University of Baghdad

College of Dentistry

Causes and treatment options of single discolored tooth

A graduation research submitted to the College of Dentistry /
University of Baghdad
in partial fulfillment of the requirement for B.D.S. degree

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1439 2018

يرفعِ اللهُ الَّذينَ آمنوا منكم والَّذينَ أوتوا العِلمَ درجاتٍ

صَدَقَ اللهُ العَظيمِ

Dedication

TO MY PARENTS

WHOSE LOVE, SUPPORT, ENCOURAGEMENT, AND PRAYS OF DAY AND NIGHT MAKE ME ABLE TO GET SUCH SUCCESS AND HONOR

AND TO MY SUPERVISOR
DR. HUSSAIN AL-SHAMMA

WHOSE SUPPORT AND ENCOURAGE ME IN THAT PROJECT

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Introduction

Single dark teeth represent a major challenge to obtain best esthetic outcome in a patient's smile. Treatment options may include single crowns, veneers, bonding, or bleaching. Bleaching is the most conservative option to consider, but the potential for a successful outcome varies based on the cause and extent of the discoloration. When a patient presents with either intrinsic or extrinsic staining or discoloration and seems to be a candidate for tooth bleaching, there is a variety of factors and options for the clinician to consider. Depending on the cause for the discoloration and if there was a tooth trauma involvement, or if the affected tooth has been endodontically treated, and what is the best delivery method for the patient's lifestyle, financial situation, and commitment level to home care. Single dark teeth present a unique challenge for color change and the clinician must be aware of the basic principles of changing the color of one or more teeth in order to implement a successful treatment plan ***(Haywood and DiAngelis, 2010).***

Tooth discoloration

Permanent incisors may discolor following trauma, loss of vitality, endodontic treatment and restorative procedures

1. The blood pigment heamatin is responsible for enamel and dentine staining following trauma induced erythrocyte destruction

2. Other causes of discoloration in endodontically treated teeth include obturation materials, remnants of pulp tissue in the pulp horns, intracanal medicaments and coronal restorations **(Leith and Moore, 2009).**

Causes

Extrinsic: stains are food, beverage, or smoking-related superficial stains and discolorations. Pigments from beverages such as coffee or tea or tar from smoking may cause dark, brownish discolorations as shown in figure (1) . Extensive consumption of oranges, carrots, or chocolate may lead to food-related stains. In areas with diverse populations, betel chewing and areca nut use may be prevalent. Consistent chewing of betel nut and related substances may cause large-scale black discolorations. The effects of staining may be accelerated or enhanced if demineralization from acidic food or poor oral hygiene creates rougher tooth surfaces. In general, extrinsic stains respond well to scaling, polishing, or bleaching **(SEZTER et al, 2002)**.

Figure (1) *Extrinsic discoloration*

Overview of Intrinsic and Extrinsic Discolorations			
Color of Stain	Extrinsic	Intrinsic (Single Tooth)	Intrinsic (Multiple Teeth)
Black	Betel nut Chromogenic bacteria Coffee Dental plaque Metals Tea Tobacco Wine	Amalgam restorations Glass ionomer restorations Pulpal trauma with hemorrhage Minocycline (revascularization procedures) Metals (silver, gold, alloys)	Minocycline (oral) Tetracycline (oral)
Gray		Metals (silver, gold, alloys) Silicate compounds (e.g., MTA)	Dentinogenesis imperfecta Thalassemia
Brown/reddish	Coffee Dental plaque Doxycycline Drugs (e.g., khat, marijuana) Iodine Metals/halides Oral rinses (e.g., chlorhexidine) Other foods Tea Tobacco Wine	Caries (active, arrested) Cervical root resorption Composite resin, glass ionomer restorations Dental trauma Endodontic irrigation solutions Iodine Minocycline (revascularization procedures) Pulpal trauma with hemorrhage Resorcinol-formaldehyde resin	Amelogenesis imperfecta Congenital erythropoietic porphyria Dental trauma Dentinogenesis imperfecta Fluorosis Infection during enamel formation Tetracycline (oral) Thalassemia
Green	Chromogenic bacteria Metals Tea	—	Hyperbilirubinemia Thalassemia
Orange	Chromogenic bacteria Metals Doxycycline	—	—
Yellow	—	Caries (active) Composite resin, glass ionomer restorations Dental trauma	Aging Amelogenesis imperfecta Dentinogenesis imperfecta Dental trauma Dentinal dysplasia Fluorosis Hemolytic diseases Hemoglobin, heme Hyperbilirubinemia Nutrition deficiency (e.g., rickets, scurvy)
White	—	Caries (incipient) Dental trauma	Calcification due to trauma Fluorosis Infection during enamel formation Nutrition deficiency (e.g., rickets, scurvy)

Table (1) *intrinsic and extrinsic discoloration*

Aging

Aging-related tooth discolorations are the result of a physiologic process attributed to the uptake of discoloring agents into the hard tissue structure over time. Age-related changes such as incisal wear craze lines, or cracks allow for easier penetration. Furthermore, over time, enamel becomes thinner, and the change in ratio between dentin and enamel structure results in additional optical darkening of the teeth. Extracoronal bleaching can partially whiten age-related stains **(Vogel et al 1975)** as shown in figure (2)**.**

Figure (2) *Discoloration from aging*

Treating Extrinsic Stain/Tooth Discoloration

Chemically, hydrogen peroxide is effective for treating extrinsic stain. In addition, surfactants contained in dentifrices and rinses, such as sodium lauryl sulphate, help lift and remove stain from the tooth surface. Physical removal of extrinsic stain can be achieved with abrasives. These are routinely used in prophylactic pastes during dental prophylaxis where they have the ability to

remove stubborn stain due to their abrasivity, that regular dentifrices would not remove. Abrasives are also containedinin dentifrices to help remove stain and prevent stain buildup on a daily basis. Recent studies have shown not only that dentifrices containing no abrasive result in stain accumulation, but that patients are unwilling to comply with regular home care using a nonabrasive toothpaste even under study conditions **(Hefferrenet al. 1996).**

This would result not only in the accumulation of stain, but also the accumulation and maturation of biofilm since patients do not perform good home care under these conditions. Therefore, for good oral hygiene and patient compliance it is important to be able to achieve cleaning and stain prevention and removal, while preserving tooth structure. A dentifrice should ideally contain sufficient cleaning power to remove and help prevent staining without being so abrasive that it results in loss of tooth structure **(Wülknitz et al, 1997)**

Local Intrinsic Causes:

Intrinsic discoloration can be defined as discoloration which is incorporated into the structure of either enamel or dentine and which cannot be removed by prophylaxis with toothpaste or pumice. Intrinsic tooth discoloration can be a significant cosmetic, and in some instances, functional, problem. Loss of vitality secondary to trauma or infection frequently results in tooth discoloration which is not responsive to conventional endodontic therapy. Similarly fluorosis, tetracycline staining, localized and chronological hypoplasia, and both amelogenesis and dentinogenesis imperfecta can all produce a cosmetically unsatisfactory dentition and,in the latter two examples a structurally “at risk” dentition as well. These Guidelines are designed to outline the most appropriate options for treating the

different a etiological categories of intrinsic discoloration of the anterior permanent dentition in child and adolescent patients **(Wray and Welbury , 1990)**.

the causes :

1) Pulpal Hemorrhage

Dental trauma may lead to the rupture of intrapulpal blood vessels with subsequent intrapulpal hemorrhage and the release of blood components into the dentinal tubules. The hemolysis of erythrocytes will result in the degradation of hemoglobin into globin and the heme protein, containing an iron atom. The iron, in the form of iron sulfides, may reach dentinal tubules, causing stains and discolorations in the surrounding dentin, Intracoronal bleaching has proved effective in these situations **(Marin et al, 1997)** as shown in figure (3).

Figure (3) *red discoloration from Pulpal hemorrhage*

2) Pulp Necrosis

Irritation of the dental pulp can happen chemically, mechanically, or by microbial insult, especially by bacteria and their toxic by-products. After initial inflammation, the pulp develops local micro abscesses followed by tissue necrosis and eventually complete necrosis. Disintegration products from pulp necrosis may

become incorporated into dentinal tubules and cause discoloration of the surrounding dentin. The intensity of the discoloration appears proportional to the time the discoloring agents remain in the pulp chamber as shown in figure (4). These types of discolorations tend to respond favorably to intracoronal bleaching **(Rotsteinet al, 2002).**

Figure (4) *yellowish discoloration from Pulp Necrosis*

3) Restorative Materials:

Metallic filling materials, such as amalgam or gold, may cause discolorations. Gold fillings—for example, gold foil compaction fillings, inlays, or onlays, but also pins or posts—mostly cause color changes, reducing tooth translucency and adding dark hues through thin remaining tooth portions. Amalgam fillings, over time, will undergo corrosive changes and degradation, with by-products causing color alterations in tooth structure as shown in figure (5). For any metallic filling that remains visible through existing tooth structure, removal of the filling and exchange with an aesthetic filling material is the preferred choice. Effective dentinal discolorations by amalgam can be bleached but may be prone to

recurrence. Composite resin restorations may leak at the margins and allow for discoloring agents to penetrate into the tooth and dentinal tubules **(Nathooet al, 1997).**

Figure (5) gray – *black discoloration from old Restorative Materials*

4) Intracranial Medicaments and Root Filling Materials

A variety of endodontic medications and filling materials may be responsible for discolorations. Silver points, historically used for root fillings, can cause gray, dark discolorations in teeth and the surrounding tissues due to corrosive processes as shown in figure (6), Gutta-percha was reported to cause a light pink discoloration **(Partoviet al, 2006).**

Resorcinol-formaldehyde resin paste ("Russian Red") was reported to cause discolorations ranging from pink to dark burgundy**(Matthews J, 2000).**

Phenols or iodine containing intracanal medications (e.g., camphorated monochlorophenol [CMCP] or iodine-potassium-iodine [IKI]) may reside in the root canal space and start gradual discolorations by penetration of dentinal tubules through oxidation Endodontic sealers, particularly those containing metallic compounds (e.g., silver), can cause dark discoloration, either if the material is incompletely removed from pulp chambers and access cavities or because some components interact with moist dentine over time **(Parsons et al, 2001).** The corrosion of silver in the sealer may cause a gray to black discoloration **(Davis et al, 2002).**

Figure (6) *discoloration from root filling materials*

Incomplete removal of AH26 can cause discoloration in reaction with intracanal medicaments, Mineral trioxide aggregate (MTA), a dental material known for excellent biocompatibility, is used for apexificationsperforation repair, root-end filling, and revascularization procedures. MTA may discolor teeth and adjacent soft tissuesThe discoloring effects were shown for both gray and white formulations **(Belobrov and Parashos , 2011).**

Antibiotic pastes in various combinations are used to initiate revascularization of immature necrotic teeth. In particular, use of the triple antibiotic combination of metronidazole, minocycline, and ciprofloxacin has produced cases of dark discolorations of hard tissue structure **(Kim et al, 2010).**

Minocycline, a tetracycline derivate, binds calcium ions of the root dentin and forms an insoluble complex. Other medications shown to induce discolorations include corticosteroid preparations or formocresol and iodoform-based medications ,Repeated applications of formocresol will penetrate dentin and cementum, particularly in the teeth of younger patients. Discolorations may also occur due to irrigation solutions. Sodium hypochlorite can discolor dentin based on its destructive effect on erythrocytes and the ability to crystallize on the dentin surface **(Gutierrez and Guzman, 1968)**. In contact with chlorhexidine, sodium hypochlorite forms a dark brown precipitate containing parachloroaniline, which can only be removed by mechanical action **(Holmstrup et al, 1988).**

MTAD (a mixture of a tetracycline isomer, citric acid and a detergentcan cause brown discolorations probably caused by dentinal absorption and release of the doxycycline **(Torabinejad et al, 2003).**

5) Dental caries

Progressing caries can cause tooth discoloration. Early stages of caries are characterized by white, opaque enamel lesions. If caries arrests, the lesion may darken by taking up pigments from exogenous sources, frequently rendering it a deep dark brown or black color as shown in figure (7), Explanations for discoloration include the formation of melanin or lipofuscin; the sugar-protein reaction also known as the Maillard reaction or nonenzymatic browning; melanin or food dye uptake into the lesion, or compounds diffusing ahead of the bacterial penetration of demineralized dentine. Dietary chromogens entering the dentine is seen at least as a co-staining factor facilitated by the increased porosity of the hard tissues by the carious process **(Thylstrup and Fejerskov, 1995).**

Figure (7) *brown discoloration from dental caries*

6) Calcific Metamorphosis/Dystrophic Calcification Calcific metamorphosis

Can be caused by trauma resulting in obliteration of the pulp with mineralized tissue. Odontoblasts can become destroyed by the traumatic impact and replaced by cells from adult stem cell populations in the pulp. These cells may initiate rapid deposition of reparative dentin, resulting in yellowish or yellow-brownish discolorations as shown in figure (8). Anterior teeth are mostly affected. The reparative dentin may occupy the entire pulp chamber, and in certain cases also major parts of the root canal system, resulting in a loss of translucency of the crown. Depending on whether or not the remaining uncalcified portions of the pulp remain vital, endodontic therapy may be indicated, yet difficult to execute, depending on the extent of the calcification, Dystrophic calcification involves the formation of foci of calcification frequently found in the aging pulp, usually in perivascular or perineural locations **(Watts and Addy, 2001).**

Use of internally placed color modifiers. A, Maxillary right central incisor exhibits bright intrinsic yellow staining as a result of calcific metamorphosis. B, Color modifiers under direct-composite veneer reduce brightness and intensity of stain and si mulate vertical areas of translucency.

Figure (8) *yellowish discoloration from Calcific Metamorphosis*

The Initial Examination

The first and most important consideration is to determine the cause of the tooth discoloration. A clinical examination is conducted, which includes evaluation of the color of the teeth and the adjacent gingiva additionally, transillumination, radiographs, and pulp testing may be appropriate.

1) Radiographs: should always be taken of a single dark tooth, as teeth can undergo pulpal necrosis without any other symptom than becoming dark , From this examination, the determination is made of whether the tooth is vital or not.

2) Color of tooth: A vital tooth may be darker due to trauma and resultant bleeding into the dental tubules without loss of vitality. Vital teeth may also discolor from internal or external resorption, calcific metamorphosis, as well as decay or leaking

restorations on the proximal or lingual surfaces. A non-vital tooth may have become darker from the same reasons as a vital tooth, but also have experienced pulpal death. A tooth that has received endodontic treatment may also later darken, especially if there is a poor seal of the endodontic access opening. Even if a tooth tests as non-vital, it may not require endodontic therapy. If there is no radiographic evidence of pathology and no clinical symptoms, then there is no reason to initiate endodontic therapy based on vitality testing alone. Often single dark teeth are the result of trauma, which should be determined in the dental history. It can take anywhere from 1 to 20 years after the trauma before any pulpal problems develop.

3) Additional considerations for the single dark tooth are the color of the gingival tissues around the tooth, as well as whether there is any root structure visible due to recession. A smile analysis is used to determine these conditions as well as the movement of the lip during smiling and whether a “gummy smile” exists. The dentin in the root is different from the dentin in the anatomic crown, and does not bleach well if at all, regardless of whether internal or external bleaching is attempted. Also, discolorations of the gingiva may cause a tooth that may be a perfect color match to not be harmonious. Either of these conditions is magnified if the lip exposes much of the root or gingiva because of a hyperactive lip or gummy smile.

4) Vitality testing:

These teeth are normally vital but, due to trauma, the pulp chamber may be calcified or reduced in size. As a result, there will be a slower response from the electric pulp tester. It is important to take time in testing the response of the patient, as the patient will take time to register the reading. The same is true for the

cold or ice test when placed on the tooth. It will eventually respond and the patient will report that they can feel the cold cotton wool on the tooth **(Greenwall,2001).**

5) Transillumination

Describes the use of a bright light that is placed behind the tooth to observe how light travels through the tooth. Normally a tooth should be translucent and light up when transilluminated as shown in figure (9). If intrinsic discoloration is present, light will not transmit. The vital tooth lets light pass through the tooth very readily, whereas the dead tooth appears more opaque when comparing to contralateral vital teeth in the mouth. However, when trying to assess the vitality of a tooth, transillumination will not tell you anything more than what the naked eye has already seen. If you have any intrinsically discolored tooth, light will not pass through the tooth as readily, regardless of whether it is ambient light or focused light **(Hill, 1986).**

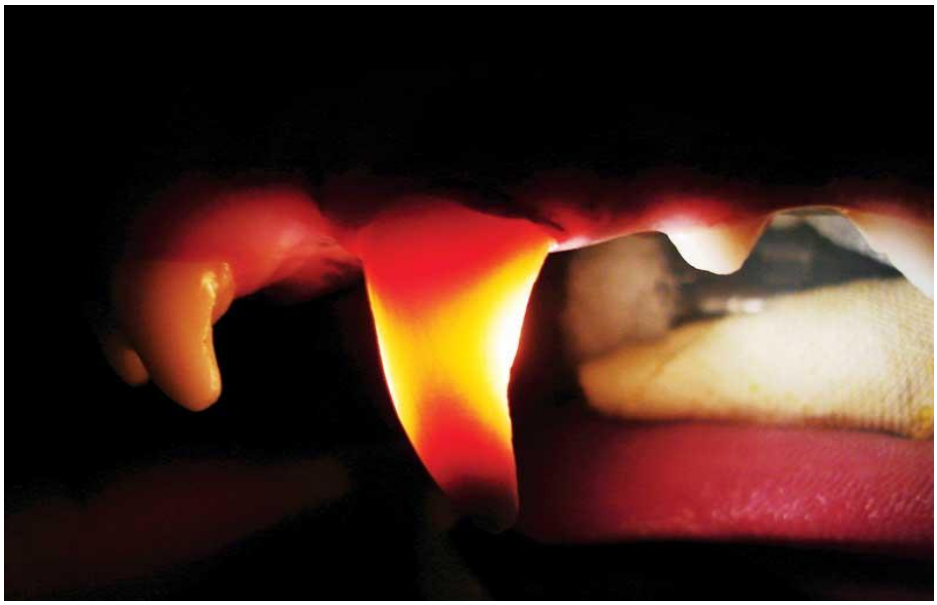

Figure (9) *transillumination*

Treatment options of discolored tooth:

-Tray Bleaching

There are a number of types of bleaching techniques to consider for both vital and non-vital teeth, but these types may be divided mainly into those performed in-office or those continued at home. With the advent of nightguard vital bleaching involving tray application of 10% carbamide peroxide as shown in figure (10), a method for bleaching single dark teeth became more readily available, and did not involve the use of highly caustic chemicals. The original recommendation for a single dark tooth was to make a non-scalloped, no-reservoir tray, and bleach all the teeth. The tooth that was darker generally took longer, so an "X" was made on that tooth mold of the tray so the patient could continue to bleach that tooth longer than the other teeth. The use of the "X" on the teeth to be bleached was also helpful when the patient already had crowns on some teeth, and placing bleaching material on them was a waste of material. While this tray system was simple and effective, it did not always result in a perfect match of the teeth. All the teeth would lighten, but often the darker tooth was not able to lighten as much as the normal teeth, and the resultant outcome was lighter teeth, but still with one tooth slightly darker than the others. Some authors have recommended using a reservoir on the darker tooth, but the use of reservoirs has not been shown to increase bleaching efficacy, It is not possible to "spot bleach" a tooth either, because the bleaching material goes through the enamel and dentin to the pulp in 5 to 15 minutes, and bleaches under restorations and from one surface to the other (facial to lingual). It has also been shown to bleach beyond the borders of the tray, generally to the cemento-enamel junction (CEJ), even if the tooth is only partially erupted. The ideal bleaching tray is fabricated on a horseshoe-shaped cast with no vestibule to provide good adaptation of the bleaching tray material. Also, the cast

should be trimmed such that the central incisors are vertical to avoid folds on the facial. One challenge in fabrication of the single-tooth or regular bleaching tray is trimming the cast without abrading either the teeth or the gingiva. This outcome is accomplished by trimming the cast from the base rather than the sides **(Haywood, 2008).**

Figure (10) *Tray Bleaching*

- Single-Tooth Bleaching Tray

An improvement on this concept is the use of the "single-tooth" bleaching tray when one tooth is darker, but the other teeth are reasonably acceptable,In this tray design, a conventional non-scalloped, no-reservoir tray is fabricated. Then the teeth molds on either side of the dark tooth are removed the patient is given one syringe of bleaching material and applies it only to the single dark tooth mold and sleeps in the appliance. as shown in figure (11) ,Teeth will bleach at different rates and to different color levels. The goal is to determine how light the single dark tooth will bleach first. If the color of the singledark tooth does not get as light as the surrounding teeth, then the other teeth are not bleached and the closest match has been achieved. If the single dark tooth matches the other teeth then, again, the other teeth are not bleached. Only if the single dark tooth gets lighter than the adjacent teeth should they be bleached, and in that case, daytime

bleaching in short intervals should be used to avoid getting the adjacent teeth lighter than the single dark bleached tooth. Generally, the patient should be informed that the bleaching time for the single dark tooth is about 8 weeks, although it is highly variable **(DiAngelis, 2010).**

"One challenge in fabrication of the single-tooth or regular bleaching tray is trimming the cast without abrading either the teeth or the gingiva. This outcome is accomplished by trimming the cast from the base rather than the sides." **(DiAngelis, 2010).**

Figure (11) *Single-Tooth Bleaching Tray*

Internal bleaching:

Internal staining of dentin can discolor the teeth from inside out. Internal bleaching can remedy this on root canal treated teeth. Internal bleaching procedures are performed on devitalized teeth that have undergone endodontic treatment (root canal treatment) but are discolored due to internal staining of the tooth structure by blood and other fluids that leaked in. Unlike external bleaching, which brightens teeth from the outside in, internal bleaching brightens teeth from the inside out. Bleaching the tooth internally involves drilling a hole to the pulp chamber no more than 2mm below the gingival margin, cleaning any infected or discolored dentine, sealing, and filling the root canal with gutta-percha points,

cleaning the inside of the canal using etchant and placing a peroxide gel or sodium perborate tetrahydrate into the pulp chamber so they can work directly inside the tooth on the dentin layer In this variation of whitening the whitening agent is sealed within the tooth over a period of some days and replaced as needed, the so-called "walking bleach" technique. A seal should be placed over the root filling material to minimize microleakage. There is a small risk of external resorption **(Goldstein and Lancaster, 1984)** as shown in figure (12).

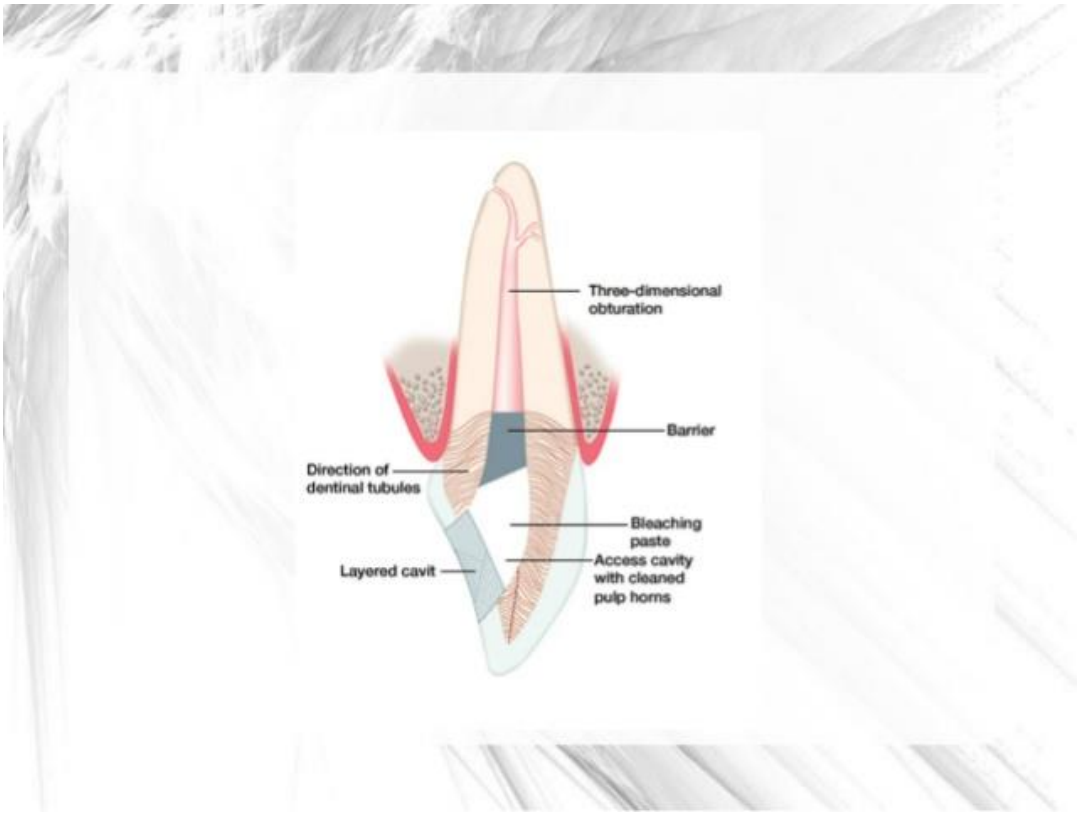

Figure (12) *internal bleaching*

Walking Bleach Technique

The walking bleach technique was described early on as leaving a mix of sodium perborate and distilled water in the pulp chamber for a period of several days, with the access cavity sealed with a temporary restoration. Later on, the use

of 30% hydrogen peroxide instead of water was suggested to provide better bleaching effectiveness. The mix of sodium perborate with water or, alternatively, anesthetic solution remains the most commonly used technique for internal bleaching of nonvital teeth. The enhancement of the mixture with 30% hydrogen peroxide is being used less due to concerns of cervical root resorption but remains an option for stains resistant to whitening that require stronger chemical compounds to achieve good bleaching results **(Boksman et al, 1983)** as shown in figure (13).

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Figure (13) *Walking Bleach Technique*

-Inside-Outside Closed Bleaching

One of the best options for an endodontically treated tooth is to use both the inside and outside techniques in combination. Entering the inside of the tooth will allow removal of any pulp tissue, filler, or cement sealer, as well as discolored restorations in the chamber. The classic walking-bleaching treatment is performed as described above, and then the tooth is temporarily sealed while a single-tooth bleaching tray is fabricated. Bleaching continues at home externally using the single-tooth tray approach until the single dark tooth has reached its maximum lightness, Then the patient waits 2 weeks for the shade to stabilize and the bond strengths to return to normal. Upon return to the dentist, a comparison of the single tooth is made to the adjacent teeth. If the endodontically treated tooth remains slightly darker than the remaining teeth, an opaque stark-white composite is used internally to fill the pulp chamber and provide an additional slight lightening of the tooth ,The final orifice is closed with the appropriate color matched composite to the external portion of the tooth. Some clinicians prefer to use a resin-modified glass ionomer internally to improve the bond to dentin, followed by the traditional composite restoration to close the opening. This approach of both inside and outside bleaching with a closed pulp chamber gives the benefits of both techniques. The inside bleaching segment allows the tooth to be cleaned as well as tempers the final color with a composite restoration, while the outside bleaching segment allows the patient to bleach as long as necessary to obtain the maximum whitening of the tooth without returning to the office. Because a cast already exists for the single-tooth tray, should the single tooth get lighter than adjacent teeth, a new bleaching tray can be fabricated and the patient can use it for day wear to titrate the color to a final match. The average treatment time for single dark teeth seems to be 8 weeks, although there is a wide range of treatment times. While 10% carbamide

peroxide is generally used for traditional overnight treatment, higher concentrations may be used once it is determined that sensitivity is not a problem **(Baratieri et al, 1995).**

Inside-Outside Open Bleaching

In special patients and situations, the dentist may choose to perform inside and outside bleaching while leaving the access opening unrestored. In this situation, the patient injects carbamide peroxide into the pulp chamber and the tray, then seats the tray in the mouth to protect the opening. While this may shorten treatment time due to the continued application of fresh bleaching material, it is essential that the patient be able to perform their part, and also return to the office to have the opening closed. While the tooth will not get any tooth decay during the bleaching process due to the increase in pH afforded by the carbamide peroxide, there is the danger that the patient may cease bleaching but not return in a timely fashion to have the orifice sealed. If the office is not equipped to fabricate the additional single-tooth tray, then the standard replacement of the internal carbamide peroxide is performed weekly, taking 1 to 6 office visits for completion. A provisional restoration maintains the seal, and the patient is instructed to call the office immediately if occlusion or food disrupts the provisional seal **(Haywood et al, 2010).**

Crowning:

Indicated for severe cases where there is a surface mottling ,The question is often asked why the anterior endodontically treated tooth is not crowned today as it once was in the past. One reason for the resurgence of bleaching single

anterior teeth is that the research has shown that while posterior teeth that have received a root canal should be crowned, anterior teeth should only be crowned if they needed a crown regardless of the endodontic therapy as shown in figure (14). The reason is because the single greatest predictor of survival of an endodontically treated tooth is the amount of remaining dentin. If an intact anterior tooth has a root canal, the external enamel and dentin is still intact. Preparing the tooth for a crown after the endodontic treatment removes the remaining dentin and results in a premature loss of the tooth. Research has also shown that the post does not strengthen the tooth, and cannot compensate for the loss of dentin. Hence, the tooth has a better prognosis to be bleached and restored with composite than to receive a post, core, and crown **(Wray and Welbury, 1997).**

Figure (14) *crowning for single discolored anterior tooth*

Direct veneer

Direct composite additions or direct composite veneershave often been heralded as a more conservative alternativeto porcelain, and with the advent of micro hybrid and Nano-hybrid composites In 1997, Lambrechts et al found an 89% success rate in terms of aesthetics of direct composite additions to maxillary anterior teeth after five years and the aestheticsand durability of these materials has

improved dramaticallysince then. However, obtaining optimal results with direct composite Restorations can provide a technical challenge in certaincircumstances, particularly when treating multiple teeth. Athird alternative has been developed with the introduction of direct composite veneers. Although direct veneers are note a new concept, their failure has beenin the thickness and the durability of the polish of therestorations compared to other techniques **(Belser and Magne, 1997)** as shown in figure (1).

Figure (15) *direct veneer*

Indirect veneer

Indirect porcelain veneers are often the ideal restoration for intrinsically stained teeth.. Porcelain laminate veneers are often indicated when teeth bleaching or direct composite bonding procedures cannot provide the desired esthetic result. Veneers are more appealing to many patients than full coverage crowns because of the more conservative tooth preparation required. If technique details are followed meticulously and cases are appropriately selected, porcelain veneers are not only durable but also promote marvelous gingival health and may be the most esthetic anterior dental restoration **(Steven et al, 1997)** as shown in figure (16).

Figure (16) *Indirect veneer*

Conclusion:

The single dark tooth is an esthetic challenge regardless of the treatment approach. Bleaching the single tooth alone is the safest, most conservative approach to determining the response of the single tooth before changing theadjacent tooth colors. A “single-tooth” bleaching tray is the tray of choice for external bleaching. Single dark teeth with calcific metamorphosis should not be treated endodontically unless there are clinical symptoms of pain or radiographic evidence of an abscess. For internal bleaching of an endodontically treated tooth, a “walking bleach” approach using 10% carbamide peroxide internally seems to afford the safest approach over previous traditional methods. The combination of one internal bleaching appointment to debride the pulp chamber, followed by tray bleaching with a single-tooth tray or full non-scalloped, no reservoir tray provides the flexibility of unlimited time of treatment without incurring significant in-office charges. Additionally, waiting 2 weeks after bleaching for the shade to stabilize and the bond strengths to return to normal and then using internal composite bonding can harmonize final shade discrepancies.

Regardless of the technique used for bleaching, a relapse is possible in 1 to 3 years, and is generally best addressed by outside bleaching in a single-tooth tray with 10% carbamide peroxide to re-bleach the tooth until it matches the surrounding teeth .

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