

Internal Bleaching of Non-Vital Tooth



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Clinical Case

23 y.o. F presents to clinic with referrals for extractions and crowns

CC: Upper front tooth is sensitive to temperature; past history of trauma 4-5 years ago from dancing

Med Hx: Non-contributory

Meds: None

NKDS

Dent Hx: Exam, cleaning, and fillings done 6 months ago

Radiographic: Localized calculus, #3-M incipient decay, #4-D decay into dentin, #8-RCT, #13-M (open)/D (plus), #1, 16, 17, & 32 impacted.

Clinical:

- #8- visually discolored; L access restored with composite→ leaking/recurrent decay
- #14-OL Am fracture on the O
- #18-Large DOB++ Am, defective B margin
- #-19- Large DO, B Am
- #30- Large DO, B Am
- #31-MO fracture on the O

Vitality Test:

- #6-#11
 - Positive to cold except #8
 - #7 responds stronger and lasts longer compared to the other teeth
 - Negative to palpation and percussion

Obtained endo consult

Clinical Case

#8

Dx: Asymptomatic, Non-vital tooth with internal discoloration

Tx:

- 1) Do nothing
- 2) Internal Bleaching - Conservative
- 3) #8 and #9 Crowns - Aggressive
 - Possibly #6-#11 (for esthetics)

****Patient elected to do internal bleaching on #8****

#4- DO Cp

#14- OL Cp

#18- PFM

#19-PFM

#30-PFM

#31-MOD Am

#7

Dx: Sensitive to cold

Tx: Monitor, since we do not have a definitive diagnosis

Etiology of Intrinsic Discolorations

Post-eruptive causes

Pulpal necrosis

Intrapulpal hemorrhage

Residual pulp tissue after
endodontic treatment

Endodontic materials ie.
medications/irrigants, root canal
sealer

Filling materials

Root resorption

Aging process

Pre-eruptive causes

Medications ie. Tetracycline

Metabolism ie. Fluorosis

Genetics ie. Amelogenesis
Imperfecta



Discoloration of Endodontically Treated Teeth

Haemorrhage in pulp chamber

Blood then enters the dentinal tubules

Haemolysis of red blood cells along with release of haemoglobin, produces a yellowish brown discoloration when the iron pigment degrades to iron sulfide

Post endodontic discoloration caused by:

- Failure to completely remove blood and organic material from the pulp chamber

- Inadequate access opening to pulp chamber

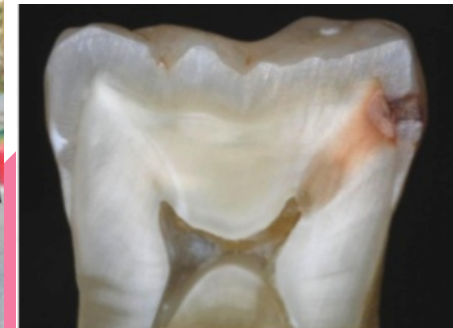
- Remnants of medicaments and sealing pastes in the coronal part of the tooth prior to sealing the pulp chamber

Indications for Internal Bleaching

- Indicated for all discolorations of non vital teeth
 - EXCEPT those caused by metal ions i.e. amalgam and metal pins
- Root canal filling must be adequately sealed
 - a base material should be used to seal root canal filling material
 - cements like MTA, which are used for perforations, should also be covered
- Tooth must be asymptomatic
 - determine if periapical lesion is healing by monitoring
- Coronal restorations with poor marginal seals should be replaced

Contraindications

- Superficial enamel discolorations
- Defective enamel formation
- Severe dentin loss
- Caries
- Discolored proximal composites (unless they are replaced after bleaching)
- Patients with unrealistic expectations
- Pregnant/lactating women



Bleaching Agents

1) Hydrogen Peroxide (H_2O_2)

- Concentration >30% used with caution due to increased risk of root resorption

2) Sodium Perborate

- H_2O_2 is released upon adding water
- Bleaching ability mixed with water vs. H_2O_2 equal

3) Carbamide Peroxide

- Contains H_2O_2 and urea
- Bleaching ability equal to H_2O_2

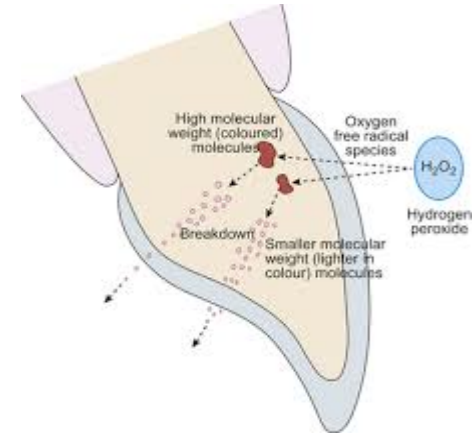


Mechanism of Bleaching

Pigments = long chain organic molecules with double carbon bonds

Bleaching agents = oxidizing/ reducing agents

- Hydrogen peroxide (H_2O_2) diffuses into tissue, breaks up and forms:
 - hydroxyl radical (HO^*)
 - perhydroxyl radicals (HOO^*)
 - perhydroxyl anions (HOO^-)
 - superoxide anions (OO^{*-})
- Free radicals attack the double bonds of pigment molecules in tooth enamel
- Tetracycline bleaching
 - Chemical degradation of the unsaturated quinone-type structures found in tetracycline
 - Fewer colored molecules, lighter tooth shade
- Heat serves as catalyst in breaking bleaching agent into oxidizing products and supplies energy to the bleaching solution.



Zimmerli B, Jegel F, Lussi A
2010
Baratieri, L. N. et al 1995
Alqahtani, M. Q. 2014

Technique Overview

1. Walking Bleach
2. Inside/Out Bleach
3. In office technique
4. Thermocatalytic

Zimmerli B, Jeger F, Lussi A
2010

Boksman L, Jordan RE, Skinner DH 1983

Technique 1: Walking Bleach

Pros: Less chair time, more comfortable, safest for the patient. Longer duration. Should be used in most situations requiring internal

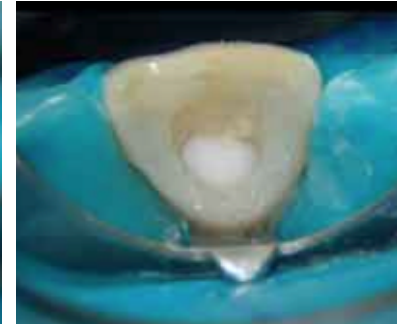
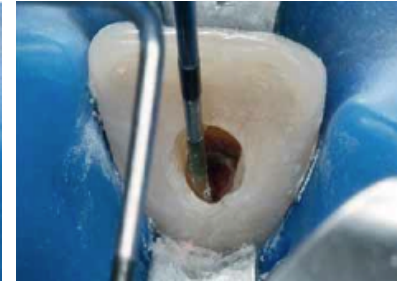
1. 1st appointment: bleaching.

- a. Access canal.
- b. Remove old obturating materials.
- c. Apply 3 mm protective base.
- d. Place sodium perborate into pulp chamber.
- e. Remove excesses.
- f. Pack thick mix of Cavit or IRM.
- g. Reschedule in 4-7 days.

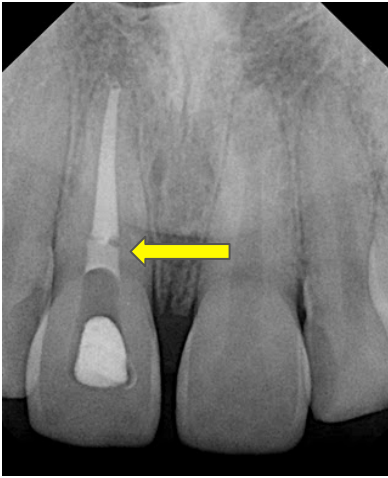
2. Reapplication bleaching appointments

- a. Remove thin layer of dentin.
- b. Repeat steps 4a-f.

3. Final appointment: Final restoration



Sealing of Cervical Base



NEGATIVE CONTROL



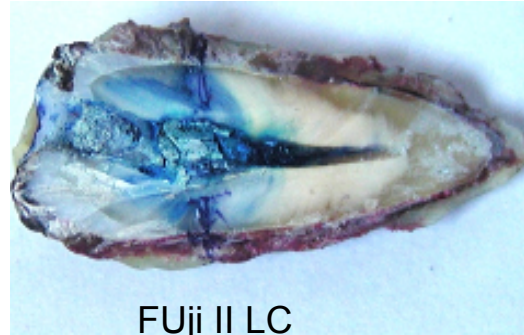
POSITIVE CONTROL



GIC



FUji II LC



Hybrid Composite



Technique 2-Inside/Outside Bleaching

Bleaching takes place internally and externally with use of mouthguard

Considered a modified walking bleach technique

Pros:

Can be used to whiten both vital and non-vital teeth simultaneously

Less potential for resorption

Uses lower concentrations of bleaching agents

Treatment proceeds rapidly (3-4 days, depending on the degree of discoloration of the teeth)

Cons:

Requires excellent patient compliance for best results

Requires patient have adequate manual dexterity to follow procedure instructions

Lack of bacterial control, and open environment for the access cavity

Requires some planning before (lab time/ cost)



Steps: Inside/Outside Technique



**Cervical
seal**



10% carbamide
peroxide with plastic
syringe

Wear loaded mouthguard for
1-2 hrs and change the
solution or wear when
sleeping



Liebenberg, W. H. (1997).
Settembrini, L., et al (1997)

Technique 3-In Office Bleaching

Mainly used for vital tooth bleaching

Uses high concentrations of hydrogen peroxide (25-40%) gel applied in office

Light and Heat may be applied at 50 - 60 °C for 5 min then tooth is allowed to cool for 5 min

Walking bleach technique may be used between visits

Pros:

Dentist has complete control of the procedure and ending the process at the desired shade

Shorter application time

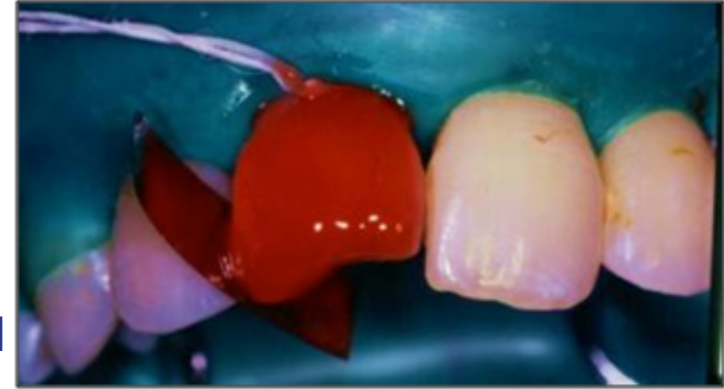
Cons:

Low predictability, effectiveness is short-term

Lightening is mainly produced by dehydration of tooth under rubber dam

Steps: In-Office Bleaching

- 1) Petroleum jelly is applied to gingival tissues prior to rubber dam isolation
- 2) Access cavity preparation and cervical root canal seal completed as in the Walking Bleach Technique
- 3) 30% hydrogen peroxide applied onto and into tooth for 15-20 min
- 4) Gel is rinsed off and applied again if necessary
- 5) Definitive closure of access cavity is completed at a subsequent visit



Technique 4- Thermocatalytic

Involves placing the bleaching agent in the pulp chamber and then applying heat

Source of heat: heat lamps, flamed instruments or electrical heating devices, which are specific to bleach teeth

Heat might also be applied with heated metal instrument or other commercial heat applicators (System B, Touch'n Heat)

Potential damage include external cervical root resorption

Due to irritation of cementum and the periodontal ligament from the bleaching agent combined with heat

Application of heat during bleaching should be limited

Complications

Soft tissue irritation

Soft tissue burns

GI mucosal irritation

Cervical root resorption

Coronal Fracture

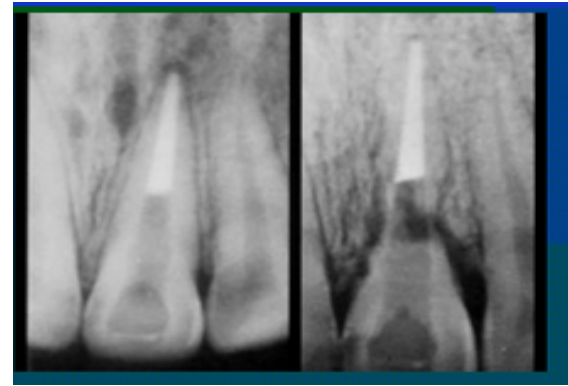
Tooth Sensitivity

Changes in enamel and dentin:

Enamel: Increased porosity, demineralization, decreased protein concentration, modification in calcium:phosphate ratio and calcium loss

Decrease in micro-hardness

Might change abrasion resistance



Final Restoration

Restorative Materials:

Composite

Glass ionomer

Zinc phosphate cement

Gutta percha temporary stopping

When is the best time to restore?



Patient Satisfaction and Recurrence

*Variable by Study

Friedman 1997

2 years : 10% recurrence rate

5 years : 25% recurrence rate

8 years : 49% recurrence rate

Feiglin 1987

6 years: 45% satisfactory

Amato et al 2006

After 16 years, 62.9% satisfactory, and 37.1 % unsatisfactory.

*Dentists judge bleaching success more critically than do patients.



Clinical Case

Visit 1:

Initial Shade: D3

Took initial image

Anesthetized and isolated with rubber dam

Removed composite (to level of gutta percha)

Cleaned out intrinsic stains (as much as possible)

Sealed gutta percha with Fuji IX (2mm)

Etched and rinsed

Wet sodium perborate with few drops of anesthesia (4% Septocaine)

Placed moistened sodium perborate in access opening

Wet small cotton pellet with sodium perborate and placed in access opening

Sealed off access opening with cavit

Removed excess cavit and removed rubber dam

Checked occlusion

NV: 1-week follow up and new application of sodium perborate

****Assessment- #8 discoloration due to leakage and possible insufficient removal of pulp tissue****

- Pulp horns were not completely accessed/cleaned



Clinical Case

Visit 2:

Updated Shade: C1

Took updated image

Anesthetized and isolated with rubber dam

Removed cavit and cotton pellet

Rinsed and dried

Wet sodium perborate with few drops of anesthesia (4% Septocaine)

Placed moistened sodium perborate in access opening

Wet small cotton pellet with sodium perborate and placed in access opening

Sealed off access opening with cavit

Removed excess cavit and removed rubber dam

Checked occlusion

NV: 1-week follow up and new application of sodium perborate

Assessment- #8 is still darker compared to #9, but is starting to look similar to #6, 7, 10, 11



Clinical Case

Visit 3:

Updated Shade: B2

Took updated image

Anesthetized and isolated with rubber dam

Removed cavit and cotton pellet

Rinsed and dried

Wet sodium perborate with few drops of anesthesia (4% Septocaine)

Placed moistened sodium perborate in access opening

Used heated tip/system B (set at 99 degrees) to warm sodium perborate for 10 seconds

Repeated 5 times

Rinsed and dried

Etched, bonded (except facial wall) and filled with A2 composite

Removed excess composite and removed rubber dam

Checked occlusion

Assessment- #8 is still darker compared to #9, but is starting to look similar to #6, 7, 10, 11

Assess color at future visits/follow up with patient to see if they are still satisfied with results



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Happy Friday!

