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# Bleaching a Retained Primary Tooth



**Figure 1.** This preoperative photo demonstrates how the dark retained primary tooth was a distraction from the smile.



**Figure 2.** A close-up of the primary tooth shows discoloration extent compared to the adjacent permanent teeth.



**Figure 3.** A radiograph of the retained primary tooth demonstrated no pathology with the absence of a permanent tooth.

## INTRODUCTION

Bleaching is not the same as “whitening.” *Bleaching changes the inherent color of the tooth,*<sup>1</sup> while whitening merely removes surface stains.<sup>2</sup> Bleaching can change the inherent color of the tooth because the bleaching material is able to pass through intact enamel and dentin to the pulp in 5 to 15 minutes.<sup>3</sup> The color of the tooth resides in the dentin, so the bleaching material is able to penetrate the enamel and change the color of the dentin, thus bleaching the single dark tooth from the outside in as easily as from the inside out.<sup>4</sup> Using a special bleaching tray for

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the single dark tooth, the outcome of the dark tooth can be determined *prior* to committing to bleaching any of the other teeth.

A previous article has reported on the bleaching of primary teeth in a 4-year-old child.<sup>5,6</sup> The teeth became dark after trauma, but there was no indication for any treatment other than that of the color change. The use of tray bleaching with 10% carbamide peroxide provided a satisfactory outcome, and the primary teeth exfoliated with no problem and no damage to the permanent teeth.

The purpose of this case report article is to share the clinical protocol and outcome when bleaching a retained primary tooth in an older adult by implementing the same principles used for bleaching single dark permanent teeth.

## CASE REPORT

### Diagnosis and Treatment Planning

The patient presented with a retained primary tooth in the position of the mandibular right canine (Figure 1). The patient's dental history indicated that the permanent tooth had been horizontally impacted with no reasonable option to bring it into the arch, so it had been extracted. The primary tooth was significantly darker than the adjacent permanent teeth and was a noticeable distraction when smiling (Figure 2).

With any single dark tooth, a preoperative radiograph should be taken to determine whether any pathology exists that would explain the discoloration.<sup>7</sup> Pathology could include an abscessed tooth, internal or external resorption, or calcific metamorphosis. The radiograph was negative for pathologies and demonstrated a fully formed primary tooth with no successor (Figure 3).

Since it was unknown whether the primary tooth would respond favorably or not to the bleaching technique, the decision was made to only treat the primary tooth. Based upon previous experience, the permanent teeth would probably respond well to bleaching. However, if the primary tooth did not respond, the resultant smile would have an even darker appearance of the primary tooth due to the contrast to the even whiter permanent teeth. The best option for bleaching a single dark tooth is to make a single-tooth bleaching tray, and only apply the material to the primary tooth to determine the outcome.

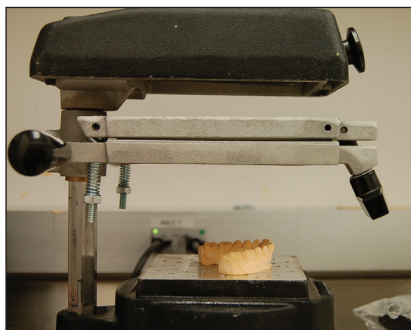
### Clinical Protocol

A mandibular alginate impression was made using a stock tray

*continued on page 76*



**Figure 4.** The trimmed cast should have the incisors vertical, no vestibule, and in a horseshoe shape or with a hole in the center.



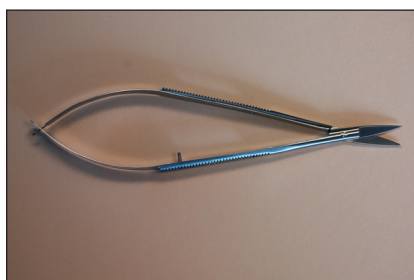
**Figure 5.** The cast was trimmed by holding the central incisors perpendicular to the model trimming blade so the final cast would sit in the vacuum former with the incisors perpendicular to the table, allowing the tray material to adapt without folds on the facial.



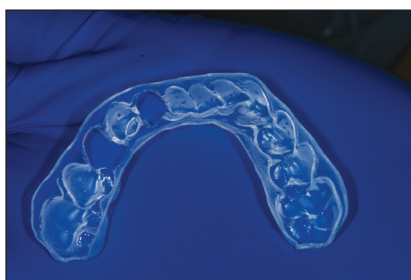
**Figure 6.** The bleaching tray material (Sof-Tray Classic Sheets [Ultradent Products]) was heated to the point where it sagged 1 in below the holder to ensure maximal softness and the thinnest and best adaptation to the cast.



**Figure 7.** A tongue blade was used to separate the hot tray material from the vacuum former without distorting the fit of the tray while the material was still warm, ensuring a well-adapted tray, once cooled.



**Figure 8.** The use of special spring-loaded scissors (Ultra-Trim Scalloping Scissors [Ultradent Products]) ensured smooth trimming that required no further finishing of the edges.



**Figure 9.** The tray was trimmed in such a way that it extended onto the tissue but did not cover the teeth adjacent to the single dark tooth.



**Figure 10.** The occlusion with the tray in the mouth was compared to the occlusion of the natural teeth. Since this patient's anterior teeth were naturally in contact, the anterior teeth on the tray should be in contact, but they are not.



**Figure 11.** If the anterior teeth that contacted without the tray are no longer in contact with the tray in the mouth, then the most terminal teeth need to be removed and the occlusion re-evaluated.

### Bleaching a Retained Primary Tooth

*continued from page 74*

after allowing the tray adhesive (Jeltrate Plus [Dentsply Sirona]) to dry for 10 minutes. In addition to filling the tray, the alginate impression material was wiped on the occlusal and facial surfaces of the teeth. After removal, the impression was rinsed with water, disinfected for one minute, rinsed, and then poured with a quality dental stone (Microstone [Whip Mix]). After setting, the stone cast was trimmed such that the centrals were vertical, there was no vestibule on the cast, and there was a hole in the center from the horseshoe shape (Figure 4). This is best accomplished by trimming the cast from the base rather than the sides as would be done in a conventional cast (Figure 5). Trimming the cast in this way allows the vacuum former to work optimally, providing excellent adaptation of the soft tray material to the dry stone cast.

Once the cast was fully set and dry, the soft tray material was used to make a conventional bleaching tray. The tray was fabricated directly onto

the cast with no spacers or reservoirs. Research has shown that spacers are not needed to bleach the teeth<sup>8,9</sup> and, in this case, would not allow the tray to fit as comfortably and seal as well around the single dark tooth. The vacuum former was turned on for the initial warm-up, and the tray material (Sof-Tray Classic Sheets [Ultradent Products]) was placed in the holder. The carrier was raised, and the cast was placed on the vacuum former platform. As the material is heating, it will be passed through a series of stages from wrinkled, to clear, to sagging. The material should sag 1 in below the holder (Figure 6) in order to be soft enough to make a well-fitting tray and to be thin enough to not compromise the patient's occlusion. Once the tray material was sagging at 1 in, the vacuum was then turned on and the properly heated tray material was brought gently down over the cast. If the material is brought down too fast, folds can be created. If the material is not soft enough, poor adaptation will occur. If the vestibule is not removed, then the material will not adapt well around the necks of the teeth. Once the mate-

rial is seated down on the tray with the vacuum motor on, wait approximately 15 to 20 seconds for the vacuum to pull through the dry cast. The vacuum former is then turned off. The hot tray material should not be handled in any way with fingers or other items, as this disrupts the smooth and glassy surface of the material. Also, the material should not be manipulated in any way while still warm. This may present a challenge in removing the

chair, and the tray is needed sooner, then running the assembly under cool water will re-solidify the tray material. Then the cast can be removed from the tray material by inverting the material. Trimming the outside edges can be accomplished with heavy duty scissors, but the borders of the tray are best trimmed with more delicate scissors (Ultra-Trim Scalloping Scissors [Ultradent Products]) or surgical scissors (Hu-Friedy) (Figure 8). When

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material and cast from the vacuum-forming machine without stretching the material or allowing it to contact itself and stick. The use of a tongue blade to separate the material from the machine avoids distortion of the tray (Figure 7). Once the tray material is removed, it should be allowed to bench cool before being separated from the cast. If the patient is in the

a conventional tray is fabricated for a patient using 10% carbamide peroxide, the tray can extend onto tissue for 1.0 mm to 2.0 mm, but do not let it enter an undercut. Extending onto the soft tissue is acceptable for 10% carbamide peroxide because this chemical and concentration was originally used as an oral antiseptic that was placed on the tissues to aid in wound healing.<sup>10</sup>





**Figure 12.** The teeth molds on either side of the single dark tooth were removed so that when the bleaching material was placed in the single dark tooth mold, it could be wiped from the adjacent teeth to avoid any color change of the adjacent teeth.



**Figure 13.** A close-up of the bleached single tooth demonstrated the natural appearance. We waited 2 weeks before determining the final shade to allow the oxygen to exit the tooth.



**Figure 14.** After 8 weeks of nightly bleaching, the primary tooth was slightly lighter than the adjacent permanent teeth. (Note: The patient then became interested in bleaching the remaining portions of the mandibular arch as well as the maxillary arch.)



**Figure 15.** The patient completed the bleaching of the mandibular arch and the maxillary arch, resulting in a much-improved smile.

Generally, the tissue health of the patient improves during bleaching for this reason. However, with the single dark tooth tray, the tray material should extend slightly further onto the tissue since parts of the tray will be removed. Once the single dark tooth mold was identified in the tray, the teeth on either side were “pinch-cut” to remove their tooth molds while leaving the integrity of the borders of the tray intact (Figure 9).

Once the teeth molds on either side of the single dark tooth were removed, the extensions of the tray were trimmed to terminate on tissue

the tray must be comfortable on the teeth and tissue.

The patient was instructed in placement and removal of the tray and then allowed to practice the procedure. Generally, the tray is best removed by grasping one terminal end and peeling it from the teeth. The patient was also shown where to place the bleaching material, and some material was extruded from the syringe so that the patient was aware of the composition and fluidity of the material. It generally only requires one drop of material into the single dark tooth tray mold to bleach such a tooth. The patient

bleaching techniques, a wait time of 2 weeks without bleaching allows the shade to stabilize and the bond strengths to return to normal.<sup>12,13</sup> Generally, the single dark tooth can remain bleached for a minimum of 1 to 3 years or even permanently. Should it begin to darken again, the same tray can be used to re-bleach the tooth to the original color.

For the patient in this case report, the primary tooth bleached slightly lighter than the adjacent permanent teeth (Figure 13). After the shade was stabilized, the next step was then to decide whether to bleach the permanent teeth slightly lighter to match. This would be accomplished by recommending daytime bleaching using a full-arch tray. If the single dark tooth did not achieve the same color as the adjacent teeth, then no further treatment would have been recommended or rendered.

In this case, the patient was so pleased with the outcome on the primary tooth that bleaching of the maxillary arch was requested (Figure 14). Since the maxillary teeth were found to be darker than the sclera of the patient's eyes, bleaching would improve personal appearance. As is often the case, once the dentist is able to remove any disfiguring situations (such as a dark tooth, white or brown spots, nicotine stains, or tetracycline stains), patients will often become excited about additional treatment options for improving the overall aesthetics of their smiles (Figure 15).

#### IN SUMMARY

This case report has presented the technique and outcome of bleaching a single retained primary tooth, which, in turn, then served as encouragement for the patient to further improve the patient's overall smile. ♦

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*Disclosure:* Dr. Haywood has received grant support, honoraria, and products from Ultradent Products, Inc.

*With all bleaching techniques, a wait time of 2 weeks without bleaching allows the shade to stabilize....*

(not extended into any undercuts or frenum attachments). The tray was then ready to take to the mouth. The patient's occlusion should be evaluated first without the tray to determine which teeth are in contact in the anterior segment. Then, with the tray inserted, the occlusion should be re-evaluated such that the same anterior teeth are in contact (Figure 10). If the anterior teeth do not touch with the tray as they did without the tray, then the most posterior teeth on either side of the tray should be removed and the tray occlusion evaluated again (Figure 11). Continue to remove posterior teeth until the anterior occlusion is satisfactory. Failure to address the occlusion will cause the tray to be uncomfortable to the patient,<sup>11</sup> discouraging them from wearing it overnight. With single dark teeth being bleached with 10% carbamide peroxide, the average treatment time is 8 weeks of overnight wear; therefore,

was shown how to place the material, insert the tray, and then press against the facial of the tray to spread the material and subsequently wipe any excess from the adjacent teeth (Figure 12). Then the patient was instructed to sleep with the tray in place every night for approximately 8 weeks.

The patient was told to continue bleaching until either the tooth no longer gets any lighter, the tooth is lighter than the adjacent teeth, or the patient is satisfied with the color change. Because oxygen is inside the tooth from the bleaching process, the tooth ideally should be slightly whiter than the adjacent teeth. Then the patient should terminate bleaching and wait 2 weeks before evaluating the shade. This allows the oxygen, which makes the tooth slightly and artificially whiter, to leave the tooth. Also, if any bonding is planned, the oxygen in the tooth will reduce the bond strength 25% to 50%. With all