What's new for the clinician – summaries of recently published papers (June 2024)

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1. BLEACHING EFFICACY OF IN-OFFICE DENTAL BLEACHING WITH DIFFERENT APPLICATION PROTOCOLS: A SINGLE-BLIND RANDOMISED CONTROLLED TRIAL

Most bleaching products used in dentistry are based on the direct use of hydrogen peroxide (H2O2) or its precursor, carbamide peroxide. Tooth whitening is a very complex process that depends on several factors including the pH of the bleaching agent, the method of application and thickness of the bleaching agent to the enamel, the fluctuation of irradiation, length of photoactivation, tooth size, selective absorption of the wavelength of irradiation and so on. Two techniques of tooth whitening have been described – ambulatory (at home) and in-office (by a professional).

In-office bleaching involves using high-concentration hydrogen peroxide gels, typically applied for eight to 50 minutes, with possible renewals two to four times in the same sess ion, after soft tissue protection with a gingival barrier.[1] Uncertainties also persist about the timing and frequency of these applications. Favoreto and colleagues in Brazil (2024)[1] reported on a trial that sought to assess the colour change, adverse effects, self-perception and the impact of oral condition of three different in-office bleaching protocols. The primary research hypothesis tested was whether (1) the use of different in-office dental bleaching protocol with varying application times and frequency are equivalent in terms of colour change. Additionally, as secondary hypotheses, the researchers tested whether interventions will differ in terms of (2) absolute risks and intensities of tooth sensitivity (TS) and gingival irritation (GI) and (3) the self-perception and impact of oral care.

METHODOLOGY

This Brazilian study was designed as an equivalent, parallel, evaluator-blinded randomised controlled trial with an equal allocation ratio. Reporting of the data followed the format of the Consolidated Standards of Reporting Trials (CONSORT).

Participants were recruited via social media platforms such as Instagram®. To be eligible, participants needed to meet the following criteria: good general and oral health, age over 18 years old, absence of periodontal disease, gingival recession or carious lesion in anterior teeth. Additionally, their canines had to have colour A2 or darker based on value-oriented shade guide (Vita classical A1-C4). Exclusion criteria encompassed patients with a history of prior bleaching, dentin hypersensitivity, ongoing use of orthodontic apparatus, dental prosthesis or restoration in anterior teeth, prior endodontic treatment in anterior teeth, severe tooth discoloration (fluorosis or pulpless teeth, stains due to the use of tetracycline), visible cracks in teeth, continuous use of medications such as analgesics and anti-inflammatories, pregnant or lactating women, and patients with habits such as smoking or bruxism.

The sample size calculation included a measure for possible losses, an additional 20% was added, bringing the total required participants to 55 per group or 165 volunteers in total. Randomisation in blocks of 3, 6 and 9 was performed, with an equal allocation ratio. The patients were randomly divided into three groups ($n = 55$) according to the in-office bleaching protocol. In group 1, the bleaching product was applied in two 20-min applications (2 x 20min; manufacturer's recommendation); in group 2, the product was applied in a single 40min application (1 x 40min); and in group 3, the product was applied in a single 30-min application (1 x 30min).

The allocation sequence was determined using opaque, sealed and sequentially numbered envelopes. The individual responsible for randomisation and blinding in this study was not involved in the intervention process. Prior to starting the bleaching procedure, the operator opened the envelopes containing the randomisation details, revealing the participant's assigned group. In this study, only the evaluators were blinded, making it a single-blind clinical trial. Operator and patients knew the groups to which they were allocated due to treatment time or gel renewal during the procedure.

The bleaching procedure was performed by three dentists who had more than five years of clinical experience. The participants were submitted to dental prophylaxis with pumice stone and water with the aid of a Robinson brush on low speed. Operators placed a soft tissue retractor in the patient's mouth and protected the gingival tissue with a light-cured gingival barrier (Total Blanc). The barrier was light cured for 30 seconds every two teeth.

The 35% hydrogen peroxide (Total Blanc Office One-Step), packed in pre-dosed attachable syringes, was employed. The current gel starts with an initial pH 7.3 but isn't stable throughout the entire application period, decreasing to pH 6.3 after 40min of application.

The hydrogen peroxide and thickener syringes were attached by a syringe connector to both syringes. The plungers were pushed six to seven times to ensure a homogeneous activated gel with red colour. The entire mixture was transferred to one of the syringes and disconnected. Then the application tip was attached to the loaded syringe. The bleaching product was applied on the dental surfaces of the participants following the randomisation. Both arches of the participants underwent tooth bleaching, with the teeth from the second premolars to the second premolars being treated. In group 1, after 20min the gel was removed with

an aspirator cannula, and then reapplied for another 20min. In the groups 2 and 3, the gel was kept undisturbed for 40min and 30min respectively. At the end of the bleaching protocol, gel was removed with an aspirator cannula and a moistened gauze. The gingival barrier was removed and the patient's teeth cleaned with an air-water spray. Each patient underwent two bleaching sessions with an interval of seven days between them.

The colour objective and subjective was registered before, after the first and second. bleaching sessions and 30 days after the end of the treatment. Two blind calibrated evaluators with an inter-examiner agreement level of agreement of at least 85% (Kappa statistic) assessed colour outcomes. In case of disagreement during the evaluation, the evaluators needed to reach a consensus before the participant was dismissed. The recordings were made in the same room with the same lighting conditions, with hydrated teeth.

The colour assessment utilised the objective method employing the Vita Easyshade Advance 4.0 spectrophotometer (Vita). This spectrophotometer function is based on the CIELab* system, where L* indicates the lightness value ranging from 0 (black) to 100 (white). Additionally, a* measures colour along the green-red axis and b* measures colour along the blue-yellow axis. The device, calibrated before each measurement, provided these parameters during the assessment. To ensure consistent and standardised measurement of objective colour an impression of the participants' upper arch was made using blue-green condensation silicone to create a guide for the upper anterior teeth. The matrix, created in the vestibular region of the upper right canine's middle third, was perforated to match the active tip of the Vita Easyshade Advance 4.0 spectrophotometer with the aid of a 6mm diameter circular scalpel. The difference between the coordinate registered before, after the first and second bleaching sessions and 30 days after the end of the treatment was calculated. Additionally, the Whiteness Index for Dentistry (WI_D) was calculated. The 50:50% acceptability threshold was considered when the differences in colours observed before and after bleaching exceeded ΔE_{ab}>2.7, ΔE_{00} > 1.8 and WI_D>2.9.

Additionally, only the colour evaluation the upper right canine's middle third was performed using subjective methods using shade guides (Vita classical A1-C4) and Vita Bleachedguide 3D-MASTER. The value-oriented Vita classical A1-C4 colour scale consists of 16 colour shade guides, arranged from the highest (B1) to the lowest (C4) value. Vita Bleachedguide 3D-MASTER scale is a tooth bleaching scale which contains lighter coloured tabs arranged from the highest value (0M1) to the lowest (5M3) value. The colour change of shade guide units (ΔSGU) in the middle third of the vestibular right canine was calculated by subtracting the baseline colour number from the final colour number.

Participants were instructed and asked to assess their tooth sensitivity (TS) and gingival irritation (GI) using a visual analogue scale (VAS) ranging from 0 to 10, where 0 indicated no TS or GI and 10 signified severe TS or GI. The assessed TS is regarded as a brief, acute discomfort that may persist for up to 48h following the bleaching session. The measured GI is described as a stinging or burning sensation experienced by the participant in the soft tissues. The participants should mark a vertical line along the 0-10cm VAS line, the region corresponding to their intensity of TS or GI. Assessments were conducted immediately after, up to 1h, up to 24h and up to 48h following the bleaching sessions. For the dichotomous assessment of TS and GI risk, only those who recorded zero were categorised as without TS or GI; all other recorded values were considered indicative of the presence of TS or GI. To calculate the intensity of TS and GI, the distance from the marked region to the zero end was measured in cm. This procedure was done in both the first and second bleaching sessions and the worst value for statistical analysis was taken.

Aesthetic self-perception was evaluated through the Orofacial Aesthetic Scale in Portuguese (OES-Pt) which contains eight aspects, being: 1. Your facial appearance; 2. Appearance of your facial profile; 3. Your mouth's appearance (smile, lips and visible teeth); 4. Appearance of your rows of teeth; 5. Shape/form of your teeth; 6. Colour of your teeth; 7. Your gums' appearance; 8. Overall, how do you feel about the appearance of your face, your mouth and your teeth.

Patients were instructed to respond by marking with an x how satisfied they were with each of the eight aesthetic aspects on the numerical scale (0-10), where "0" represented very dissatisfied and "10" represented very satisfied. The scale was delivered to be answered before the start of bleaching and after the end of all treatment. Volunteers answered the questionnaire without any intervention and time limit for completion.

The impact of oral condition on quality of life was evaluated through the Brazilian version of the abbreviated form of the Oral Health Impact Profile (OHIP-14), which contains 14 questions. Participants were instructed to respond by marking the questions (0-4) with an x, where "0" = never, "1" = rarely, "2" = sometimes, "3" = repeatedly and "4" = always. The scale was delivered to be answered before the start of bleaching and after the end of all treatment. The participants answered the questionnaire without any intervention from the evaluators and without a time limit for completion.

RESULTS

Three hundred and sixteen participants were examined and 165 were included in the clinical study and randomised to the three study groups (n=55 each).

On average, after one month of bleaching procedure an average of colour change of 10, 7 and 13 units were observed for ΔE_{ab}, ΔE_{00} and WI_D, regardless of the experimental groups evaluated (p>0.48; p>0.38 and p>0.29, respectively). For subjective evaluation, 6 and 7 units were observed with the VITA Classical (p>0.06) and VITA Bleachedguide, respectively (p>0.11) for all experimental groups. According to all colour parameters evaluated, groups did not differ from one another in any of the time assessments (p>0.06).

A significant difference in the risk of tooth sensitivity (TS) was observed between groups (p<0.04). The TS risk of the group 1x30min was the lowest (58%, 95% CI 45-70%) compared to the groups 2x20min (76%, 95% CI 68-85%) and 1x40min (71%, 95% CI 58-81%). Regarding the intensity of TS, no significant difference among groups was observed in any of the two bleaching sessions (p>0.43), as well as in the worst-case scenario when the researchers took the highest value reported by the participants during the

bleaching ($p = 0.31$). The overall value of TS, irrespectively of the group and time assessment, was 0.84 ± 1.45.

No significant difference was observed in the risk of gingival irritation (GI) among groups ($p > 0.44$). The GI risk of the group 1 x 30min was (51%, 95% CI 38-63%), for the group 2 x 20min was (43%, 95% CI 31-57%) and for the group 1 x 40min was (49%, 95% CI 36-62%). Regarding intensity of GI, no significant difference among groups was observed in any of the two bleaching sessions ($p > 0.36$), as well as in the worst-case scenario when the highest value by the participant was used for statistical purposes ($p = 0.78$). The average value of GI intensity, irrespectively of the group and time assessment, was 0.18 ± 0.72.

When each item of aesthetic self-perception (AS) was compared before and after the bleaching treatment, a significant improvement was observed for the three groups ($p < 0.02$) with the largest mean difference 3.6 (95% CI 2.7 to 3.6) in the aspect "Colour of your teeth". Differences among groups were neither observed in the items individually ($p > 0.16$) nor in the overall analysis ($p = 0.12$).

A significant and positive impact of oral condition on quality of life after bleaching was observed for all groups ($p < 0.001$) but they did not differ from one another ($p = 0.320$.

CONCLUSIONS

The results of the present study indicate that high-concentration in-office bleaching can be applied without the need for replacement and for a shorter duration (30min) compared to 40min, as it maintains the whitening effect while reducing the percentage of patients experiencing TS. Additionally, in all groups there was an improvement in aesthetic self-perception and quality of life.

IMPLICATIONS FOR PRACTICE

This trial showed that the 1 x 30min protocol produced equivalent colour change when compared to the other longer bleaching protocols with reduced risk of tooth sensitivity and shorter application time. Also, a more simplified application regimen of a single application of 30min yields effective bleaching and patient satisfaction while minimising undesirable side effects and improving patient satisfaction.

REFERENCE

1. Favoreto MW, Camargo CM, Forville H, et al. Bleaching efficacy of in-office dental bleaching with different application protocols: a single-blind randomized controlled trial. *Clin Oral Invest* 28, 295 (2024). https://0-doi-org.innopac.wits.ac.za/10.1007/s00784-024-05697-0

2. THE HAEMOSTATIC AND COMFORTING EFFECTS OF ORAL ADHESIVE BANDAGES IN TOOTH EXTRACTION: A RANDOMISED CONTROLLED CLINICAL STUDY

Several strategies have been widely used for haemostasis in tooth extraction, including compression, packing and suture. Most commonly used is compression (biting) with cotton balls and gauze for about 30 to 60min, which is economical and convenient. During this period, speaking, chewing and drinking are forbidden to maintain the position of the cotton balls and gauze. Continuous jaw clenching can cause significant discomfort for patients. After removal of the cotton balls, the sockets are exposed to the oral cavity and actions such as spitting, sucking, eating and rinsing can disturb the blood clots within the sockets, leading to potential bleeding. Lacking coverings that prevent irritants from entering the sockets may elevate the risks of dry socket, infection and delayed wound healing.

Oral adhesive bandages are a type of wound dressing material that can adhere to wounded areas and durably shield the wounds from local stimuli in the oral cavity. Several clinical trials have been conducted to explore the characteristics of oral adhesive bandages in various dental practices, including tooth extraction. For extraction sockets, continuous and durable isolation from irritants is critical for haemostasis and the healing of wounds. New types of oral adhesive bandages that can achieve long duration of adhesion, provide excellent haemostatic and pro-healing effects and offer a comfortable experience would provide benefits for patients and deserve to be explored.

Zhou and colleagues from China reported on a trial that sought to test a new type of oral adhesive bandage against the traditional compression materials (cotton balls and gauze) to evaluate whether this wound dressing material could provide durable isolation, ideal haemostasis and protection, and a comfortable experience following tooth extraction.

METHODOLOGY

The was a randomised controlled clinical trial reported in the Consolidated Standards of Reporting Trials (CONSORT) format. There were two groups (experimental and control) of 60 patients each. The trial inclusion criteria were: patients aged 18-65 years who required surgical removal of one single tooth (except upper and lower third molars) at a time. Exclusion criteria were as follows: menstruation, pregnancy or lactation, periodontitis, tobacco usage, coagulation disorders, infection or immune dysfunction, a history of allergy to any drugs, cyst or tumour, and unwillingness to participate in this trial. Blood tests were performed routinely to exclude patients who suffered from coagulation disorders or any serious haematological diseases.

Patients who met the inclusion criteria were randomly divided into the study and control groups by the lottery method. In the study group, oral adhesive bandages were applied to the gingiva and covered the sockets immediately after tooth extraction, remaining in place until they naturally fell off. In the control group, patients bit on cotton balls and gauze for 1h.

The same dentist performed tooth extraction surgeries for all patients following the standard procedure. The surgical area was prepared with 5% povidone iodine solution. All patients were given local anaesthesia. The teeth were removed by using dental elevators or forceps, and curettage of the sockets was performed. Subsequently, different haemostasis materials were placed onto the sockets – oral adhesive bandages for the study group, cotton balls and gauze for the control group.

The oral adhesive bandage was composed of an absorbable adhesive layer and a nonabsorbable shielding layer. The biodegradable adhesive layer was made from hydroxyethyl cellulose, polyvinylpyrrolidone and corrigent. The nonabsorbable shielding layer was made from ethyl cellulose. The oral adhesive bandage is underlaid by a removable polyethylene film. This type of oral adhesive

bandage has two subtypes: type A is designed as a rectangular shape (length: 30mm, width: 15mm, thickness: 0.4mm), while type C is a shorter rectangular shape with a small concave arc on each long side (length: 25mm, width: 15mm, thickness: 0.4mm). Only type A oral adhesive bandages were used in the trial.

When teeth were extracted, blood and saliva on the mucosal surface around the extraction socket were wiped out with cotton balls and saliva suction tubes. The dentist tore the oral adhesive bandages off the polyethylene films and stuck the adhesive side of the bandages to the gingival surface around the sockets. To ensure adhesive strength, continuous pressure on the bandages for more than 15 seconds was required. Then the oral adhesive bandages would stick to the extraction sockets and tightly cover the holes to protect the blood clots.

At postoperative 1h and 24h, the dentist examined the extraction sockets and evaluated and scored the bleeding based on the following standard: 0, severe bleeding, requiring haemostatic measures; 1, moderate bleeding; 2, slight bleeding; 3, no postsurgical bleeding. At postoperative 1h, all patients were given a comfort rating scale which ranged from 0 to 10 (0, severe discomfort; 1-3, slight discomfort; 4-6, normal; 7-9, slight comfort; 10, high comfort), and scored the comfort levels for the method they used. On postoperative day 7, another dentist working under a single-blind principle (unaware of which group patients belonged to) examined all patients and evaluated the healing of wounds following such a standard: 0, moderate to severe tenderness or pain, moderate to severe inflammation reaction in the surgical area; 1, slight to moderate swelling and tenderness, slightly reddened; 2, no swelling and tenderness, normal appearance. Also, the adhesive time of all oral adhesive bandages and any adverse reactions were recorded.

RESULTS

One hundred and twenty patients (49 males and 71 females) were randomised into the study group and the control group. Both groups had similar demographic characteristics. The clinical data revealed that the average adhesion time of oral adhesive bandages was 26.6h. Forty percent of the bandages remained in place on the extraction sockets for an average of 5.7h, while 28% lasted for an average of 21.3h. Additionally, there were 13% and 4% of bandages remaining in place for 30.7h and 45.5h, respectively. Furthermore, 15% of bandages remained at the sites of placement for 83.4h.

At postoperative 1h and 24h, the haemostatic scores of the oral adhesive bandage group, which were 2.88 and 2.97, were significantly higher than those of the cotton balls and gauze group, which were 2.40 and 2.88, respectively. The oral adhesive bandage group also scored significantly higher in terms of comfort compared to the control group. Both groups had similar healing effects and side effects, but the mean score of the oral adhesive bandage group was slightly higher than that of the control group. The adverse event in the oral adhesive bandage group was a case of slight nausea. After the bandage was removed, the nausea obviously subsided.

CONCLUSIONS

The oral adhesive bandages were found to be more effective than the traditional compression method in haemostatic and comforting effects on extraction wounds, and exhibited higher clinical value in extraction wound management.

IMPLICATIONS FOR PRACTICE

For patients with a history of bleeding, oral adhesive bandages seem to offer particular benefit.

REFERENCE

1. Zhou X, Cai Y, Zhao J. The hemostatic and comforting effects of oral adhesive bandages in tooth extraction: a randomized controlled clinical study. Clinical Oral Investigations. 2024 Apr 7;28(5):244

CPD questionnaire on page 282

The Continuing Professional Development (CPD) section provides for twenty general questions and five ethics questions. The section provides members with a valuable source of CPD points whilst also achieving the objective of CPD, to assure continuing education. The importance of continuing professional development should not be underestimated, it is a career-long obligation for practicing professionals.