a) Medical history

Patients should be questioned about current use of any medication, existing systemic diseases such as diabetes and if they are pregnant or lactating.

b) Oral condition

Patients must be questioned whether fluoride was unduly ingested in childhood, if they encountered dental trauma or have previously had dental bleaching. Dental hypersensitivity on a daily basis must also be identified prior to exposing patients to treatment.

c) Diet

Patients must be questioned on the frequency of consumption of coffee, tea, soft drinks, red wine and other heavily coloured substances.

d) Habits

Patients must be questioned to see if they are smokers, suffer from onychophagy (nail biting), bruxism, etc.

STEP TWO CLINICAL EXAM

Patients considering the treatment should be free of oral health problems, in case of any; they must be detected and treated prior to dental bleaching procedures.

Professionals must basically search for:

a) Dental plaque or calculus

Enhance gel contact to the surface with a scale and polish (prophylaxis).



b) Carious lesions

Remove decay and restore teeth with temporary or permanent material*.



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c) Unadapted restorations

Change restoration for temporary or permanent material*.



d) Gingivitis or periodontitis

Diagnose causes and treat the disease.



e) Receding gingiva

It is indicated to cover exposed areas with temporary or permanent material*.



f) Pulp alterations

Teeth with affected pulp must be root treated prior to bleaching and may require specific bleaching afterwards.



g) Dental cracks or fractures

According to the extent and amount of dentine exposure, it is suggested to restore tooth with temporary or permanent material*.



h) Enamel hypoplasia

Spots may become more evident after bleaching, eventually consider restorative approach after bleaching or the use of new enamel infiltration systems such as Icon white spot treatment.



i) Fluorosis staining

According to the level of staining, microabrasion treatment prior to bleaching may be suggested.



j) Tetracycline staining

Treatment may differ according to the level of the staining; in some cases bleaching can be performed for longer periods than in other diagnoses.



*When deciding whether to restore with a temporary or permanent dental material, be aware that the material is not bleached as teeth are, so the restoration may need to be changed post treatment.

STEP THREE RADIOGRAPH EXAMINATION

Performing radiographic examination to complement clinical information is advisable. This confers a higher level of safety to the treatment, by taking interproximal radiographs or periapical radiographs as required, to rule out any undetected dental disease.

STEP FOUR PROPHYLAXIS

This involves elimination of superficial staining that cannot be removed by normal brushing. Sodium bicarbonate jet polishing may be used, as well as polishing with rubber cup or Robinson brush. For patients who present with pigmentation of interproximal areas, fine grain sandpapers strips can be used below contact point area.

Please note that if a patient requires a course of periodontal treatment before bleaching that it may be prudent to have a break before beginning. This allows the gums to heal after scaling and/or root surface debridement, as sore gingiva may be easily irritated by peroxides.



STEP FIVE INITIAL SHADE REGISTRATION

To obtain reference to colour changes during treatment, it is essential to register initial shade with the aid of a shade guide. Always consider canines and incisors separately, since canines may present a more saturated colour. Patients should confirm the shade with a mirror.



MANUFACTURING INDIVIDUAL TRAYS FOR AT-HOME DENTAL BLEACHING

MOULDING TECHNIQUE

STEP ONE

Before taking the impressions, perform dental prophylaxis. Then, place the patient in an adequate position to allow the impressions to be taken with the dental arch parallel to the floor.

STEP TWO

Select an appropriately sized impression tray that covers all the teeth of the arch and has sufficient free space for adequate thickness of impression material (Fig. 1). The tray must completely cover all teeth. If total coverage is not reached, extend the tray using wax.



Figure 1: Selection of the impression tray

STEP THREE

The material of choice is alginate. Dispense the correct proportion of water/powder according to the manufacturers instructions. Place the powder in a bowl and then add water and mix it until a smooth and homogeneous mix is obtained (Fig. 2).



Figure 2: Correct homogenisation of alginate

STEP FOUR

Place the mixed alginate in the selected impression tray, spreading the material all over the surface (Fig. 3).



Figure 3: Loading the impression tray with alginate

STEP FIVE

Place the loaded tray into the patient's mouth deepening from posterior to anterior, aligning the central part of the

tray to the midline of the patient (Fig. 4). Apply moderate pressure and be sure that the tray does not contact teeth.



Figure 4: Place the tray onto the patients' dental arch

STEP SIX

Keep the impression tray static stabilising it with two fingers (Fig. 5) until the complete gelification of the alginate. When ready, remove the tray.



Figure 5: Moulding of the arch

STEP SEVEN

Before casting the mould with plaster, disinfect the alginate impression with an antimicrobial agent for ten minutes. Ideally the impression should be cast with plaster right after obtaining the mould. When it is not possible, cover the impression with a damp tissue and keep in a sealed bag until casting. (Or refer to manufacturers instructions for the alginate you use).

MAKING OF THE MODEL

STEP EIGHT

The material of choice to cast the impressions is type III dental plaster, prepared in a proportion of 30ml of water to 100g of powder. Pour water into a bowl and then add the powder, mixing both vigorously for about 45 seconds until homogenisation is complete (Fig. 6).



Figure 6: Mixing of the plaster

STEP NINE

After mixing the plaster, proceed to casting aided by a spatula or brush. If possible, use a vibrating device for better flowing and prevention of air blows (Fig. 7 and 8).



Figure 7: Casting the impression aided by spatula

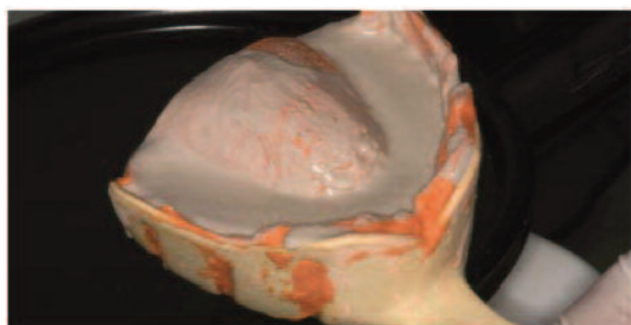


Figure 8: Vibration device for better flowing

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STEP TEN

Wait until the plaster is completely set. Remove the model 30 to 60 minutes after casting depending on manufacturers instructions.

STEP ELEVEN

Trim the model using a dental plaster trimmer, removing excess and leveling the base (Fig. 9). The model should be shaped as a horseshoe to allow the vacuum forming machine to create the custom tray.



Figure 9: Trimming of the model

STEP TWELVE

After trimming the models, dry them vigorously (Fig. 10). Reservoirs on buccal surface of the model are not required ²⁸.



Figure 10: Models trimmed in a shape of horseshoe

STEP THIRTEEN

Place the model on the vacuum forming device, under the vinyl tray sheet (Fig. 11). Turn on the equipment to start heating the sheet. When it shows a bulging of about one inch, rapidly pull down the sheet over the model and turn the vacuum on for about ten seconds.



Figure 11: Model on the vacuum forming device. Observe the bulging of the vinyl tray sheet showing the correct time to lower it down over the model

STEP FOURTEEN

The tray sheet must be well adapted to the contours of the model, especially close to the gingival margins helping to hold the gel in the custom tray (Fig. 12).



Figure 12: Correct adaptation of the vinyl sheet to the model

STEP FIFTEEN

After cooling of the tray, trim it in order to keep its contour 1mm above the gingival margin (Fig. 13).



Figure 13: Trimming of the tray respecting the cervical

SECTION 3

TEETH WHITENING STRIPS
6% HYDROGEN PEROXIDE

WhiteWash Professional Teeth Whitening Strips are mouldable plastic strips containing the optimum amount of whitening gel to simply, safely, and effectively, whiten teeth. With a unique gentle whitening formula that helps to limit tooth sensitivity, these enamel-safe professional whitening strips are designed to follow the contour of teeth, enabling patients to safely and comfortably achieve whiter teeth by applying the strips for 60+ minutes once a day for 14 days.

- + 14 Applications (14 upper strips, 14 lower strips)
- + Enamel Safe
- + Advanced Seal Strips with Non-Slip Technology
- + Patented Formulation with Slow-release Whitening Ingredients
- + Formulated by UK Dentists



EFFICACY OF 6% HP TEETH WHITENING STRIPS

CASE STUDY

Dr Bradley Thornton BChD (Leeds) 2007

Teeth whitening strips are the most popular form of whitening in America. They are available over the counter from most major retailers and it's easy to see why they are such a hit with the public; they are relatively inexpensive, easy to self-administer and have a short application time.

In the UK and throughout Europe, tray whitening is and will continue to be the most popular form of teeth whitening treatment. This is because until recently it was the only option, however, with the introduction of teeth whitening strips, a new market for patients has opened up, for those who would not normally whiten their teeth or who may otherwise whiten their teeth illegally at a beauty salon.

"As a practicing dentist, I am always looking for innovative ways to treat my patients; I was intrigued to discover WhiteWash Laboratories - a business providing teeth whitening strips which are mouldable plastic strips with 6% hydrogen peroxide gel already 'pre-loaded'.

Each patient is given a box containing 28 strips, one for the upper arch and one for the lower arch, designed to be worn for 1 hour each day over a 2 week period".

The purpose of this clinical trial is to check the efficacy of the WhiteWash Laboratories 6% Hydrogen Peroxide Strips. In the setting of a busy private practice it was also to determine its place in modern day practice and the 'ideal' patient to offer this treatment to.

MATERIALS AND METHODS

The trial was done at a busy private general and specialist referral practice. All patients chosen were chosen from the existing patient database and selected after a routine recall appointment. Selection criteria were as follows:

- + No medical contraindications to tooth whitening
- + Over 18 years of age
- + No dental pathology clinically or radiographically
- + Good levels of oral hygiene
- + Little or no anterior restorations
- + Not already had tooth whitening

A total of 20 patients were selected over a period of 12 months.

Patients of different ages and different starting shades were chosen, to get a fair representation of a variety of patients, to determine the 'ideal' patient for teeth whitening strips.

Once the patient had been selected, consent was obtained. A baseline shade was taken using VITA shade tabs under natural light. This shade was independently checked by two dental professionals to ensure consistency and clinical photos were taken for our records.

The first cycle of use was completed in surgery for each patient and then they were given the rest of the box along with verbal instructions and written instructions to finish the course at home.

A review appointment was made 15 days after the first appointment to allow the full course to be finished. The patients were given instructions to rebook the review appointment for a later date if they had missed any days due to sensitivity or lack of compliance. The review appointment being the day after the course finished.

At the review appointment, a new shade was recorded, clinical photos were taken for our records and this shade was compared with the initial shade.

The VITA shade guide was in order of VITAs recommended VALUE order as follows:



RESULTS

2 subjects failed to return for their review appointment but returned at their 6 monthly recall visit. They have not been included in the results.

4 subjects took longer than the expected 14 days to complete the course due to various factors with 2 stating that on a few days their teeth were sensitive so as instructed, deferred that day until the next when the sensitivity had subsided. The two predictors of sensitivity in vital night tooth whitening are clinical findings of sensitive teeth or frequent application (more than one per day)¹.

All candidates wore the strips for 1 hour per day as instructed and completed the full course. The only side effect described was the sensitivity in the 2 subjects noted earlier. As with all whitening protocols we use, this subsided and was not present at review. All subjects initially found the lower strip more difficult to apply but all managed and were happy with the ease of use when asked at review.

All patients were happy with the end results.

Subject	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Start Shade	A3	C4	B3	A3.5	C2	C2	A3	A3	A3.5	A4	A3.5	A3	C4	D3	D3	B4	C1	A3.5
Finish Shade	B2	C3	B2	A3	C1	B1	B1	B2	A3	A4	A3	A2	C3	D2	D3	B3	A1	A3
Shade Change	6	2	8	3	1	6	8	6	3	0	3	4	2	6	6	2	5	3

AVERAGE SHADE INCREASE = 4.1 SHADES

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Figure 1.1: Patient A, Before



Figure 1.2: Patient A, After



Figure 2.1: Patient B, Before



Figure 2.2: Patient B, After



Figure 3.1: Patient C, Before



Figure 3.3: Patient C, After

The photographs above show some clinical case results from the study. As you can see from Figure 1.1 & 1.2, there is a marked improvement for Patient A for their before and after pictures. Patient B shown in Figure 2.1 & 2.2 also show a good result and Patient C in Figure 3.1 & 3.2 show a slight improvement with the teeth looking 'fresher' and 'cleaner'.

In private practice with a fee paying patient, I would be happy with the results of the first example, the second I would be happy with but expect the patient to wish for further whitening to improve the result. I felt that with the final patient the result could have been better although the patient was happy with the results.

DISCUSSION

The main purpose of this trial was to assess the efficacy of the WhiteWash Whitening Strips with 6% hydrogen peroxide. By giving a variety of patients the strips spanning different age groups and starting shades, despite being a small sample group, we were able to define our ideal patient for the strips. We established a criteria to use in practice to ensure each patient maximises the results of their tooth whitening.

As we find with all our tooth whitening, the best results tend to come from younger patients with a yellow discolouration. Even though age is not something we take into account when discussing whitening with a patient, we find younger patients tend to have a better result in a shorter time. With the strips, this still applies but as the box has a 14 day treatment course, it is important to assess the patient well prior to the whitening process.

When giving a patient a box of strips, they assume that everything they need to achieve their desired result is within one box. My personal experience is that patients perceive the strips as not working if they need another box, even if I have pre-warned them one box might not be enough. Patients are generally more accepting of the fact that the same course is being 'extended' by giving more syringes if they have had tray whitening and did not reach the shade they anticipated. When getting another box of strips I found patients felt they were 'starting another course' as the first one had not worked.

If I felt the patient could not achieve their desired result with the one box of whitening strips due to severe discolouration I would discuss the choice of doing back-to-back whitening with two boxes of whitening strips or other options including tray whitening using WhiteWash 16% Carbamide Peroxide Gel for overnight wear.

A study which compared the different types of teeth whitening to determine the amount of bleaching needed for a six-shade change indicated that three applications of 38% hydrogen peroxide achieved the same result as 1 week of 10% carbamide peroxide nightly or 16 days of daily application of 5.3% hydrogen peroxide on a whitening strip. So it is possible to achieve the same results no matter which product is used; there is just a different time factor to achieve the desired shade¹.

For this reason, if prolonged tooth whitening is anticipated I would advise overnight trays with WhiteWash 16% Carbamide Peroxide Gel. If the patient cannot tolerate overnight wear of trays and has to opt for daytime wear, the options would be 6% hydrogen peroxide gel in trays for prolonged use or multiple boxes of the strips depending on the patients budget and preference.

Tooth sensitivity caused during tray tooth whitening could be due to overloading the trays, abrasion of the trays on tissue or ill-fitting trays². None of these apply with the strips, which explains the low number of cases where sensitivity was reported. All sensitivity ended with cessation of treatment and no patients felt the sensitivity experienced would affect their decision to use the strips again.

CONCLUSION

WhiteWash 6% Hydrogen Peroxide Strips are a good addition to the options available to patients for tooth whitening. They are the most cost effective solution and will open up the market to patients who would not normally whiten their teeth. However, it is unwise to opt for the most cost effective solution if as a clinician you feel the effect might not meet patient expectations, therefore careful patient selection is essential.

In my practice, the ideal candidate for the strips would any or all of the following:

18-40 years old, yellow discolouration or as a top up to previous whitening treatment.

If someone fell outside the age range but had 'young teeth', by which I mean little tooth wear especially labially then I would be happy to go for the strips if their discolouration was yellow.

As with all whitening treatment, good case selection and management of patient expectations are paramount to a successful result. This is no different with the strips. As part of a comprehensive list of options available to patients for their whitening treatment and in light of informed consent, patients should be made aware of the option to use whitening strips for their treatment and dentists need to be educated in their uses, benefits and limitations.

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DISSOLVING TEETH WHITENING STRIPS

6% HYDROGEN PEROXIDE

WhiteWash Dissolving Teeth Whitening Strips have been developed to provide convenient, no-fuss teeth whitening, with a simple application method and no strip to remove afterwards.

They are great for top-ups and keeping your smile white. You can initially do a full course of whitening and can also do several strips each month to maintain your white smile. They also have a pleasant mint flavour to help freshen breath.

- + 56 Applications (28 upper strips, 28 lower strips)
- + Easy application (20 minutes, once daily)
- + Enamel Safe
- + Advanced Seal Strips with Non-Slip Technology
- + Formulated by UK Dentists



DISSOLVING TEETH WHITENING STRIPS

CASE STUDY: CARDIFF UNIVERSITY DENTAL SCHOOL (UK) JULY 2013

Professor J.S Rees & Dr A Alamri

HYDROGEN PEROXIDE WHITENING STRIPS

After application of the WhiteWash Dissolving Teeth Whitening Strips containing 7% hydrogen peroxide to both stained and unstained groups, significant whitening effect was obtained after 14 days.

STAINED GROUP

The ΔE^* value has changed from 8.77 to 30.3 at day 14, and the baseline shade has changed from D4 to B1 which is 7 units change according to the Vita shade guide.

UNSTAINED GROUP

The ΔE^* value has a little bigger than stained group value at day 14, and thus a more whitening effect was produced. The specimens in this group also bleached to the lighter shade [B1] according to Vita shade guide, Table 1.

TABLE 1

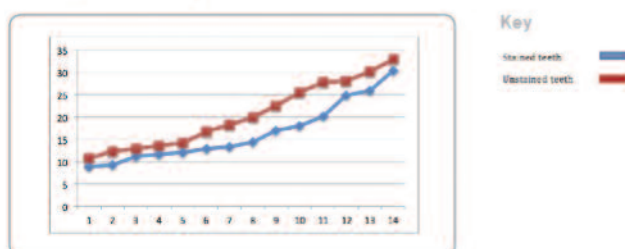
ΔE^* value for both stained and unstained groups.

Days	ΔE^* Stained	ΔE^* Unstained	Group	Pre treatment	Post treatment	No. of teeth
Day 1	8.77	10.77	Stained	D4	D2	7
Day 2	9.3	12.22	Unstained	D2	D1	3
Day 3	11.2	12.9				
Day 4	11.6	13.5				
Day 5	12.1	14.3				
Day 6	12.96	16.78				
Day 7	13.4	18.23				
Day 8	14.5	20				
Day 9	16.99	22.54				
Day 10	17.97	25.43				
Day 11	28.1	27.8				
Day 12	24.09	28.1				
Day 13	26	30.2				
Day 14	30.3	33				

PERFORMANCE VERSUS MARKET LEADER

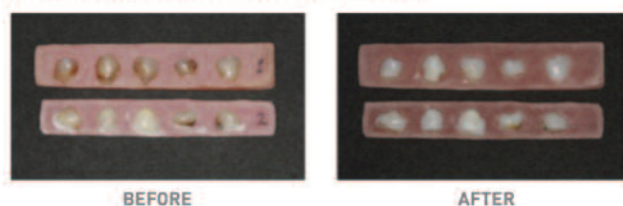
The WhiteWash Dissolving Whitening Strips data for stained teeth was comparable to the performance of the market leaders teeth whitening strips (Product C) which changed from 8.2 to 28 at day 14, also 7 units change according to the Vita shade guide.

Figure 1. Colour change following bleaching with the WhiteWash Dissolving Whitening Strips using human teeth, after 14 days.



BEFORE & AFTER

Pre treatment photograph (left) and post treatment photograph (right) of the human teeth bleached with WhiteWash Dissolving Whitening Strips.



WHITE WASH WHITENING

DISCUSSION

The results of this study suggest that Product C and WhiteWash Dissolving Whitening Strips are very effective for bleaching discoloured teeth clinically.

Following the manufacturers regime, extracted teeth lightened by more than 7 shades from baseline, and 6 shades versus the placebo.

Almost 100% of the treated teeth had at least a 2-shade improvement. The response was also evident in the before and after photographs. There was a significant difference between groups treated with Product C and WhiteWash Dissolving Whitening Strips and control teeth ($P < 0.05$) and this is in accordance with Kugel and Kastali (2000) using the same bleaching regime.

TEETH WHITENING GEL

WhiteWash Professional Teeth Whitening Gel has been designed to help patients conveniently achieve a whiter smile with the least possible hassle. Our Professional Teeth Whitening Gel also contains a number of specially selected ingredients to help reduce sensitivity.

As with all of our products, it is beautifully presented in an ergonomically designed syringe with a custom made applicator for accurate placement of the gel into whitening trays.

6% HYDROGEN PEROXIDE

- + With desensitising potassium nitrate, remineralising calcium & fluoride and soothing aloe vera
- + High water content to prevent tooth dehydration and fade-back
- + Excellent viscosity for ease of use
- + Neutral pH
- + Large 3ml syringe for excellent economy
- + 6% hydrogen peroxide

10% AND 16% CARBAMIDE PEROXIDE

- + With desensitising potassium nitrate and remineralising fluoride
- + High water content to prevent tooth dehydration and fade-back
- + Excellent viscosity for ease of use
- + Neutral pH
- + Large 3ml syringe for excellent economy
- + Available as 10% or 16% carbamide peroxide



WHITEWASH LABORATORIES **6% HYDROGEN PEROXIDE** **TEETH WHITENING GEL** AT-HOME TOOTH WHITENING: CLINICAL CASE

Prof. Dra. Elaine Maia (UNIP-DF, IPESP)

Prof. Dra. Nara Cordeiro (UNIP-DF, FOPLAC, IPESP)

Fabiane Machado (Student - UnB)

The choice of the whitening procedure must be left to the patient to decide, as their lifestyle will indicate which procedure is best suited to them.

In the past many patients have preferred power whitening due to the reduced time involved. Most commonly a high percentage of hydrogen peroxide (HP) has been used for these procedures as it is less stable and degrades faster than carbamide peroxide (CP), requiring less time to produce the desired results.

When using these high concentrations of HP it was important to prescribe a desensitising agent, as the higher the concentration of whitening gel used the greater the chance the patient would experience sensitivity. Due to recent changes in the law throughout Europe the highest concentration of HP that can now be used is 6%.

The following clinical case shows the at-home whitening procedure performed with hydrogen peroxide at 6% (WhiteWash Professional Teeth Whitening Gel) performed over a period of 14 days.



Hydrogen peroxide at 6% (WhiteWash Professional Teeth Whitening Gel).



The bleaching gel was used for 1 hour each day, for a period of 2 weeks.



Patient picture before the treatment. Note; the shade of the patient's teeth matches her skin tone, her smile is not contrasting.



Patient smile before treatment.



Initial situation (shade A3).



After 2 weeks of uninterrupted treatment, the whitening effect can be observed.



Closer view from the teeth, which have reached a extremely satisfactory shade. (Shade B1)



Patient smile after the treatment with WhiteWash Professional Teeth Whitening Gel (6% HP).



WHITEWASH PROFESSIONAL TEETH WHITENING GEL CLINICAL CASE

The product used was WhiteWash Professional Teeth Whitening Gel with 6% hydrogen peroxide and calcium. An impression of both arches was taken using alginate. From these impressions, custom trays were created and it was decided that the patient should start by bleaching the upper arch first, so that the patient could visualise the difference between both arches and consequently the efficacy of the gel.



Figure 1 – Initial Case.



Figure 2 – Starting bleaching on the upper arch, using the gel for 1:30h per day. The patient shows a considerable contrast between the arches, showing high efficacy of WhiteWash Professional Teeth Whitening Gel with 6% hydrogen peroxide and calcium.



Figure 3 – The final result after two weeks of bleaching. Observe the excellent result.



Figure 4 – Before.



Figure 5 – After.

WHITEWASH LABORATORIES 10% CARBAMIDE PEROXIDE TEETH WHITENING GEL AT-HOME TOOTH BLEACHING: CLINICAL CASE REPORT

Letícia Cunha Amaral Gonzaga de Almeida

DDS, MS - Master of Science in Dentistry, Aracatuba School of Dentistry, University of the State of São Paulo (UNESP), Brazil.

Paulo Henrique dos Santos

DDS, MS, PhD - Assistant Professor, Professor of Dental Materials, Aracatuba School of Dentistry, UNESP, Brazil.

André Luiz Fraga Briso

DDS, MS, PhD - Associate Professor, Head of Department of Operative Dentistry I, Aracatuba School of Dentistry, UNESP, Brazil.

ABSTRACT

The aim of this study was to report the clinical steps of the at-home bleaching technique performed with WhiteWash Laboratories' Teeth Whitening Gel applied in custom-fitted dental trays. The therapy consisted of the application of 10% Carbamide Peroxide Whitening Gel in both dental arches for 3 weeks. The custom-fitted tray was used for a further 1 week; however the material was applied only in the premolar and canine regions. The bleaching therapy was effective in obtaining the desired colour, and the aesthetic results remained stable over a period of 26 months. It was concluded that the at-home bleaching technique with 10% carbamide peroxide is a simple technique capable of providing patient satisfaction by offering excellent long-lasting results.

KEYWORDS

Aesthetics. Dental bleaching. 10% carbamide peroxide. Case report.

INTRODUCTION

Teeth bleaching has been used successfully in cases where the dentine is naturally dark or shows colour changes that compromise aesthetics and therefore the patients' health. In these clinical conditions, the exposure of teeth to peroxide-based oxidising agents has been the first choice of treatment.

The bleaching treatment can be performed with the at-home or in surgery techniques. At-home bleaching is performed with the use of low concentrations of carbamide or hydrogen peroxides applied in custom-fitted trays that need to be worn daily by the patient. The objective of this study was to report a clinical case of a patient with naturally yellow teeth using at-home bleaching with 10% carbamide peroxide whitening gel.

MATERIAL AND METHODS

A 23-year old female patient was not satisfied with the yellowing appearance of her teeth, especially the posterior teeth and the canines. Initially, the clinical (Figure 1) and radiographic examination was performed to observe periodontal health and the likely presence of carious lesions or exposed dentine.



Figure 1

We observed the presence of gingival recession and these areas were restored before the tooth bleaching treatment. The operative field was isolated with lip retractor, cottons rolls and saliva ejectors. The exposed dentine areas, without mineral loss, were conditioned with phosphoric acid for 30 seconds and received 3 coats of the adhesive. Where cavitation was found, the lesions were adequately restored with resin-modified glass ionomer cement.



Figure 2

Then, at-home tooth bleaching with WhiteWash 10% Carbamide Peroxide Teeth Whitening Gel, was chosen.

A gel containing 10% carbamide peroxide was chosen based on the patients age (the pulp chamber is expected to have a larger volume) and on the favourable colour pattern (low number of shade changes to achieve the desired result).



Figure 3

Before starting the procedure, we carried out the initial registration of the teeth colour using a value-oriented shade guide. The upper central incisors were found to be shade A2 (Figure 2) and the canines and premolars were found to be colour A3.5 (Figure 3).

Then, impressions of the patients' arches were taken with alginate to fabricate stone models and the custom-fitted trays. The custom-fitted trays were trimmed 1 mm beyond the gingival margin. In a second clinical appointment, the trays were positioned in the patient's mouth and the adaptation and patient's comfort (lack of pain) were tested.

The patient was instructed to apply a small portion of the product in the buccal area of the teeth to be bleached inside the tray. The bleaching therapy consisted of wearing the custom-fitted tray with the bleaching gel for 3 hours daily over a 3 week period.

(Figure 4), until the central incisors reached the shade A1 (Figure 5) and the premolars and canines shade A2 (Figure 6).



Figure 4-9

During and after treatment the patient did not report tooth sensitivity or gingival irritation and they were satisfied with the final outcome. After 6 months, the patient returned for a new clinical assessment and reported that they would like to bleach their canines even more as they were still slightly darker than the incisors.

The patient wore the tray again for another week. We can see that all anterior teeth reached the same colour. A new clinical evaluation was performed after 26 months and we found that the colour was uniform and stable and the enamel surface was shiny. The patient was still satisfied 26 months after the treatment was completed.



Figure 10

At this recall, the initial shade of the teeth was compared with the final colour at the 26-month period (Figures 8 and 9). We can observe evident colour change and improvements in the aesthetics of the patient's smile (Figures 10).

DISCUSSION

According to World Health Organization (OMS - 1948), health is not only the absence of disease but the state of perfect physical, mental and social well-being of an individual. Thus, procedures that improve a patients' self-esteem and confidence are also promoting their health.

Today, tooth bleaching is one of the most popular aesthetic procedures for patients who seek to improve their smile.

The at-home tooth bleaching technique using 10% carbamide peroxide in custom-fitted trays was initially proposed by Haywood and Haymann in 1989, and since then has been widely studied by researchers.²⁻⁸ This protocol is considered a non-invasive, safe, effective and long-lasting procedure when well indicated and supervised by a dentist.

In this case report, the selected bleaching agent contained the active ingredient of 10% carbamide peroxide, which is considered the gold standard against which all new products are compared, since there has been a vast number of studies conducted with this material.¹⁻¹¹ When this agent is in contact with dental tissues it dissociates into urea and hydrogen peroxide which, in turn, release free oxygen radicals. As the oxygen free radicals are extremely reactive, they break down molecules of pigments from the dental structure, making them smaller and lighter. This oxidative chemical reaction is currently the accepted explanation for the complex mechanism involved in the tooth bleaching procedure.^{12,13}

However, prior to dental bleaching, it is essential to conduct a thorough clinical and radiographic examination to verify the presence of carious lesions, exposed dentine, enamel fissure or restorations with lack of marginal adaptation. As these factors can influence the experience of tooth sensitivity during and after the dental bleaching treatment.

Tooth sensitivity is the most common side effect of the tooth bleaching. However when the bleaching treatment is carried out with 10% carbamide peroxide products, patients usually do not present tooth sensitivity or report only a mild sensitivity. It is worth mentioning that severe or considerable tooth sensitivity can occur when some of the above mentioned predisposing factors are present. Therefore ruling out any contraindications and dentist supervision are of vital importance for clinical success. So because of this, we opted to seal out the exposed dentine in order to prevent an excessive and fast penetration of the product into the dental tissues.

According to Patel, Louca and Millar, at-home tooth bleaching is, among all bleaching protocols, the one that offers the best relation between bleaching effectiveness and tooth sensitivity. Besides that, it is a low-cost procedure.² In this clinical case, the treatment did not produce any tooth sensitivity or discomfort and allowed the patient to achieve their desired tooth colour.

The success of bleaching was also observed after 18 and 26 months of clinical evaluation, confirming the findings of Dietschi and colleagues,⁹ who reported that this technique provides long-lasting outcomes as it acts deep within the tooth structure.

CONCLUSIONS

The at-home bleaching technique performed with the WhiteWash 10% Carbamide Peroxide Whitening Gel is effective for naturally yellow teeth, providing satisfactory and long-lasting results.

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COMBINED DENTAL BLEACHING TECHNIQUE

Successful dental bleaching is achieved by conducting a thorough patient history and examination and then providing a tailored whitening treatment plan following strict clinical protocols for each individual. Depending on the clinical situation and the patients' profile, a combined bleaching technique could be selected, which will both speed up the results and provide longer lasting results.

Professional supervised at-home bleaching with 10% or 16% carbamide peroxide is known as an efficient bleaching technique and presents a low risk of hypersensitivity; however it takes time for the results to be achieved. Besides that, some patients cannot or do not wish to wear custom trays overnight for a number of weeks. So to increase patient compliance it may be wise to use 6% hydrogen peroxide for 1 hour per day instead of overnight carbamide peroxide.

On the other hand, in surgery bleaching does not demand the use of custom trays, although it requires more chair time and is more costly. It is also limited in its effectiveness due to recent changes in European law which means the strongest concentration that can be used is 6% hydrogen peroxide.

Another option to consider for supervised at-home bleaching is teeth whitening strips. They do not require any impressions so besides being good for patients with severe gag reflexes, they can be taken away on the same day whilst the trays are being fabricated. This allows the patient to start bleaching immediately if they want or need to achieve rapid results.

Choosing the most suitable bleaching technique requires taking into consideration many factors such as the patients history, age, teeth shade, discipline, hypersensitivity, expectations towards the length of treatment, and besides that clinical and radiograph exams.

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The bleaching guide was developed aiming to instruct professionals on performing dental bleaching. The manufacturer is not to be held account for any damage that may occur to patients who undergo treatment in disagreement to the content herein published. The company strongly recommends reading the instructions of each product prior to executing the protocol in patients.

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