

# Aesthetic Rehabilitation of Discoloured Nonvital Anterior tooth with Carbamide Peroxide Bleaching: Case Series

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## ABSTRACT

Discolouration of teeth, especially the anteriores, can result in considerably cosmetic impairment in person. Combine effects of intrinsic and extrinsic colour determines the appearance of teeth. Whitening of teeth with bleaching is a more conservative therapeutic method than full crowns, veneers or composite restorations which is more invasive and expensive. Among bleaching techniques, in office bleaching with carbamide peroxide provide superior aesthetic result in short period of time with no adverse effects. This paper presents case series of tooth discolouration in non-vital tooth which was successfully bleached using 35 % carbamide peroxide. After 1 year follow up the prognosis was good with no reversal of tooth discolouration. This case report allows the better understanding of the concept of nonvital tooth bleaching with carbamide peroxide which gives a non-invasive alternative for aesthetic purpose in preserving the natural tooth structure.

**Keywords:** Bleaching, Carbamide peroxide, Discolouration, Non-vital tooth

## CASE 1

A 35 year old female patient was reported to the department of conservative dentistry and endodontics with complaint of discoloured upper anterior teeth. Patient had history of trauma with anterior teeth 5 years back. Intraoral examination revealed brown discoloured maxillary right central incisor [Table/Fig-1]. An intraoral radiograph showed large periapical lesion with 11 [Table/Fig-2]. Periapical cyst was diagnosed with 11. Non-surgical management with endodontic treatment and in office bleaching was planned. Access opening and complete biomechanical preparation was completed. Calcium hydroxide (RC Cal; Prime Dental Products, Thane, India.) intracanal medicament was placed and recalled the patient after three weeks. Obturation with lateral condensation was done and recalled after seven days for bleaching procedure. Gutta-percha filling was removed from the access cavity to 2 mm bellow cemento-enamel junction with gates glidden drill (Dentsply Maillefer, Ballaigues, Switzerland). A plug of resin modified glass ionomer (GC Fuji PLUS, GC Corporation, Tokiyo, Japan.) was placed over the gutta-percha in cervical region to prevent percolation of bleaching agent in apical area. Opalescence gel (Ultradent, St. Louis, MO, USA), containing 35% carbamide peroxide was used for bleaching.



[Table/Fig-1]: Discoloured maxillary right central incisor



[Table/Fig-2]: Periapical radiolucency with maxillary right central incisor

OpalDam was applied and cure for 20 second over gingiva as well as 2 mm over the adjacent the tooth for protection of gingiva. Opalescence gel was applied inside the pulp chamber as well as over labial surface and kept for 30 minutes [Table/Fig-3]. Material was removed from the tooth and thoroughly rinsed with water. The access cavity was sealed with IRM cement (Dentsply De Trey



**[Table/Fig-3]:** Opal Dam and Opalescence gel was placed over gingiva and tooth surface

GmbH, Konstanz, Germany.) and patient was recalled after 72 hours for evaluation. Same procedure was performed in second visit as slight discoloration was present with 11. Two sittings of bleaching procedure showed complete removal of stains from the tooth and present colour was comparable to adjacent tooth [Table/Fig-4]. Coronal access cavity was sealed with composite resin (3M Dental Products, St Paul, MN, USA.). One year evaluation of patient showed complete healing of periapical lesion and no significant shade regression was observed [Table/Fig-5a and 5b].



**[Table/Fig-4]:** Maxillary right central incisor after bleaching



**[Table/Fig-5a]:** No significant colour change was seen after one year

## CASE 2

A 29-year-old female patient was reported to the department of conservative dentistry and endodontics with complaint of discoloured upper anterior teeth. Patient had history of trauma with anterior teeth 3 years back and she had taken root canal treatment for the same. Intraoral examination revealed brown discoloured maxillary left central incisor [Table/Fig-6]. An intraoral radiograph showed obturation and normal periapical tissue with 21. In office bleaching with 35 % carbamide peroxide (Opalescence gel, Ultradent, St. Louis, MO, USA) was decided for this patient and similar bleaching procedure was performed as described in above case. Tooth showed significant changes in shade after 72 hours [Table/Fig-7].



**[Table/Fig-5b]:** Healing of periapical lesion



**[Table/Fig-6]:** Discoloured maxillary left central incisor



**[Table/Fig-7]:** Significant colour change after bleaching

## CASE 3

Similar case of a 19-year-old male patient reported with complaint of discoloured tooth and history of trauma with maxillary right central

incisor one year back. Patient had taken root canal treatment with the same tooth [Table/Fig-8a]. Single visit of 35 % carbamide peroxide (Opalescence gel, Ultradent, St. Louis, MO, USA) in office bleaching showed significant changes in shade of 11 [Table/Fig-8b]. There was no significant shade reversal observed in both the cases i.e. 2<sup>nd</sup> & 3<sup>rd</sup>, after three months of follow up period.



[Table/Fig-8a]: Discoloured maxillary right central incisor



[Table/Fig-8b]: Significant colour change after bleaching

## DISCUSSION

Bleaching of discoloured nonvital teeth was first described during the middle of the 19<sup>th</sup> century advocating different chemical agents [1]. An early description of the use of hydrogen peroxide for bleaching was reported by Harlan [2]. Action of hydrogen peroxide is mainly due to reactive oxygen through the formation of free radicals [3]. Thermocatalytic technique was used to bleach nonvital teeth as the application of heat increases the bleaching properties of hydrogen peroxide by accelerating the bleaching reaction [1]. Today the thermocatalytic technique and high concentration of hydrogen peroxide is used less due to increase risk of external cervical resorption [4]. Exact mechanism of resorption in bleached tooth has not yet been adequately explained. There is speculation that hydrogen peroxide diffuses through dentinal tubules, cementum, periodontal ligament and reach to periradicular bone and directly induces an inflammatory resorption process [5]. There are different predisposing factor for diffusion of hydrogen peroxide to cervical tissue. Patients those had bleaching therapy at young age [6], application of heat (thermocatalytic method) [7] and natural anatomic defects at CEJ also responsible for diffusion of hydrogen peroxide into periradicular tissue [8]. Also the sealing of root filling with 2mm layer of glass ionomer cement at CEJ is essential to prevent radicular penetration of bleaching agents [9].

An alternative to thermocatalytic bleaching is the walking bleach technique with sodium perborate-hydrogen peroxide solution which did not show any cervical resorption even after 1 year [4]. More recently carbamide peroxide is the choice of material for intracoronary bleaching due to low levels of extraradicular diffusion and its effectiveness [10].

In present cases, 35 % carbamide peroxide was used as a bleaching material and placed on labial surface as well as in the pulp chamber because it is recommended that pulp chamber should accessible during bleaching procedure for proper penetration of

material into discoloured tooth [1]. High concentration of bleaching agent promote faster tooth bleaching than lower concentrations of carbamide peroxide which takes longer time to bleach teeth but eventually achieve the same results as higher concentrations [11, 12]. Carrasco et al., [13] reported that 37% carbamide peroxide as an intracoronary bleaching increased dentinal permeability, which was not observed for 27% carbamide peroxide.

35 % Carbamide peroxide when come in contact with water breaks into 23- 25% of urea and 10-12% of hydrogen peroxide [14]. Urea is capable of penetrating enamel and affecting the interprismatic region [15]. It is also capable of attacking the protein structure and denatures it. Structural alterations may occur in enamel proteins such as enamelin and amelogenin, thus urea increases the permeability of enamel to peroxides and free radicals [16]. Initial faster rate of bleaching was observed with higher concentration of carbamide peroxide [17]. The efficacy of hydrogen peroxide containing products are approximately the same when compared with carbamide peroxide containing products with equivalent or similar hydrogen peroxide content either tested *in-vitro* [18] or *in-vivo* [19]. Lim MY et al., in their study found that 35 % carbamide peroxide and 35 % hydrogen peroxide were equally effective for intracoronary bleaching [20].

The effect of carbamide peroxide on enamel surface after bleaching was studied by investigators and found there is no alteration of the surface texture of enamel or slight increase in enamel porosity immediately following treatment which is reversed after 6 months as observed in follow up examination [21,22]. Lewinstein et al., observed a slight reduction in enamel surface microhardness following 35% carbamide peroxide treatment on human enamel which was completely reversed when treated with 0.05% fluoride solution [23]. Carbamide peroxide was effective against mild to moderate fluorotic stains but more time is required to assimilate with the normal enamel in surrounding, due to different responses of sound and fluorotic enamel to the bleaching regimes [24]. Single bleaching therapy seems to be satisfying nonabrasive approach in cases of mild or moderate fluorosis [24].

Thus, non-vital tooth office bleaching with carbamide peroxide is a relatively fast method in whitening the discoloured tooth and equally effective to hydrogen peroxide with less complications of external cervical resorption.

## CONCLUSION

From the present cases it was concluded that, 35% carbamide peroxide was effective as in office bleaching of discoloured nonvital teeth with significant improvement in colour of teeth in relatively short working time. Also the bleaching procedure is more economical and less invasive than other invasive tooth whitening procedures. This technique provides minimum risk of complications and more promising results.

## REFERENCES

- [1] Howell RA. Bleaching discoloured root-filled teeth. *Br Dent J.* 1980; 148: 159-62.
- [2] Harlan AW. The removal of stains from teeth caused by administration of medical agents and the bleaching of pulpless tooth. *Am J Dent Sci.* 1884/1885; 18: 521.
- [3] Gregus Z, Klaassen CD (1995). Mechanisms of toxicity. In: Cassarett and Doull's Toxicology, the basic science of poisons. Klaassen CD, editor. New York: McGraw-Hill Companies Inc., pp 35-74.
- [4] Madison S, Walton R. Cervical root resorption following bleaching of endodontically treated teeth. *J Endod.* 1990; 16: 570-74.
- [5] Heithersay GS. Invasive cervical resorption: analysis of potential predisposing factors. *Quintessence Int.* 1999; 30: 83-95.
- [6] Heithersay GS, Dahlstrom SW, Marin PD. Incidence of invasive cervical resorption in bleached root-filled teeth. *Aust Dent J.* 1994; 39: 82-87.
- [7] Rotstein I, Torek Y, Lewinstein I. Effect of bleaching time and temperature on the radicular penetration of hydrogen peroxide. *Endod Dent Traumatol.* 1991; 7: 196-98.
- [8] Ten Cate AR. Oral histology: development, structure, and function. 2<sup>nd</sup> ed. St Louis, MO: Mosby, 1985.
- [9] Rotstein I, Zyskind D, Lewinstein I, Bamberger N. Effect of different protective base materials on hydrogen peroxide leakage during intracoronary bleaching in vitro. *J Endod.* 1992; 18: 114 -47.

- [10] Lim MY, Lum SO, Poh RS, Lee GP, Lim KC. An in vitro comparison of the bleaching efficacy of 35% carbamide peroxide with established intracoronal bleaching agents. *Int Endod J.* 2004; 37: 483–88.
- [11] Leonard RH, Sharma A, Haywood VB. Use of different concentrations of carbamide peroxide for bleaching teeth: an in vitro study. *Quintessence Int.* 1998; 29: 503-37.
- [12] Braun A, Jepsen S, Krause F. Spectrophotometric and visual evaluation of vital tooth bleaching employing different carbamide peroxide concentrations. *Dent Mater.* 2007; 23: 165-69.
- [13] Carrasco LD, Fröner IC, Corona SA, Pécora JD. Effect of internal bleaching agents on dentinal permeability of non-vital teeth: quantitative assessment. *Dent Traumatol.* 2003; 19: 85-89.
- [14] Haywood VB, Heymann HO. Nightguard vital bleaching. *Quintessence Int.* 1989; 20: 173-6.
- [15] Aereuds J, Jogenbloed WI, et al – Interaction of urea and human enamel. *Caries Research.* 1984; 18: 17-24.
- [16] Goldberg M, Areuds J, Jogenbloed WL, et al – Action of urea solution on human enamel surfaces. *Caries Research.* 1983; 17: 106-12.
- [17] Matis BA, Wang Y, Jiang T, Eckert GJ. Extended at-home bleaching of tetracycline-stained teeth with different concentrations of carbamide peroxide. *Quintessence Int.* 2002; 33: 645–55.
- [18] Joiner A, Thakker G. In vitro evaluation of a novel 6% hydrogen peroxide tooth whitening product. *Journal of Dentistry* 2004; 32 (Suppl. 1): 19–25.
- [19] Kihn PW, Barnes DM, Romberg E, Peterson K. A clinical evaluation of 10 percent vs 15 percent carbamide peroxide tooth-whitening agents. *J Am Dent Assoc.* 2000; 131: 1478–84.
- [20] Lim MY, Lum SO, Poh RS, Lee GP, Lim KC. An in vitro comparison of the bleaching efficacy of 35% carbamide peroxide with established intracoronal bleaching agents. *Int Endod J.* 2004 Jul; 37: 483-88.
- [21] Leonard RH, Eagle JC, Garland GE, Matthews KP, Rudd AL, Phillips C. Nightguard vital bleaching and its effect on enamel surface morphology. *J Esthet Restor Dent.* 2001; 13: 132–39.
- [22] Turkun M, Sevgican F, Pehlivan Y, Aktener BO. Effects of 10% carbamide peroxide on the enamel surfacemorphology: a scanning electron microscopy study. *J Esthet Restor Dent.* 2002; 14: 238–44.
- [23] Lewinstein I, Fuhrer N, Churaru N, Cardash H. Effect of different peroxide bleaching regimens and subsequent fluoridation on the hardness of human enamel and dentin. *J Prosthet Dent.* 2004; 92: 337–42.
- [24] Knösel M, Attin R, Becker K. A randomized CIE L \*a\*b\* evaluation of external bleaching therapy effects on fluorotic enamel stains. *Quintessence Int.* 2008; 39: 391-399.

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