

ORIGINAL ARTICLE

DENTAL BLEACHING POSSIBILITIES IN THE DENTAL OFFICE

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Abstract: (1) *Background:* Tooth bleaching is a minimally invasive, precise, practical, conservative, and accessible clinical procedure for patients, involving a low degree of difficulty in performance, resulting in improved tooth color. Different tooth bleaching techniques exist, and their use depends on the type and concentration of the bleaching agent as well as the patient's clinical situation. The study aims to evaluate the aesthetic and clinical efficacy of tooth-bleaching products, analyze their safety, and determine the duration of the bleaching effect. (2) *Methods:* The study was conducted in the Odontotherapy Clinic of the Faculty of Dental Medicine, Craiova, between April 2023 and June 2024. The study analyzed the efficiency and safety of the bleaching products and the duration of the aesthetic effects obtained. After the end of the bleaching treatment, the clinical results were appreciated. The most relevant cases were presented. (3) *Results:* The study includes 15 clinical cases with patients who benefited from tooth bleaching treatment. (4) *Conclusions:* Teeth bleaching with peroxides is an effective method of correcting dental dyschromia, with notable results when performed under the supervision of a specialist under controlled conditions. The area most affected by dental dyschromia is the anterior one, which affects aesthetics and determines patients to want a tooth bleaching treatment.

Keywords: tooth bleaching, aesthetics, dental dyschromia.

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1. Introduction

There is an increasing concern among patients regarding the appearance and especially the color of their teeth. For dentists, managing dental dyschromia involves implementing different treatments or protocols, resulting in improved aesthetic appearance of the teeth [1,2].

Patients desire white teeth due to the emphasis placed on aesthetics. The number of tooth-bleaching treatments performed in dental offices has increased due to a higher patients demand [3-5].

Tooth bleaching is a minimally invasive, safe, reasonably easy-to-perform, relatively low-cost therapeutic method for treating dental dyschromia. The specialized literature describes different tooth bleaching techniques, the choice being influenced by the clinical situation, the type of bleaching agent, the concentration of the bleaching agent, and the vitality of the tooth [6-9].

The clinical tooth bleaching procedure helps improve the color and appearance of the teeth. Whitening can be done either by physically removing stains from the dental structures or through a chemical reaction that causes the degradation of chromogens, ultimately obtaining a lighter shade of color than the initial one [6].

The main bleaching agents used in the clinical tooth bleaching procedure are hydrogen peroxide and carbamide peroxide of different concentrations, their choice being determined by each clinical situation [10-12].

Generally, hydrogen peroxide is used in high concentrations of 35-40%, while carbamide peroxide can also be applied in lower concentrations but also in concentrations of up to 37% [10,12].

The aim of the study was to highlight the clinical stages of performing in-office tooth whitening, to monitor the safety and effectiveness of this procedure, to evaluate the aesthetic results obtained and the indications for subsequent treatments.

2. Materials and method

The present study was conducted during the period April 2023 - June 2024, within the Odontotherapy clinic of the Faculty of Dental Medicine Craiova.

The clinical results were assessed at the end of the bleaching treatment, for the efficacy and safety of the bleaching product.

The study was done as follows: a detailed dental chart was filed for each participant before starting the bleaching treatment. The chart included a history of dietary habits and oral hygiene, oral exam results, and paraclinical examinations. A session of professional hygiene, oral treatments before tooth bleaching, and establishing tooth color was provided for each patient before bleaching. At the end of the bleaching treatment, a complete oral exam was performed to determine the status and color of bleached teeth. Patients will be followed up 6 months and 12 months after the end of the bleaching treatments.

For each follow-up session, the medical history regarding eating habits and oral hygiene, examination of the oral cavity and determination of the dental-periodontal status, paraclinical examinations, and establishing of tooth color were done.

We used the visual method for the color reading with the Vitapan Classic and Vitapan 3D Master color keys. The criteria for including the patient in the study were: (1)

written consent of the patient; (2) the presence of discoloration of the dental tissues that required chemical treatment or retreatment of tooth bleaching, with the primary objective of preventing and resolving dyschromia.

The criteria for excluding the patient from the study were: (1) periodontal disease; (2) young patient with incompletely formed apex; (3) advanced dental wear.

During the dental bleaching treatments performed on the sample of patients taken into the study, the resources were the clinical chart, the Vitapan Classic and Vitapan 3D Master color keys, the clinical case photography before and after the treatment, the Woodpecker ultrasonic scaler, the contra-angle handpiece, brushes for professional brushing, the abrasive hygiene paste, the dam system to obtain isolation of the operating field, as well as to prevent possible accidents, the liquid dam, sterile rolls, the Flache Zoom dental whitening device from Dentotal Protect, the Philips Zoom whitening lamp (Figure 1), the light-curing lamp, the Opalescence Booster syringe, the Zoom Kit Dental Whitening package (Figure 2).



Figure 1. Philips Zoom whitening lamp.



Figure 2. Zoom Teeth Whitening Kit Package.

The Zoom Kit Tooth Bleaching package contains 2 x Zoom! WhiteSpeed Light-Accelerated Tooth Whitening Gel syringe, 25% concentration, for two patients (packaged separately), 2 x light guide devices, 2 x IsoPrep retractors for soft tissue protection, 4 x face protection bib, 12 x gauze napkin, 4 x cotton roll, 2 x surgical suction cannula, 2 x Liquidam® 2.9 g gingival protection material syringe, with plastic and metal applicators, 2 x whitening gel application brush, 2 x Relief ACP 2.4 g - desensitizing gel, instructions for use.

The studies were carried out according to the approval no. 115/15.06.2022 issued by the Ethics and Scientific Deontology Committee of the University of Medicine and Pharmacy of Craiova.

3. Results

Following the inclusion and exclusion criteria, 15 clinical cases were included. Patients underwent the clinical procedure of tooth bleaching. In all monitored cases, strict

compliance with the work protocol and the manufacturer's instructions resulted in no adverse effects being recorded. The aesthetic results obtained varied depending on the difference between the initial color and the desired final color, the number of applications of the whitening material, and the need to apply the light curing lamp. Indications for subsequent treatments ranged from applying a fluoride treatment to applying teeth whitening products at home, repeating a teeth whitening session in the office to continuing with indirect aesthetic techniques to achieve the desired result.

We chose three representative cases to present the technical stages followed in different clinical situations and the obtained effects of the tooth bleaching treatment.

Case 1.

Patient V.P., aged 29, presented at the Odontotherapy clinic of the Faculty of Dental Medicine Craiova dissatisfied with the appearance of his teeth in the upper and lower frontal group. The patient complained that he had problems not only with physiognomy but also with speech.

The medical history revealed that the patient consumes large quantities of carbonated drinks such as Coca-Cola and Pepsi and smokes.

During the clinical examination performed by inspection and palpation at the level of teeth 1.1, 1.2, 1.3, and 2.1, 2.2, 2.4, the status of teeth was recorded. These teeth had a yellow-brown color, a characteristic coloration of smoking patients. A diastema is present between teeth 1.1 and 2.1, as well as the rotation of tooth 1.1. Tooth 1.2 is in palatal position; tooth 2.3 is missing;

posterior teeth migration and partial space closure.

Unsatisfied with the fact that he has this diastema, but also with the color of the teeth, the patient refuses to contact an orthodontist to align his teeth and accepts physiognomic restoration by indirect veneering. Considering the dark color of the teeth, the decision was to bleach the teeth.

In the first session, professional scaling and brushing were performed to remove stains and discolorations from the tooth surface.

In the second session, an external chemical bleaching was performed.

Hydrogen peroxide is caustic to the soft tissues in the oral cavity, requiring rigorous isolation when applying the gel.

At the gingival level, we applied a liquid dam that we fixed with the help of a photopolymerization lamp. It thus isolates the gums from the irritating action of hydrogen peroxide. In addition, cotton rolls and sterile compresses were used, as well as spacers to protect the patient's lips and cheeks (Figure 3).



Figure 3. The initial appearance of the teeth.

The following clinical situation was used as a starting point, with the initial color being visually determined using the Vitapan color chart, namely A4.

After isolating the teeth and placing the gingival barrier, its light-curing was performed for 20 seconds.

The gel was applied after the correct and complete isolation of the teeth to be treated.

According to the manufacturer's instructions, the gel's action time is 20-25 minutes, and after that it was removed with cotton balls and abundant washing.

For a better result, the gel was activated with UV light.

The color change of the involved teeth was surprising after a single session, obtaining the shade A2 (Figure 4).



Figure 4. The appearance of the teeth after the completion of the teeth bleaching treatment.

After the bleaching session, a desensitizing gel was applied with a brush to the entire surface of the front teeth. The gel was removed after two minutes, and the patient rinsed his mouth vigorously.

He did not notice any postoperative sensitivity.

Three weeks after the bleaching session, the indirect veneering treatment could begin.

Case 2.

Patient A.M, 32 years old, male, presented himself at the Odontotherapy clinic of the Faculty of Dental Medicine Craiova, wishing to change the appearance of his teeth. After the medical history, the patient received a suggestion for teeth bleaching treatment. Following the consultation, there were no factors that would contraindicate tooth bleaching (Figure 5).



Figure 5. The initial appearance of the teeth.

The first session included scaling and professional brushing to remove surface stains.



Figure 6. Isolation of the teeth, followed by application of carbamide peroxide gel.

The patient then presented two days later for the teeth bleaching treatment. External teeth bleaching was performed. First, the initial tooth color was recorded using a shade guide. Then, the teeth were isolated using a liquid dam (Figure 6).

A liquid dam was applied to the gingival level and fixed with the help of a light-curing lamp. It thus isolates the gingiva from the irritating action of carbamide peroxide. In addition, spacers to protect the patient's lips and cheeks were used.

The bleaching was performed in 3 sessions of 20 minutes each, applying a carbamide peroxide-based gel with a lower concentration to avoid post-operative sensitivity.

Finally, the desired color was obtained, and a dental fluoridation treatment was performed (Figure 7).



Figure 7. Appearance of teeth after bleaching treatment.

Case 3.

Patient B.D., 27, male, presented to the Odontotherapy clinic of the Faculty of Dental Medicine Craiova, wishing to change the appearance of his teeth. After taking the medical history, the patient received a suggestion for teeth bleaching treatment.

Following the consultation, it was found that there were no factors that would contraindicate teeth bleaching.

In the first session, scaling was performed, followed by professional brushing to remove surface stains.

The patient then presented to the second session, one day later, for the teeth bleaching treatment. The first time, the initial tooth color was recorded using a shade guide, obtaining the color 2M3 (Figure 8).



Figure 8. Initial tooth color 2M3.

The bleaching was performed using a gel with a concentration of 35% hydrogen peroxide for 20 minutes after applying the gingival protection from the whitening kit. Hydrogen peroxide is caustic for the soft tissues in the oral cavity, requiring their rigorous isolation at the time of application of the gel.

A liquid dam was applied to the gingival level, which we fixed with the help of the photopolymerization lamp. It thus isolates the gingiva from the irritating action of the hydrogen peroxide. In addition, cotton rolls, sterile compresses, and spacers were used to protect the patient's lips and cheeks.

The gel was applied after the correct and complete isolation of the teeth, after drying them beforehand.

The gel's action time was respected according to the manufacturer's instructions, after which it was removed with cotton balls and by abundant washing with water.

The desired chromatic result was achieved, and a dental fluoridation treatment was performed. (**Figure 9, Figure 10**).



Figure 9. Final appearance.



Figure 10. Final appearance.

4. Discussions

Patients who experience tooth discoloration often choose to undergo tooth bleaching procedures. Achieving the desired result in tooth bleaching requires accuracy in establishing the diagnosis and the specific type of dyschromia on the tooth surface. The two main categories of tooth discoloration sources are intrinsic and extrinsic staining [13-15].

Different methods of activating bleaching agents, such as light sources, can be used to accelerate their action, resulting in a decrease in treatment duration. Therefore, different light sources can activate bleaching agents, thus increasing the possibility of free radical release and oxidative capacity [16,17].

However, within the specialized literature, activating bleaching agents with light sources is an intensely debated topic, with supporters and opponents regarding their effectiveness on tooth bleaching [16-18].

Recent studies confirm the improvement of the whitening effect on natural teeth when the bleaching agents are activated by light sources [19-22]. This aspect was observed in the present study, where light activation was used, obtaining excellent results.

Hydrogen peroxide is one of the most widely used bleaching agents, and its concentrations vary depending on the patient's clinical situation. High concentrations of hydrogen peroxide are used to obtain the best results. The tooth bleaching process involves an oxidation reaction, transforming the chromogenic compounds into colorless forms [23-25].

Despite its proven effectiveness, tooth bleaching performed in the office with hydrogen peroxide requires multiple applications of the bleaching agent or even multiple treatment sessions to achieve the desired results. Thus, tooth sensitivity may occur, one of the most common complications of tooth bleaching [19,26-28].

Tooth sensitivity manifests by the appearance of discomfort that the patient complains of immediately or a few days after the tooth bleaching treatment. The

application of chemical desensitizing agents helps to prevent the occurrence of tooth sensitivity. These chemical agents help obliterate dentinal tubules, remineralize, and reduce excitability through ion deposition [29-31]. Post-bleaching sensitivity did not occur in the present study due to the desensitizing gel used after bleaching.

Laser therapy, an intensely debated topic in the specialized literature, represents another alternative to prevent or treat post-bleaching tooth sensitivity, being [32-35].

For patients with fillings, it was decided to replace dental fillings later after bleaching

due to the changes produced by the bleaching substances on their surface [36-37].

5. Conclusions

To apply bleaching treatment, a teeth hygiene treatment must be carried out beforehand, consisting of professional scaling and brushing with abrasive pastes. Chemical bleaching with peroxides leads to good results, mainly when performed with high concentrations in a controlled environment, i.e., in the dental office. Strict compliance with the work protocol allows the desired aesthetic results to be achieved without adverse reactions to the surrounding tissues.

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