

Case Report

In office external bleaching of teeth with discoloration: A case reportCinitra Anindya¹, Kun Ismiyatin², Nanik Zubaidah², Rafaele Raditya Supandji³, Binar Najwa Nurkhalidah³¹Faculty of Dental Medicine, Universitas Muhammadiyah, Surabaya, Indonesia²Departement of Conservative Dentistry, Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia³Undergraduate Student, Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia**ABSTRACT**

Background: Tooth discoloration is a prevalent issue that significantly impacts an individual's self-confidence. Fortunately, dentists offer highly effective and non-invasive teeth whitening techniques that use higher concentrations of hydrogen peroxide (HP) of around 35% to 40%. These techniques can help resolve the problem of teeth discoloration better than at-home methods designed to deliver faster results. This is particularly helpful when immediate whitening is required. **Purpose:** This case study aims to report cases of in-office external bleaching of discolored teeth. **Case:** A 29-year-old woman complained about the yellowish shade of her teeth, which made her feel less confident due to the yellowish color. **Case Management:** The management for discoloration of teeth was done with dental bleaching using 40% hydrogen peroxide. As a result of the treatment, the desired tooth color increased from 3M1 to 1M1 Vita 3D Master and from Opalescence no.6 to 4. **Conclusion:** In-office dental bleaching is a highly effective treatment option for correcting tooth discoloration that dental professionals widely use. The procedure can significantly improve the appearance of discolored teeth and increase self-confidence of the patient.

Keywords: tooth discoloration; in-office bleaching; esthetics

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INTRODUCTION

Tooth discoloration is a common dental concern and is classified into two categories, they are extrinsic and intrinsic tooth discoloration. Extrinsic tooth discoloration occurs when chromogenic substances accumulate on the tooth's surface from sources such as wine, coffee, tea, and poor oral hygiene practices. On the other hand, intrinsic tooth discoloration occurs beneath the tooth's surface and is caused by factors such as dental trauma, aging, and certain medications.¹ Discoloration of teeth can often be corrected totally or partially by bleaching, although several techniques are available to manage tooth discoloration, such as restorative procedures, crowns and veneers. Bleaching procedures are more conservative than restorative methods, relatively simple, and less expensive. These approaches have been demonstrated to be effective in restoring the natural color of discolored teeth.²

Tooth bleaching has emerged as a favored treatment option among patients and is often requested by those seeking a brighter smile.³ Tooth bleaching is a common cosmetic dental procedure involving hydrogen peroxide application. The bleaching agent can be directly applied or synthesized through a chemical reaction from sodium perborate or carbamide peroxide.⁴ Tooth bleaching is

classified into two main categories: internal and external. The external bleaching can be achieved using either an in-office or an at-home method, requiring different types and levels of bleaching agents.⁵

Dentists offer in-office teeth whitening techniques that use higher concentrations of hydrogen peroxide (HP) than at-home methods. These products usually contain 35% to 40% HP and come as a base and catalyst gel, which can either be pre-mixed or freshly mixed at the dental office. The higher HP concentrations are used to achieve faster results, which is helpful in situations where immediate whitening is necessary.⁶

According to clinical and laboratory research, tooth bleaching is a safe and effective procedure. The latest generation of vital whitening products has shown positive results. After in-office bleaching, the reversal rate has been reported at 41% per year, while for at-home bleaching, the reversal rate is 26% in 18 months.⁷

CASE

A 29-year-old woman presented to the Dental Hospital of Airlangga University with a chief complaint of self-confidence due to the yellowish shade of her teeth. The

patient reported regularly consuming tea every day. However, she feels less confident due to the yellowish color of her teeth. The patient confirmed that she does not have any systemic health problems.

During an intraoral examination, the patient admitted to never experiencing pain. The examination revealed a normal posterior cusp and anterior relation with an overjet of 2mm and an overbite of 2mm. Based on the objective examination, the patient was diagnosed with intact anterior teeth, normal gingiva, good oral hygiene, and no calculus. All teeth showed vital signs during the vitality test, and the patient's clinical diagnosis was normal pulp.

CASE MANAGEMENT

For the first appointment, the operator used APD level 3 for optimal safety and efficiency. The patient is provided with personal protective equipment, including aprons and nurse caps, and treatments are conducted in a room equipped with aerosol suction to minimize the spread of particles (Figure 1). Dental Health Education (DHE) and

Communication, information and education (CIE) are essential components of our practice, ensuring that our team is up-to-date with the latest techniques and best practices. Informed to consent and informed consent is obtained from patients before any treatment is performed. A diagnosis is made based on the patient's symptoms and test results, and the patient's teeth are cleaned using pumice and a brush to remove any debris or stains (Figure 2), saliva tests are conducted as needed to assess their oral health, the results were, 18 seconds of hydration, it has a watery viscosity, a pH of 7.4, quantity of >5ml, and a buffer capacity of 10, which all the results were deemed normal or green. To maintain a clean and sterile environment, we use 1% povidone iodine solution to disinfect the area for 30 seconds before starting treatment. A cheek retractor is placed to expose the teeth and surrounding area for better visibility, and the initial tooth shade is determined using the 3M1 shade guide Vita 3D Master and Opalescence shade guide no 6 (Figure 3).

Mucosal protection gel and lip balm are applied to protect the patient's oral tissues during the procedure. Optragate and isoblocks are used to maintain the patient's teeth in a stable position (Figure 4A). The teeth that will be bleached are dried to ensure better adhesion of the bleaching agent (Figure 4B), and a gingival dam is applied to protect the patient's gums during the bleaching process (Figure 4C). The bleaching agent, using Opalescence® Boost 40% hydrogen peroxide, is mixed according to the manufacturer's instructions (Figure 5A) and applied using a microbrush every 5 minutes for a total of 20 minutes (Figure 5B). The bleaching agent residue is cleaned using surgical suction tips, syringes filled with water, and suction tips (Figure 6). The tooth shade is adjusted to the desired level, such as 2M1



Figure 1. Operator and patient position and proper attire (A), teeth before treatment (B).



Figure 2. Tooth cleaning using pumice and brush.



Figure 3. Initial Shading (3M1,6).



Figure 4. Preparation of *Optragate*, and *isoblock* (A), Drying of the teeth (B), Application of Gingival Dam (C).

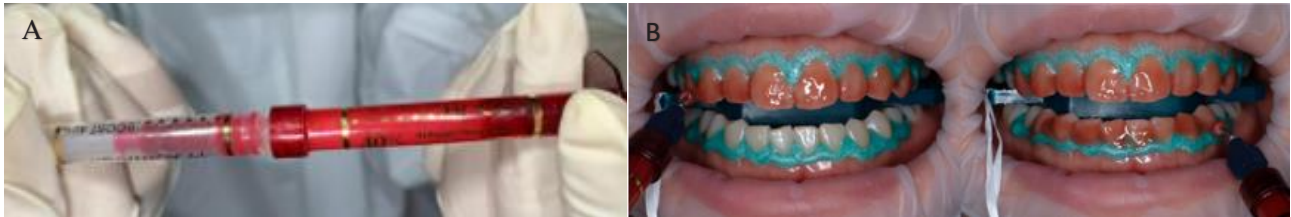


Figure 5. Mixing of Bleaching agent (A), Application of bleaching agent (B).



Figure 6. Cleaning of bleaching agent residue using surgical suction tip.



Figure 7. Color matching after bleaching cycle (From 3M1 to 2M1 shade guide Vita 3D Master).



Figure 8. Removal of opaldam.



Figure 9. Final color matching after bleaching cycle 2 after treatment (From 2M1 to 1M1 shade guide Vita 3D, opalescence shade guide no 5 to 4).



Figure 10. Post-Bleaching follow up.

shade guide Vita 3D Master or Opalescence shade guide no 5 (Figure 7), and the bleaching agent is reapplied for a second round of treatment for the same amount of time as the first appliance. The bleaching agent residue is cleaned again, the gingival dam is carefully released using dental tweezers to minimize any discomfort or irritation (Figure 8), and the tooth shade is adjusted to the final desired level, from 2M1 to 1M1 shade guide Vita 3D Master and from Opalescence shade guide no 5 to 4 (Figure 9). After the bleaching procedure, it is essential to evaluate the results to ensure the desired outcome has been achieved. This involves taking photos of the patient's teeth for comparison and documentation. To promote oral health and maintain the results of the bleaching, potassium nitrate and fluoride gel are applied to the patient's teeth. Post-bleaching instructions are provided to ensure the best possible outcome and patient comfort. These instructions include waiting one hour after the bleaching procedure before eating or drinking, avoiding strongly colored foods and beverages, not smoking, using a sensitive toothpaste sensitive, and avoiding the use of colored mouthwash. The patient is instructed to return for a follow-up appointment two weeks after the bleaching procedure to assess the effectiveness of the treatment and make any necessary adjustments.

The second visit 15 days after the bleaching treatment the operator is trained to use APD level 3 for optimal safety and efficiency. The patient is provided with personal protective equipment, including aprons and nurse caps, and treatments are conducted in a room equipped with aerosol suction to minimize the spread of particles. Before starting the treatment, the patient's teeth are disinfected with a 1% povidone iodine solution for 30 seconds. An anamnesis is

taken, and the patient reports no complaints. A thorough extraoral (E.O) examination reveals no abnormalities. Intraoral (I.O) examination confirms that the gingiva surrounding the teeth appears normal (Figure11).

DISCUSSION

Discoloration of the tooth is a result of reduced mineralization of the enamel. An enamel normally appears opaque, and creamy white, if an enamel has yellow/ brown color, it can be considered as discoloration.⁸ Tooth discoloration or staining can be caused by a variety of causes, such as, what we eat/ drink, ageing, trauma, habits, and medications or drug induced tooth discoloration. The most common causes in our daily lives are coffee, tea, cola and cigarette products.⁹ In this case, based on the anamnesis states that the patient has a habit of drinking tea every morning, and never had tooth treatment in the past.

Before choosing a treatment plan, the cause of the discoloration must be assessed first, the cause of the discoloration will determine the treatment. Treatments available are, external bleaching which could be treated with at-home treatment, power bleaching, abrasion techniques and laser, internal bleaching, which could be treated as/ with walking bleach, internal/external bleaching, and thermocatalytic bleaching, and the last option is prosthodontic options, such as resin composite or ceramic veneers or crowns.¹⁰ Based on the case of the patient and the cause of discoloration which the discoloration is caused by extended consumption of tea and the discoloration is external, the chosen treatment was in-office bleaching.

In-Office Bleaching uses 35-40% H₂O₂, usually with a light source, and with maximum of four sessions are allowed, with exposure of hydrogen peroxide ranging from 15 to 20 minutes per session.¹¹ In this case, the operator uses 40% hydrogen peroxide with 2 sessions, and 20 minutes of hydrogen peroxide exposure per session. For better results, the bleaching can be done in more than one visit. In-office bleaching techniques should be combined with at home bleaching techniques to provide optimum results.

Bleaching occurs when alkali is added or when the temperature is increased. In aqueous solutions, hydrogen peroxide behaves like a weak dibasic acid, releasing

The tooth whitening process is influenced by three main aspects: diffusion, interaction, and surface changes related to the optical properties of the tooth. Many studies have shown that surface changes and interactions with minerals in healthy tooth structures are linked to tooth whitening. However, other research suggests that tooth whitening with peroxide-based materials is a dynamic process initiated by the movement of the whitening agent into the tooth structure to interact with stain molecules. This process also involves micro morphologic alterations on the tooth surface and changes within the tooth that affect its optical properties. The interaction is not limited to organic stain molecules but is an affinity-based interaction process that also affects sound enamel and dentin structures.

The conclusion of this discussion is that, based on the patient's case, in-office bleaching treatment was preferred, as it is more secure, meaning the operator can handle and supervise the treatment, making it more time efficient and having the patient come again after 15 days concludes the treatment without any risk of side effects and thus making the treatment successful.

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