

Tooth Discoloration and Bleaching

lec: 8

Dr.Auday Asady

Tooth discoloration is defined as "any change in the hue, color, or translucency of a tooth due to any cause; restorative filling materials, drugs (both topical and systemic), pulpal necrosis, or hemorrhage may be responsible. The discoloration may be induced by intrinsic stains incorporated in tooth structures and extrinsic stains deposited on tooth surfaces.

Bleaching is a procedure which involves lightening of the color of a tooth through the application of a chemical agent to oxidize the organic pigmentation in the tooth.



Classification of discoloration

1-Patient related discoloration

- a) **Pulp necrosis**: is one of the most common causes. The longer the pulp has been necrotic, the more intense is the discoloration. Necrotic tissue contains various protein degradation products which may penetrate the dentinal tubules and create a greyish brown discoloration of the crown. This responds well to intracoronal bleaching (non-vital bleaching technique).

- b) **Intrapulpal hemorrhage**: Trauma can cause haemorrhage as blood vessels rupture in the pulp chamber. Blood is hydraulically driven into the dentinal tubules, where the RBC undergo haemolysis. liberating haemoglobin. Haemoglobin is degraded releasing iron that forms a black compound by combining with hydrogen sulphide to become iron sulphide. Immediately after injury, crown remains pink as blood breaks down. The tooth becomes orange, then blue, then brown or black. Treatment is by intracoronal bleaching (non- vital bleaching technique).

- c) **Dentine-hypercalcification**; Due to trauma, the pulp may form dentine rapidly to decrease the volume of the pulp. Such new dentine increases the yellow appearance of the tooth. Treatment starts with extracoronal bleaching (vital bleaching technique), and in case the discolouration problem was not resolved, more aggressive treatment is needed as root canal therapy followed by either intracoronal bleaching or tooth covering with veneer or crown.

- d) **Age**: In old aged teeth, certain problems occur to the tooth such as physiological dentine apposition, thinning and cracking of enamel and incisal wear of the tooth. Advantage in older patients pulp recession makes aging a boon in terms of extracoronal bleaching, since, it makes the patient less sensitive to bleaching.

2-Tooth related Causes

a) **Developmental defects** Discolorations may also result from development defects or from substances incorporated into enamel or dentin during tooth formation.

1– Enamel hypocalcification: is common, appearing as a distinct brownish or whitish area, often on the facial aspect of a crown. The enamel is well formed and intact on the surface and feels hard to the explorer. Both the whitish and the brownish spots are amenable to extracoronal bleaching.

2– Enamel hypoplasia: The enamel surface is defective and porous. It may be hereditary as amelogenesis imperfect or due to environmental factors may involve only one or several teeth. Presumably during tooth formation, the matrix is altered and does not mineralize properly. The porous enamel readily acquires stains from the oral cavity. Treatment can start by extracoronal bleaching and later conservative treatment to repair the porous surface.

b) **Systemic conditions**

1– Erythroblastosis fetalis: It happens due to Rh incompatibility of blood in new born babies. Large amounts of hemosiderin pigment (an iron-storage complex) are released and discolour the dentine. Stain is usually green, brown or blue.

2– Sickle cell anemia: It is an inherited blood dyscrasia, which cause intrinsic bluish, brown, or green discolorations. The discoloration is similar to erythroblastosis fetalis but more severe.

3– Amelogenesis imperfect: It causes yellow to brown discoloration.

4– Dentinogenesis imperfect: It causes brown, yellow or grey discoloration. These conditions are not amenable to bleaching and should be corrected by restorative procedures such as composite build-up or crowns.

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3-Drug related discoloration

There are certain drugs that cause tooth discolouration when ingested during its formation.

a) Tetracycline Discoloration of this type occurs after tetracycline ingestion, usually in children. Discoloration is bilateral, affecting multiple teeth in both arches. Color change ranges from light yellow to darker grey to brown depending on the dosage, duration of intake and age of the patient at time of administration of the drug. Tetracycline binds to calcium and gets incorporated to hydroxyapatite crystals of enamel and dentine.

Treatment may be achieved by extracoronary alone or intracoronary bleaching following intentional root canal therapy.

b) Endemic fluorosis Intake of large amount of fluoride during tooth formation may produce defect in enamel matrix causing hypoplasia. It is seen as white spots ranging from chalky white to brown discoloration. Treatment is done by extra coronal bleaching with restorative therapy of the porous surface.

c) Chlorhexidine this is a surface stain after prolonged use of chlorhexidine mouthwash. It ranges from yellowish to brown color. Treatment is achieved by extracoronary bleaching.

4-Dentist related discoloration

a) **Discoloration related to endodontic**

❖ Pulp tissue remnants: if some pulp tissue remains in the pulp chamber especially the pulp horn, discoloration occurs due to tissue and blood decomposition.

❖ intracanal medicaments: excessive use of phenolic or iodoform based medicaments may create brown, yellow or orange stains in the dentine.

❖ Obturating materials: gutta-percha has to be removed from the pulp chamber to prevent tooth discoloration. Root canal sealers containing silver may cause black stains.

The above mentioned causes of discoloration are considered intrinsic because it affects inner structure of the tooth, and they respond well to non-vital bleaching technique

b) **Discoloration related to Restoration**

❖ Amalgam: silver alloys have long been condemned for staining dentin a dark grey.

❖ Pins and posts: Metal pins and posts may show through the composite restoration or cause blue greyish stains of the composite filling.

❖ Composite: Microleakage around a composite filling may discolor the tooth due to the entrance of bacteria and fluids through the gap between the tooth and the filling.

Treatment of the above mentioned causes is replacement of the filling.

Bleaching Materials

Bleaching compounds may act as either **oxidizing** or **reducing** agents. Commonly used agents are solutions of **hydrogen peroxide**, **sodium perborate**, and **carbamide peroxide**.

❖ **Hydrogen peroxide**: is a powerful oxidizer that is available in different Concentration. Superoxyl and Perhydrol of 30% to 35% concentrations respectively are the most common used solutions. Although hydrogen peroxide will bleach quickly, it should be handled with care as it has a caustic and burns effects on soft tissue in contact.

❖ **Sodium perborate**: It is available in powder form, which is stable when dry, but in the presence of water, acid, and worm air it decomposes to form sodium metaborate, hydrogen peroxide and oxygen. It is safe and easily controlled so it is used in intracoronal bleaching.

❖ **Carbamide peroxide**: It is also called urea hydrogen peroxide (3 - 35%). Popular agent contains 10% carbamide peroxide, which breaks down into urea, ammonia, carbon dioxide, and approximately 3.5% hydrogen peroxide.

Mechanism of bleaching action

Mechanism of bleaching is mainly linked to degradation of high molecular weight complex organic molecules (stain) that reflect a specific wavelength of light that is responsible for color of stain. The resulting degradation products are of lower molecular weight and composed of less complex molecules that reflect less light, resulting in a reduction or elimination of discoloration. Bleaching agents act on the organic structure of the dental hard tissues, slowly degrading them to by-products as carbon dioxide. Inorganic molecules do not react with the bleaching agents. Bleaching action is also called oxidation-reduction reaction or redox reaction which is formed by cleavage of either an O-H bond or the O-O bond in hydrogen peroxide to give $H + OOH$ and $2OH$ (hydroxyl radical), that oxidize or reduce other organic molecules.

Extracoronary (vital) bleaching techniques

❖ In-office bleaching

- Pumice the teeth to clean off any debris present on the tooth surface.
- Isolate the teeth with rubber dam.
Saturate the cotton or gauze piece with bleaching solution (30-35% H_2O_2) and place it on the teeth.

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• Intracoronaral (nonvital) bleaching techniques for endodontically treated teeth

The protocols commonly used to bleach root canal treated teeth are the thermocatalytic and walking bleach techniques.

❖ Thermocatalytic technique this technique involves placing the bleaching agent in the pulp chamber and then applying heat, which supplied by heat lamps, flamed, instruments, or electrical heating devices.

Effect of bleaching agents on the tooth and surrounding structures

1. Tooth sensitivity

This is mostly seen with in office technique/ H₂O₂ with heat This may be due to penetration of the bleaching agent into enamel and dentine and junctions with restorations.

2. Effect on enamel

Bleaching agents decrease enamel Hardness but fluoride application restores remineralization of enamel.

3. Effect on Pulp

When the bleaching agent penetrates the enamel and dentine it will cause transient reduction in pulpal blood flow.

4. Cervical resorption

When using H₂O₂ of more than 30% concentration, external cervical resorption may occur.

5. Effect on composite

After bleaching, composite fillings may be affected by surface roughening of the restoration. Tensile strength is decreased and microleakage is more possible to occur.

INTERNAL BLEACHING

WALKING BLEACHING

Internal bleaching is the process of bleaching or whitening a tooth from the inside out. Unlike traditional tooth whitening, where whitening agents are applied to the outside of the tooth, internal bleaching is completed from the inside out. In cases of trauma or caries, the discoloration begins from inside of the tooth and spreads outwards. These types of stains can be eliminated by chemical means, via internal bleaching (a more conservative option), or by crowning or bonding the tooth surface in order to mask the discoloration. Oftentimes, a combination of internal bleaching and restorative therapy is used.



INTERNAL BLEACHING

WALKING BLEACHING

materials used in **Internal bleaching**

sodium perborate

carbamide peroxide



INTERNAL BLEACHING

WALKING BLEACHING

CAUSES OF DISCOLOURATION

interpulpal heamorrhage



INTERNAL BLEACHING

WALKING BLEACHING

CAUSES OF DISCOLOURATION

pulp necrosis



INTERNAL BLEACHING

WALKING BLEACHING

CAUSES OF DISCOLOURATION

endodontics materials



INTERNAL BLEACHING

WALKING BLEACHING

TECHNIQUE

after RCT

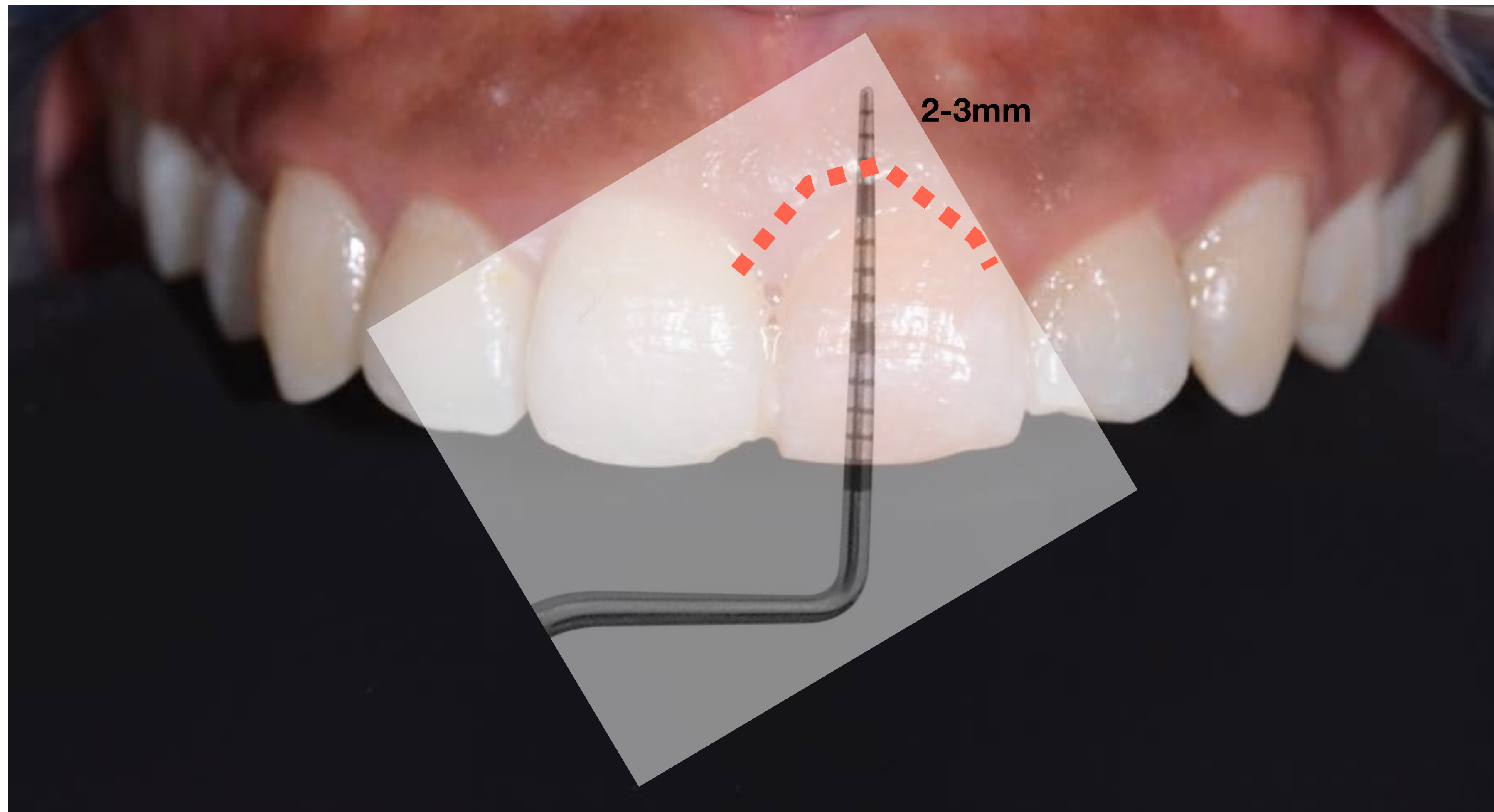


initial photo

INTERNAL BLEACHING

WALKING BLEACHING

remove the gp 2-3mm beyond the gingival level



INTERNAL BLEACHING

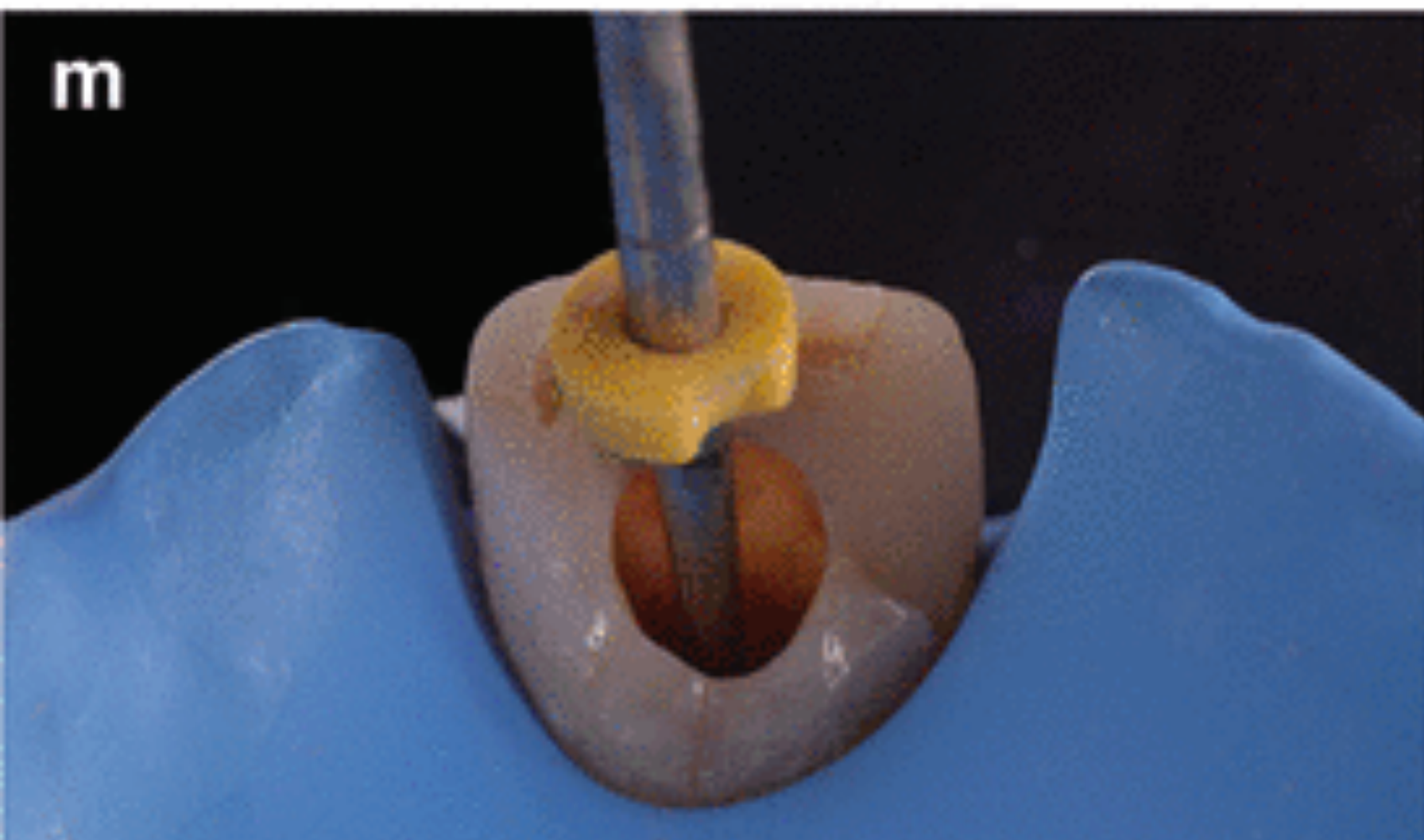
WALKING BLEACHING

seal the gp by the GIC



INTERNAL BLEACHING

WALKING BLEACHING



INTERNAL BLEACHING

WALKING BLEACHING



INTERNAL BLEACHING

WALKING BLEACHING

Apply the bleaching material then temporary filling done, recall the patient after 48 h



INTERNAL BLEACHING

WALKING BLEACHING



INTERNAL BLEACHING

WALKING BLEACHING

COMPILATIONS

*Internal or External Root
Resorption*



INTERNAL BLEACHING

WALKING BLEACHING

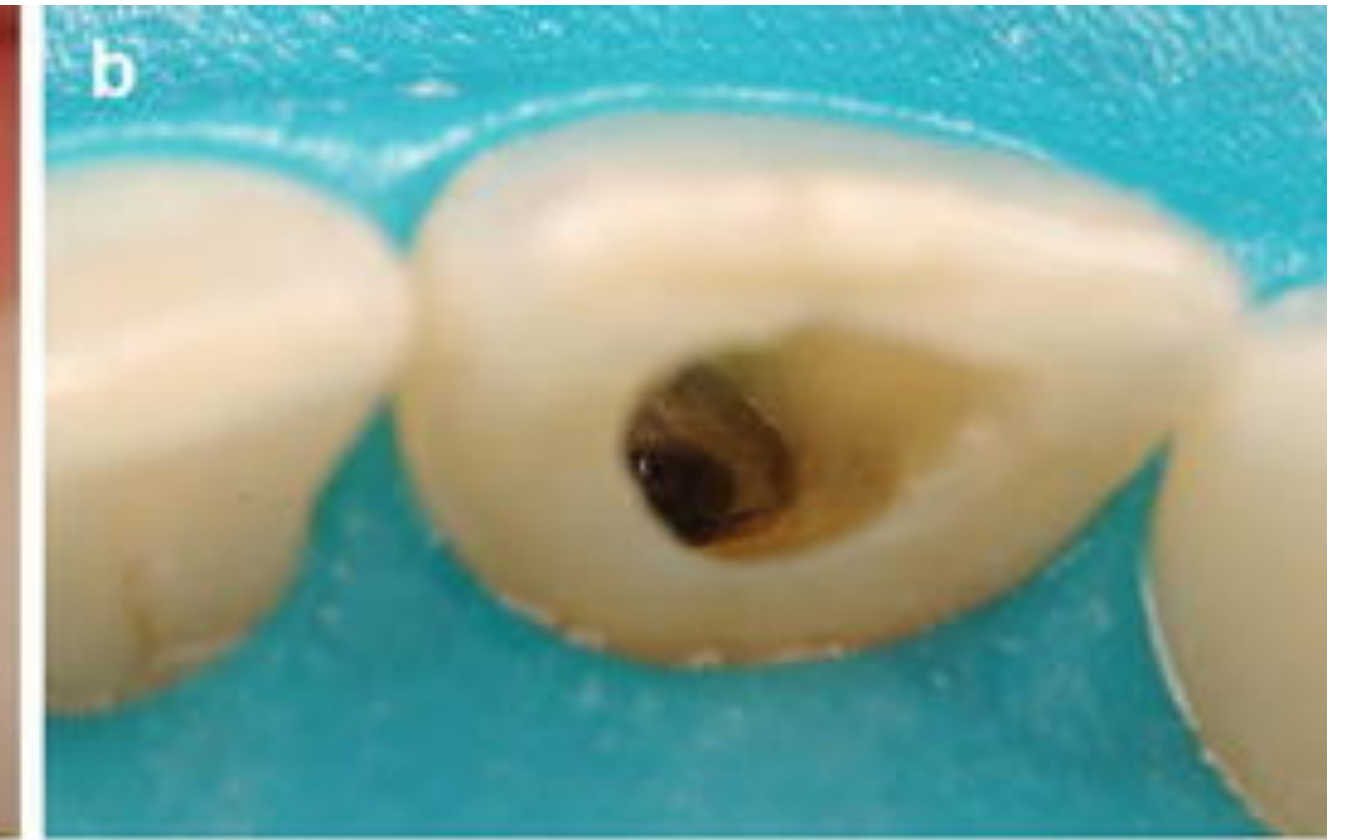
COMPILATIONS

Rediscoloration



INTERNAL BLEACHING

WALKING BLEACHING



THANK U