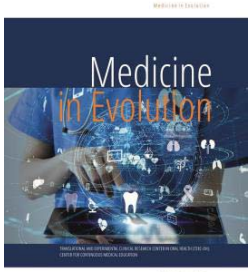
Dental Bleaching Associated to Prosthetic and Endodontic Treatments



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Abstract

The demand for teeth whitening is marking a pivotal shift in cosmetic dentistry. This study aims to explore the efficacy teeth whitening methods in different clinical scenarios. It focuses on the importance of appropriate technique and patient-specific treatment planning.

Materials and Methods

The study uses visual measurement systems pre and post-treatment, with particular attention to light-activated whitening gels. Two distinct cases were examined: a 30-year-old female post-prosthetic treatment patient, receiving in-office Light Whitening treatment (32% hydrogen peroxide) to harmonize dental shades; a 48-year-old male undergoing both internal and external whitening for a devitalized incisor;

Results and Discussions

Significant improvement in tooth whitening and colour uniformity was achieved across the cases. Treatments were tailored to individual patient needs, with a focus on enhancing aesthetic outcomes. The study discusses the effectiveness and safety of dental bleaching materials and highlighting the need for professional supervision.

Conclusion

This research underscores the effectiveness of personalized whitening treatments in achieving desired aesthetic outcomes. It highlights the evolving landscape of dental whitening, where patient education, careful treatment planning, and the use of advanced materials play crucial roles.

Keywords: teeth whitening, hydrogen peroxide, carbamide peroxide

INTRODUCTION

Recognizing the natural darkening of teeth as an aging process and the pigmentation due to medications or chemical incorporation during enamel and dentine formation, this paper addresses a pressing aesthetic concern in modern society. As the quest for youthfulness intensifies, patient demand for restoring bright, white smiles has surged, signifying a boom in cosmetic dental services. The dramatic rise in teeth whitening products over the past quarter-century underscores its critical role in dental practices, catering to both in-office and at-home treatments under professional supervision [1,2].

Case studies endorse the safety and efficacy of peroxide-based teeth whitening. However, many dental practitioners remain hesitant, often due to subjective interpretations of aesthetic outcomes. The last decade has seen heightened interest in dental aesthetics, spurring continuous efforts to optimize the active substance concentration for effective, long-lasting results with minimal side effects [3].

Aim and objectives

This paper aims to highlight the significance of choosing appropriate whitening techniques in various clinical scenarios. Adhering to whitening protocols and accurate case selection are key to predictable outcomes. This study adopts an approach where fundamental research outcomes guide practical solutions, focusing on the intricacies of tooth structure, discoloration types, and whitening methods for effective treatment planning.

MATERIAL AND METHODS

This investigation is designed to examine a spectrum of aesthetic dental rehabilitation scenarios, utilizing diverse teeth whitening approaches that range from basic to advanced. A pivotal element of this study is the integration of materials and techniques that incorporate desensitizing agents, aiming to alleviate dental sensitivity both during and after the whitening treatments. An additional focus is placed on the dental practitioner's role in comprehensively understanding and addressing patient needs and expectations to formulate an optimal treatment plan that yields the desired outcomes.

Materials and Instruments

The study employed a comprehensive array of dental tools and materials:

- A standard dental consultation kit.
- Advanced ultrasonic scaling tools, along with various polishing pastes and brushes for the professional cleaning.
- Oral retractors, protective eyewear for safety of both practitioner and patient.
- Colour measurement tools including Vita Classical and Vita 3D-Master colour keys, complemented by the Vita EasyShade electronic colour measurement device.
- Dental supplies like cotton rolls and saliva ejectors, light-curing resin for dental isolation.
- A three-wavelength whitening device designed for versatility in treatment (Beyond whitening lamp).
- A selection of whitening gel formulas suitable for various clinical scenarios.
- UltraEZ Ultradent desensitizing gel, containing 3% Potassium Nitrate and 0.25% Sodium Fluoride, to mitigate sensitivity post-whitening.

The study methodologically employed both "manual" and electronic systems for color measurement before and after the whitening treatments across all cases. Specific attention

was given to cases necessitating light-activated whitening gels, utilizing a specialized lamp equipped with white, red, and violet light sources. This lamp featured touch-screen functionality and adjustable wavelength settings to meet the individual requirements of each case.

For all the patients were obtained both the medical history and informed consent. A comprehensive oral examination was conducted to determine the suitability of the whitening treatment. The procedure involved professional oral hygiene a day prior to whitening, followed by a methodical preparation of the workspace. Patient expectations were discussed, and initial tooth shade was determined using both "manual" and electronic methods. Oral and gingival protection was applied, including the use of mouth retractors and Vitamin E. The teeth were isolated with cotton rolls and light-curing resin. Post-treatment steps included gel removal, isolation system removal, final shade evaluation and recording, and the application of a desensitizing and remineralizing gel. Postoperative care instructions were provided to the patient.

Clinical Case I:

A 30-year-old female patient, post-prosthetic treatment of tooth 2.2 with an indirect single-unit zirconia restoration, sought teeth whitening to harmonize dental shades and enhance aesthetic appearance in the maxillary anterior region. Initial colour assessment using the Vita Classical colour key revealed a discrepancy between the prosthetic restoration (shade A1) and the natural teeth (shade A2), further confirmed by the VITA Easy-Shade electronic device. The in-office Light Whitening system (32% hydrogen peroxide by WHITE smile) was selected, requiring light activation and promising rapid, effective results. The system's composition includes potassium nitrate and fluoride to minimize dental sensitivity during and after the whitening process. The kit comprised a dual syringe with self-mixing 32% HP gel, gingival protection resin, and a desensitizing/remineralizing gel containing potassium nitrate, fluoride, and xylitol (Figures 1-3).

Figure 1. Vita classic shade guide before bleaching- shade A2

Figure 2. Liquid dam for protecting the marginal gingiva

Figure 3. Vita classic shade guide after bleaching- shade A1

Clinical Case II:

For a 48-year-old male patient, the treatment focused on both internal and external whitening of a discoloured, devitalized incisor. This involved endodontic treatment and carefully sealing the root canal with glass ionomer cement plug to prevent bleaching agent infiltration around endodontic filling. Whitening agents specifically designed for devitalized teeth were used, followed by post-treatment assessments and applications for tooth stability and aesthetics. The shade of the teeth was identified with both Vita Classical shade guide and 3D Master shade guide. The liquid dam was applied and light cured to protect the gingiva.

Since the tooth presented sever discoloration the external bleaching was associated with internal bleaching in the same session. The access cavity made into the oral surface and the bleaching gel Opalescence Endo 35% peroxide hydrogen (Ultradent) laid in the dental crown. The bleaching agents were activated with the Beyond UV lamp for 30 minutes.

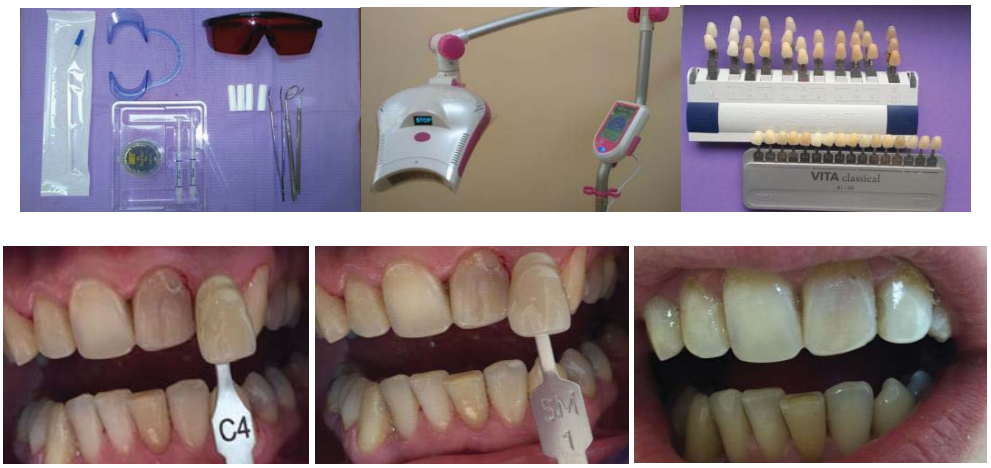

Figure 4. Bleaching gel, UV Beyond lamp and Vita Classical and 3D Master Shade guide

RESULTS

In the first case (harmonizing dental shades post-prosthetic treatment) using the Light Whitening system (32% hydrogen peroxide), successful harmonization of dental shades was achieved, bridging the colour discrepancy between the prosthetic restoration and natural teeth. The treatment also ensured minimal dental sensitivity due to the inclusion of potassium nitrate and fluoride in the whitening system. Initial colour assessment used the Vita Classical colour key and VITA Easy-Shade device, followed by the application of a specialized whitening kit, including a dual syringe with self-mixing HP gel and a gingival protection resin.

In the second case (internal and external whitening of a devitalized tooth), effective whitening of the devitalized tooth was achieved, with careful management of potential risks associated with internal whitening. Post-treatment assessments indicated improved tooth stability and aesthetics. The treatment involved endodontic therapy, root canal sealing to prevent bleaching agent infiltration, and application of whitening agents specifically formulated for devitalized teeth.

These cases demonstrate the effectiveness and safety of various whitening procedures tailored to individual patient needs, emphasizing the importance of patient education and careful treatment planning in cosmetic dentistry.

DISCUSSIONS

Hydrogen peroxide

Hydrogen peroxide is widely recognized and used in professional dental whitening treatments due to its effectiveness in bleaching tooth enamel. A 32% concentration of hydrogen peroxide is relatively high and typically used for in-office treatments under professional supervision. This concentration can provide significant whitening results in a shorter period compared to lower concentrations. While effective, higher concentrations of hydrogen peroxide can increase the risk of tooth sensitivity and irritation to gums. Therefore, professional application and patient monitoring are essential. Hydrogen peroxide acts as an oxidizing agent, penetrating the enamel and dentin to break down the compounds causing discoloration, which results in a whitening effect. The use of hydrogen peroxide in dental treatments is subject to regulation in many countries, with specific guidelines on safe concentrations and application methods to minimize risks [4,5].

At-Home Teeth Whitening Kits

At-home whitening kits have demonstrated substantial effectiveness in lightening tooth color for a broad user demographic. These kits typically incorporate lower concentrations of bleaching agents, such as hydrogen peroxide or carbamide peroxide, compared to their professional counterparts. General safety is acknowledged when these kits are used as directed. However, potential side effects, including tooth sensitivity and gum irritation, are noted, often correlating with the bleaching agent's concentration, usage duration, and the user's dental health status. Comparative studies indicate that while professional treatments offer more rapid and pronounced results, at-home kits present a viable, more affordable, and convenient alternative, albeit with more gradual outcomes. Adherence to manufacturer-provided instructions is crucial. Non-compliance may result in uneven whitening, heightened sensitivity, or dental damage. The long-term effects of at-home whitening kits on tooth enamel and dental health are varied. Moderate, guideline-adherent use is typically safe, whereas excessive use might lead to enamel degradation. Seeking professional dental advice, particularly for users with pre-existing dental conditions or sensitivity concerns, is advocated in some research circles. The effectiveness of at-home whitening kits can vary significantly, influenced by factors such as the nature and extent of tooth stains, the whitening agent's concentration, and overall dental health [6-8].

Carbamide Peroxide 35% in Teeth Whitening

This concentration is generally recognized as effective, decomposing into active bleaching agents like hydrogen peroxide and urea. It provides notable whitening outcomes. Owing to its high concentration, 35% carbamide peroxide is predominantly administered in professional settings, typically in custom-fitted tray-based systems. The duration and frequency of treatments are tailored to individual needs to mitigate gum irritation and sensitivity. High concentrations may heighten risks such as tooth sensitivity and gum irritation, underscoring the need for professional oversight. Dentists often employ desensitizing agents and adjust protocols accordingly. Research delineates the trade-offs between efficacy and potential side effects across different concentrations of carbamide peroxide. The prolonged use of high concentrations is studied for its potential impact on tooth enamel and gum health [9,10].

Whitening of Devitalized Teeth of Internal and External Whitening

Internal whitening is effective for discoloration due to internal factors like necrosis, while external whitening addresses surface stains. Internal whitening typically involves the placement of a whitening agent inside the tooth, requiring potentially multiple applications. External whitening usually applies a peroxide-based agent externally. Internal whitening necessitates careful monitoring due to risks such as root resorption. The predictability and permanence of internal whitening results can be less assured compared to external methods. Some cases may benefit from a combination of both internal and external whitening for optimal aesthetic outcomes. Recent research focuses on enhancing the safety and effectiveness of treatments for devitalized teeth, exploring new materials and methods [11,12].

Personalization of Treatment

Each clinical case mandates a tailored approach, considering individual patient requirements and specific discoloration aetiologies. The evolving field of dental whitening research underscores the significance of personalized treatment strategies to optimize both efficacy and safety [13].

Limitations and regulations regarding home bleaching should be considered since the access to bleaching agents and devices especially on internet is not limited. These products and especially home bleaching should be done only after a dental consult and at the dentist’s recommendations [14].

CONCLUSIONS

The study successfully examined a spectrum of aesthetic dental rehabilitation cases, employing a range of whitening techniques from basic to advanced. These included the use of desensitizing agents to reduce dental sensitivity during and after treatments. A significant emphasis was placed on the dentist's comprehensive understanding of patient needs and expectations. This holistic approach enabled the formulation of optimal treatment plans leading to desired outcomes.

The research emphasizes the significance of personalized treatment approaches in dental whitening, catering to specific patient needs and the unique causes of tooth discoloration. The findings advocate for a patient-centric approach in cosmetic dentistry, integrating advanced materials and methods to enhance both the efficacy and safety of whitening treatments.

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