

The Esthetic Restoration of Discolored Primary Incisors

Fred S. Margolis, D.D.S., F.I.C.D., F.A.C.D.

Many children have one or more discolored teeth. These can be discolored due to many etiologies including: enamel hypocalcification, enamel hypoplasia, amelogenesis and dentinogenesis imperfecta, or traumatic injuries. These teeth can be of various colors: yellowish, reddish, brown, brown, grey, or even black. Most parents want their child's teeth to be white in appearance, to match the adjacent teeth. Having nice looking teeth is very important to these children so that they will have a positive self image and not be introverted due to their discolored teeth and unsightly smile.

Fortunately, there are cosmetic techniques available to dentists that allow us to lighten these discolored teeth. Some of the techniques reported in the literature include: composite veneers, porcelain veneers, and bleaching. Whether these teeth have pulpal involvement or not, we have the materials and techniques to esthetically restore these discolored teeth. Thirty years ago, when the author attended dental school, he was told that bonding could not be accomplished with primary teeth because of the aprismatic layer of enamel. (1) Today, we have the techniques available to remove this thin layer of non-prismatic enamel by chemical and/or physical means to allow bonding to occur.

A discolored primary incisor does not necessarily indicate that the tooth has pulpal injury. Holan and Fuks state: "The diagnostic value of dark-gray discoloration of the crown of primary incisors following traumatic injury as a predictor of pulp vitality is controversial." (2) This discoloration does however indicate, in the case of a dark primary incisor, that during the course of the injury, the iron containing pigment of the

red blood cells, heme, was released. Will this discolored tooth return to its normal color? Will this discolored tooth remain dark or even turn darker?

A primary tooth which is yellow in appearance may indicate the calcific degeneration or calcific metamorphosis of the pulp of the tooth. This can be confirmed with a radiograph which would show the calcification of the pulp chamber. Due to the color of the dentin underlying the thin enamel of primary teeth, the tooth appears yellow.

A primary tooth appearing reddish could be the result of a ruptured capillary in the pulp or a tooth with internal resorption. A radiograph would aid in the diagnosis of the latter.

Enamel hypocalcification and hypoplasia which causes irregularity in the surface of the enamel can also cause discoloration of this surface. (3) According to Soares, et al: “Alterations during tooth structure formation, mainly on anterior teeth, are known to severely compromise esthetics.” (4) In a study reported by Slayton, et al, 698 children were examined at 4-5 years of age. Six percent of these healthy children had one or more teeth with enamel hypoplasia. (5) In another study, Aine and co-workers found that the prevalence of enamel defects was “clearly higher” in both primary and permanent teeth where the children had been born prematurely. (6)

The purpose of this article is to give the reader a method by which discolored primary teeth can be restored to their previous tooth color.

Case history #1: Madeline, a three year old girl, came to my office for her first dental visit. Upon oral examination the author noticed the gray color of the maxillary left central incisor. (Fig. 1A) The mother reported that the child had fallen three weeks prior

to this dental visit. The tooth has remained asymptomatic. The gingiva was normal in appearance and the tooth was not mobile. A radiograph was taken which showed no apparent abnormality. (Fig. 1B) The mother reported that the tooth discolored to its present gray color and shade within two weeks of the injury. The author informed the mother that if the tooth remained grey it could be lightened. The technique suggested was to provide a composite veneer on the labial surface of the maxillary left primary incisor. The mother made a subsequent appointment to have the cosmetic bonding procedure completed.

Informed consent was obtained. No anesthetic was required. The aprismatic layer of enamel was removed with an Erbium:YAG DELight laser (TM, a). (Fig.1C, 1D) If the laser had not been used a fine tapered diamond would have been used to remove the non-prismatic layer of enamel. The enamel was etched with a 35% phosphoric acid gel for 15 seconds. (Fig. 1E) The etching gel was thoroughly rinsed off the surface and the surface dried with the air syringe. Due to the dark grey color of this tooth, a thin layer of opaquer was placed on the labial surface. (Fig. 1F) (Cosmedent's Creative Color, b) The opaquer was cured with a bonding light. A bonding agent was next placed and light cured. (Fig.6) A thin layer of composite was placed over the labial surface and sculpted with a composite placement instrument. (Figs. 1G, 1H) (Prismafil TPH, Dentsply, c) The composite was cured with a bonding light. Finishing and polishing were then completed with carbide finishing burs and polishing discs. (Fig. 1I) (see technique described in Case history #2) The completed restoration can be seen in Figure 1J.

Case History #2: Matthew, age 3, has enamel hypoplasia on the maxillary right primary central incisor. (Fig. 2A) This was the only tooth in his mouth with any enamel defect.

Matthew's mother reported no trauma that she could recall. Tooth eruption occurred within normal limits. Her pregnancy was unremarkable.

Informed consent was given for the cosmetic restoration of Matthew's tooth. No anesthetic was required to restore Matthew's tooth. The DELight Erbium:YAG laser was used to remove caries and remove the aprismatic layer of enamel. (Figs. 2B,2C) An alternative technique is to use a fine diamond bur and swipe it gently across the enamel surface to remove the aprismatic layer of enamel. A 35% phosphoric acid gel is placed for 15 seconds and then thoroughly rinsed and dried. (Fig. 2D) A white opaquer (Cosmedent's Creative Color, b) was placed with a paint brush to obtain a thin, even surface on the area of hypoplastic enamel. (Fig. 2E) A bonding agent was then placed over the entire enamel surface and light cured. (Bisco's One Step, c) (Fig. 2F) A layer of composite was then placed over the entire labial surface (Prismafil's TPH, Dentsply c) and set with the curing light. The composite was then finished and polished. (Figs.2 G, 2H) (Brasseler Pedo Finishing and Polishing Kit According to Dr. Fred Margolis)(d) and a final contouring and polishing with sandpaper discs. (Fig. 2I) (Brasseler EP, d) The completed restoration can be viewed in figure 2J.

Abstract

Restoring primary teeth can be a strenuous task for many dentists who would like to have an esthetic, easy-to-use, and relatively quick restoration for children. The restoration of carious, fractured, or discolored primary incisors gives the dentist the satisfaction in knowing that he/she has restored the smile and self-confidence of a growing child. This article describes a technique that is relatively easy and produces a beautiful outcome in a relatively short time. The author has used the technique in hundreds of children for over twenty-five years. Modifications in the technique have been made as newer materials and techniques have evolved.

Objectives

After reading this article, the reader should be able to:

- Explain the reasons why primary incisors discolor.
- Explain the differences in the enamel of primary and permanent teeth.
- Explain how to esthetically restore discolored incisors.
- Explain how to finish and polish the completed composite restoration.

Review Quiz:

1. Discolored primary teeth can be caused by all but which of the following?
 - a) Traumatic Injuries
 - b) Amelogenesis Imperfecta
 - c) Dentinogenesis Imperfecta
 - d) Eating too many carrots.

(Correct answer: d)

2. When a dark primary incisor is first observed, which of the following should NOT be performed?

- a) Radiograph
- b) Dental history
- c) Medical history
- d) Extraction of the dark primary incisor

(Correct answer: d)

3. The dark primary incisor may be treated cosmetically to provide all but one of the following:

- a) satisfy the wish of the dentist only
- b) satisfy the wish of the parent
- c) satisfy the wish of the parent and child
- d) allow for the child's self image to be restored

(Correct answer: a)

4. The following may be used prior to etching the enamel of primary incisors to remove the aprismatic layer of enamel:

- a) Fine diamond bur
- b) Erbium laser
- c) Sandpaper disc
- d) All the above

(Correct answer: d)

5. The purpose of using an opaquer is which of the following:
- a) Make the bonding agent flow better
 - b) Prepare the enamel for better adherence of the composite
 - c) To mask out the discolored enamel
 - d) To make the composite flow better

(Correct answer:c)

6. Which one of the following techniques should not be attempted on a primary incisor:

- a) Heat and bleach
- b) Bleach with carbamide peroxide and a custom tray
- c) Composite veneer
- d) Porcelain veneer

(Correct answer: a)

7. The reason for removing the aprismatic layer of enamel on primary incisors does NOT include:

- a) Removing the yellowish appearance of this layer.
- b) Allowing better bond strength
- c) Allowing the phosphoric acid etch to work faster
- d) All of the above

(Correct answer: a)

8. In which order should the composite veneer procedure be performed?

- e) Etch, bonding agent, composite, opaquer
- f) Opaquer, etch, bonding agent, composite
- g) Bonding agent, etch, opaquer, composite
- h) Etch, opaquer, bonding agent, composite

(Correct answer: d)

9. The medical and dental history should include:

- a. History of trauma
- b. History of illness
- c. History of mother's pregnancy
- d. All of the above

(Correct answer: d)

10. A primary incisor with a yellow appearance may indicate:

- a. The child has eaten too many carrots or yellow vegetables.
- b. The child has not brushed his teeth on a regular basis.
- c. The child needs a pulpectomy.
- d. The child's tooth may have calcific degeneration (metamorphosis).

(Correct answer: d)

References

1. Whittaker DK: Structural variations in the surface zone of human tooth enamel observe by scanning electron microscopy. *Arch Oral Biol* 27:383-392, 1982
2. Holan G, Fuks AB: The diagnostic value of coronal dark-gray discoloration in primary teeth following traumatic injuries. *Pediatr Dent* 18: 224-227, 1996
3. Kimoto S, Suga H, et al: Hypoplasia of primary and permanent teeth following osteitis and the implications of delayed diagnosis of a neonatal maxillary primary molar. *Int J Paediatr Dent* 13: 35-40, 2003
4. Soares CJ, Fonseca RB, et al: Esthetic rehabilitation of anterior teeth affected by enamel hypoplasia: a case report. *J Esthet Restor Dent* 14: 340-348, 2002
5. Slayton RL, Warren JJ, et al: Prevalence of enamel hypoplasia and isolated opacities in the primary dentition. *Pediatr Dent* 23: 32-36; 2001
6. Aine L, Backstrom MC, et al: Enamel defects in primary and permanent teeth of children born prematurely. *J Oral Pathol Med* 29: 403-409, 2000

Product References

- a Hoya Con/Bio Laser Company, Fremont, CA 94538
- b Cosmedent Corporation, Chicago 60611
- c Bisco Corporation, Schaumburg, IL 60193
- d Dentsply Corporation, Milford, DE 19963
- e Brasseler USA Corporation, Savannah, GA 31419

