

**Various Modalities in Tooth Whitening Procedure**

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**Abstract**

Dental bleaching also known as tooth whitening, is a common procedure in general dentistry but mostly especially in the field of cosmetic dentistry. As a person ages the adult teeth often become darker due to changes in the mineral structure of the tooth, as the enamel becomes less porous. Teeth can also become stained by bacterial pigments, food-goods and tobacco. Certain antibiotic medicaments (like tetracycline) can also cause teeth stains or a reduction in the brilliance of the enamel. Tooth bleaching is not a modern practice. Bleaching of discolored, pulpless teeth was first described in 1864 and variety of medicament such as chloride, sodium hypochlorite, sodium perborate and hydrogen peroxide has been used, alone or in combination with or without heat activation.

The walking bleach technique was introduced in 1961, involving placement of a mixture of sodium perborate and water into pulp chamber. This technique was

modified and water was replaced by 30-50% H<sub>2</sub>O<sub>2</sub>. Now the popular technique night guard vital bleaching technique describes use of 10% carbamide peroxide in mouth guard to be worn overnight for lighting of tooth color. Today in-office power bleaching and laser bleach both are practiced with good results.

This article presents clinical cases in which different bleaching modalities have been used to successfully treat unsightly teeth. Depending upon the type, severity of discoloration & patient’s desire in-office vital and non-vital bleaching procedures were carried out. Discoloration of a single tooth has been managed using non-vital bleaching alone or in combination of other minimally invasive modalities for an acceptable esthetic outcome. The case selection was done by considering the patients need and expectations, the type and cause of discoloration and patient economics. Moreover, prime importance was given to conservation of the existing tooth structure and acquiring a complete change in the

shade of teeth, which was comparable to that of the adjacent teeth. The article explores various forms of bleaching and their successful usage in day-to-day clinical practice.

**Keywords:** superoxol(30% $H_2O_2$ ), 35% hydrogen peroxide, non-vital bleaching, in-office power bleaching.

### **Introduction**

The desire to have white teeth and a more pleasant smile has become an important esthetic need of the patient today. A single discolored tooth in patient may stand out and majorly influence the esthetics of smile and confidence of patient. Intracoronal bleaching of non-vital teeth involves use of chemical agents within the coronal portion of an endodontically treated tooth to remove discoloration. This article shows use of superoxol (30%  $H_2O_2$ ), home bleaching & in-office power bleaching with light activating unit with proper case reports. There is increase in patient awareness of the ability to improve the appearance of their discolored teeth. To manage discoloration crowns & veneers are also treatment options but they entail moderate loss of dental hard tissue. Bleaching is a conservative, non-invasive and safe technique. The various methods to whiten teeth include bleaching strips, bleaching pens, bleaching gels, laser bleach, bleaching with light activating unit (LED). Traditionally, at-home whiteners use overnight trays containing carbamide peroxide gel which reacts with water to form hydrogen peroxide. Power bleaching in-office here used is with machine SAAB KY-M209 to accelerate the process of whitening. The effect of bleaching last for several months but vary depending upon lifestyle of patients. The successful outcome of any modalities mainly depends on the etiology, diagnosis & proper selection of bleaching materials and the correct clinical technique.

### **Case reports**

#### **Case-1**

A 40 years old female reported to the department of conservative dentistry, endodontics and esthetic dentistry in GDCH, Nagpur with a discolored maxillary right central incisor (figure 1 (a, b)). The patient felt conscious due to the unsightly appearance of the tooth and demanded an improvement in her esthetic appearance. Patient had a history of trauma to the maxillary right central incisor 20 years ago. The treatment protocol followed in this case was root canal treatment followed by in-office power bleaching. Thorough oral prophylaxis was done, and clinical photographs were taken. Root canal treatment performed for the maxillary right central incisor. In the next appointment, excess gutta percha was removed from the access cavity and it was cleaned. The height of clinical crown was measured with periodontal probe and it was made sure that gutta percha is removed approx. 2 mm below this level and light cure glass ionomer barrier of 2 mm was placed over the gutta percha & light cured. Patient was instructed to wear eyewear. A gingival barrier was placed around contour of the teeth (figure 2). The barrier was light cured. Then POLA OFFICE (SDI DENTAL LIMITED made in Australia) was used. A ocean blue color appeared and then applied evenly on to labial surface of tooth using an applicator brush (figure 3a). Four cycles of power bleaching were carried out using the SAAB KY-M209 machine for 3 appointments. The light was 6-7mm away from teeth and perpendicular to the tooth surfaces (figure 3b). Strict adherence to the manufacturer's instructions was observed, particularly in relation to appropriate timing for the material to remain on teeth. The first cycle was incident for a period of 9 min. with 46% intensity and then bleach was removed from teeth with high volume aspirator and damp gauze.

The teeth were then washed and rinsed and bleach was reapplied for further 8 min. and power bleached with 46% intensity. Bleaching agent was again removed and teeth were washed & rinsed. Third and fourth cycles were carried out for 8 min. respectively with same intensity power. The process takes time of 45min.-1hour. The mucosal protectant was removed & mouth was rinsed. Tremendous change was in first appointment

(figure 4). The patient was appointed accordingly for next two appointments. In the final appointment the teeth were polished using diamond polishing paste to achieve enamel luster (figure 5). The shade of tooth was again assessed and compared preoperatively. The great advantage of power bleaching is less chair-side time and is comfortable both to the patient as well as dentist.

## Preoperative



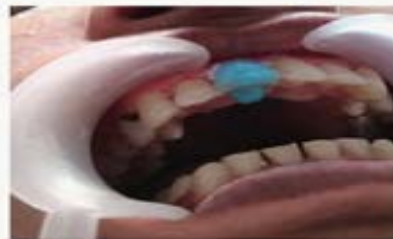
figure 1 {a}



figure 1 {b}



Gingival Barrier  
figure 2



Mixture on tooth surface  
figure 3{a}



LED Module placement  
figure 3{b}



Post-op of first appointment



Post-op of final appointment

### Case 2

A 30-year-old male reported to the department with a chief complaint of unsightly teeth due to generalized fluorosis (figure 6). A thorough oral prophylaxis was done. This was followed by in-office bleaching for first for maxillary arch to lighten the discoloration. The patient was instructed to wear eyewear. At first, a gingival barrier was placed around the anterior teeth

along the gingival contour (figure7) and it was then light cured. POLA OFFICE vital bleaching (SDI DENTAL LIMITED made in Australia) was used, freshly mixed homogenously and evenly applied onto the buccal surfaces of teeth (figure 8). LED module was placed perpendicular to the tooth surfaces, at a period for 8 min. for 3-4 times. The light activation is seen in figure 9. This was done for approx. 30 min. and alternate light

curing was performed to enhance the bleaching process. All the instructions of the manufacturer were followed. The bleaching agent was then wiped off using a gauze, and patient was asked to rinse. A total of three sessions

were required to remove the stains (figure 10) and in the last appointment a fluoride gel was then applied evenly onto bleached teeth.



### Case 3

A 24-year-old male reported to the department of conservative dentistry, endodontics and esthetic dentistry with a discolored maxillary left central incisor and felt conscious due to the unsightly appearance of the tooth (figure 11) and demanded an improvement in his esthetic appearance. The patient presented a history of trauma to the upper anterior region 3 years ago. The treatment protocol followed in this case was root canal treatment followed by using superoxol (30% hydrogen peroxide). Thorough oral prophylaxis was performed and clinical photographs taken. Root canal treatment was performed for maxillary left central incisor. In the next appointment, excess gutta percha was removed from the access cavity, and it was cleaned. The height of clinical crown was measured using periodontal probe, and it was made sure that gutta percha is removed approximately

2mm below this level. The pulp chamber was dried with cotton and blast of air. The surface of pulp chamber was freshened with bur removing all visible stains without impairing strength of tooth. Completely fill the pulp chamber with loosely packed cotton moistened with superoxol, but do not allow the bleach to drip from the cotton on tooth. Turn the lamp and apply the heated round condenser on the cotton moistened with superoxol. Now take few fibre of cotton moistened with superoxol and place it on labial surface of the tooth and again apply heated instrument on it. After five minutes remove the cotton from pulp chamber and remoisten it with superoxol, replace in the pulp chamber & apply heat to it. Repeat this procedure for 6 periods of 5 mi. Each or from a total of 20-30 min. When three such cycles of the bleach is done, a cotton pellet moistened with superoxol was sealed in the chamber and then

covered with cavit. After 4 non-vital bleaching sessions the discoloration of the tooth was not evident (figure12) and tooth was esthetically appealing.



Figure 11: Postoperative



Figure 12: Preoperative

#### Case 4

A young man aged 28 years reported to the department of conservative dentistry and endodontics with the complain of discoloration of his entire dentition since childhood. His history showed that his siblings too have the same problem on examination i.e. typical tetracycline stains (figure 13) were seen hence home bleaching technique/nightguard vital bleaching technique was planned. Custom bleaching trays were prepared and 16% carbamide peroxide gel was used in this case. The patient was shown and instructed about how to place the gel in the custom-made bleaching tray. He was asked to wear the tray overnight because overnight use causes

decrease in loss of material due to decrease salivary flow at night and decreased occlusal pressure. The patient was called after a week. The patients main concern was whitening of only upper and lower teeth so he applied carbamide peroxide gel only in canine-to-canine region of both upper and lower anteriors. After using trays for 4 weeks drastic changes were seen in his esthetics (figure 14) and he was happy with the results.



Figure 13: Preoperative



Figure 14: Postoperative

#### Discussion

The various case reports shown in this article are home bleaching, with superoxol i.e. 30% H<sub>2</sub>O<sub>2</sub> bleaching and in-office power bleaching. Intracoronary bleaching of non-vital teeth involves use of chemical agents within the coronal portion of an endodontically treated tooth to remove discoloration. It may be carried out at various

times, even many years after root canal treatment and discoloration tooth colored bleaching today is based upon hydrogen peroxide as an active agent. Hydrogen peroxide acts a strong oxidizing agent through formation of free radicals, reactive oxygen molecules & hydrogen peroxide anions. Carbamide peroxide also yields urea which is decomposed to CO<sub>2</sub> and ammonia. It is the high Ph of ammonia that facilitates bleaching process. Walking bleach is preferred as it requires less chair time and is safer and more comfortable for the patient.

The indications of non-vital bleaching include

1. Discoloration of pulp chamber origin
2. Dentin discoloration
3. Discoloration not amendable to extra coronal bleaching

The contraindications of non-vital bleaching include

1. Severe dentin loss
2. Caries present
3. Superficial enamel formation
4. Discolored composites

In office power bleaching it is seen that it imparts tremendous patient satisfaction. In bleaching is useful for removal of stains throughout the arch or even treating specific areas of a single tooth. In-office power bleaching shows good results after a single visit.

**The indications of in-office bleaching include**

1. Developmental or acquired stains
2. Stains in enamel and dentin
3. For removing yellow brown stains
4. Yellowing of teeth due to aging
5. For blending white color changes
6. Mild to moderate tetracycline changes

The contradictions of in-office bleaching include

1. Pitting hypoplasia
2. Teeth with deep cracks & fracture lines
3. Periapical pathology

4. Patients who smoke
5. Teeth with large anterior restorations
6. Teeth with attrition, abrasion and erosion.

Strong supportive statements surround the success of light sources. LUK et al 2004 reported that color change was significantly affected by inter action of bleaching and light variables, and application of light significantly improved the whitening efficacy of same bleaching materials. TORRES et al 2011 reported that bleaching is effective with a hybrid light-emitting diode and a low intensity infrared diode laser than a control group. This research evaluated the effectiveness of the color change of hybrid LED and low intensity infrared diode laser devices for activating dental bleaching, bleaching without light, and bleaching with halogen light. DOMINGUEZ et al 2011 reported that only the diode laser, halogen lamp and LED lamp showed significant color changes when using six different photo activation systems on three different 35% hydrogen peroxide whiteners. It was concluded that the light source is more important than the bleaching agent in the whitening process. LEONARD et al 1998 who compared the in vitro tooth bleaching efficacy of 5%,10% and 16% carbamide peroxide gels and found that whitening was faster for the 16% and 10% than 5%. This current article presents a case of in-office power bleaching that shows tremendous successful result.

There are many popular natural ways with which one can whiten one's teeth. One efficient type is through the use of malic acid. Simple way of natural tooth bleaching is applying pulp of crushed strawberries (containing malic acid) to the teeth and leave it for 5 min. Remaining of strawberry pulp can be removed by flossing the teeth. A whitening toothpaste can also be made by mixing one tablespoon of baking soda with two tablespoon of hydrogen peroxide.

### **Risks [side effects of bleaching]**

-Chemical burns from gel bleaching (if high concentration oxidizing agent contacts unprotected tissues, which may bleach or discolor mucous membranes), sensitive teeth.

-Over bleaching known in the profession as 'bleached effect' particularly with intensive treatments (products that show large change in color over a short period, e.g., 1hour.

-Risk of increased hot/cold sensitivity.

-Gingival and soft tissue irritation.

### **Summary and conclusion**

Although there is a wide range of esthetic restorative materials available to us today for the management of discolored anterior teeth, bleaching still remains a viable option in certain cases. A number of factors play an important role in deciding the treatment plan. The patient related factors for successful outcome are the patient's needs, age, expectations and affordability. The clinical related factors include the availability of bleaching materials and a thorough knowledge of the material science, including methodologies and techniques involved.

Non-vital bleaching can be an esthetically pleasing and minimally invasive option for young patients rather a complete coronal coverage. The cases presented of non-vital bleaching showed excellent results. Conservatively bleaching is good option where tooth structure is conserved and especially young patients who don't want any loss of tooth structure required for crowns. In-office power bleaching case presented also showed good results and moreover patient satisfaction. The process is under the control of the dentist and both clinical and vitro studies have showed that the process is safe to practice.

Moreover, depending upon the clinical condition, a synergistic approach of combining bleaching with other modalities such as micro-abrasion and composite veneers can help in gaining an excellent clinical outcome. Taking into account the increasing esthetic demand of the patients, this approach proves to be conservative and simple for the successful management of unsightly teeth.

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