

Cosmetic Nightmare! Composite Success!



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INTRODUCTION

In restorative dentistry, we are introduced to a plethora of conditions that can leave us perplexed. Not all conditions lend themselves to an ideal treatment methodology. While our goal is to always perform textbook treatment, situations arise that call for flexible treatment planning. Complex care may require multidisciplinary treatment that is simply beyond the financial capability of the patient. When such a condition presents itself, we must remember that the patient is connected to his or her condition emotionally and financially, as well as physically. This means that we must expand our paradigms so that we can improve patients' dental conditions at a pace which is both comfortable and affordable for them.¹ This article highlights a young girl's journey with amelogenesis imperfect (AI) and how she was given something to smile about.

Amelogenesis Imperfecta

AI is a developmental disorder of the teeth that can present in many ways. Fourteen forms of AI have been identified. The teeth can be discolored, pitted or hyperplastic, and present with heavy grooves or enamel deficiency. The incidence of AI has been reported in one out of 14,000 in the United States.² It is caused by mutations in the AMELX, ENAM, and MMP20 genes.³ The Table lists the 4 main types of AI with their appearance and inheritance patterns.

Treatment options for AI vary based upon the type of AI and the character of the remaining enamel. Bonding to hypoplastic or hypomature enamel is fairly predictable. If the AI is hypocalcified or weak, then bonding may not be sufficient and full-coverage restorations may be indicated.

Treatment of patients with AI can begin at an early age to treat (decrease) tooth sensitivity and to protect existing enamel. Patients and their parents should be advised that treatment will need to be upgraded throughout the patient's life.

Patients presenting with severe hypomature or hypocalcified AI may require crowns at an early age to prevent pain that can be associated with chewing and the thermal sensitivity this disease presents.



Before Image. Frontal smile of 12-year-old female with amelogenesis imperfecta.



Figure 1. Retracted view of the anterior teeth.

CASE REPORT

A 12-year-old adolescent presented to my office with a chief complaint that she was extremely self-conscious about her smile. Her parents had previously taken her to other dental offices and they had failed to find a dentist who presented an affordable treatment plan. This difficulty was compounded by the family's limited finances, the girl's severe skeletal open bite, hyperplastic gingiva, and delayed eruption patterns (Before Image and Figure 1).

The first thing that comes to mind when evaluating complex treatment challenges is the patient's chief complaint. In this case, it is readily understandable how this child was having difficulty gaining acceptance from her peers. The second issue, after diagnosis, may be sequencing ideal care. However, these options need to coincide with the family's available finances, or this diagnostic and treatment planning appointment will be yet another disappointment for all parties involved.

Skeletal Malocclusions

The incidence of skeletal open bites has been reported in 25% to 35% of patients with AI. While it is unclear why this associ-



After Image. Natural smile; after composite resin rehabilitation.

ation exists, it has been postulated that severe tooth sensitivity results in jaw posturing, which in turn affects skeletal development. According to another theory, a mutated gene found outside of the enamel matrix in AI patients is responsible for skeletal malformation.^{4,7}

While orthognathic surgery may be required to correct her skeletal open bite, the continued growth pattern of the patient may decrease the severity of the open bite over time, allowing her treatment outcome to be managed with traditional (nonsurgical) orthodontics.⁸

This young lady was not concerned with the incidence of her condition, the demographics, or mode of genetic transmission; she just wanted to be able to smile with confidence.

Keeping the Eye on the Prize

The ideal treatment scenario would have involved a multidisciplinary approach to her care. She would require a cephalometric analysis, mounted diagnostic study models, orthodontics, orthognathics, and composite resin bonding until she could afford crowns. Unfortunately, this young girl's family could not afford this option. So, we could simply refer this case out of our office, or we could do what I like to refer to as a "sequential composite upgrade path."

Previously, I have written several articles on "upgradeable dentistry," and they were done to specifically demonstrate the value in dynamic dental rehabilitation. (Note: Archived articles can be found at dentistrytoday.com.) The ability to sequentially upgrade all facets of care according to a patient's personal, social,

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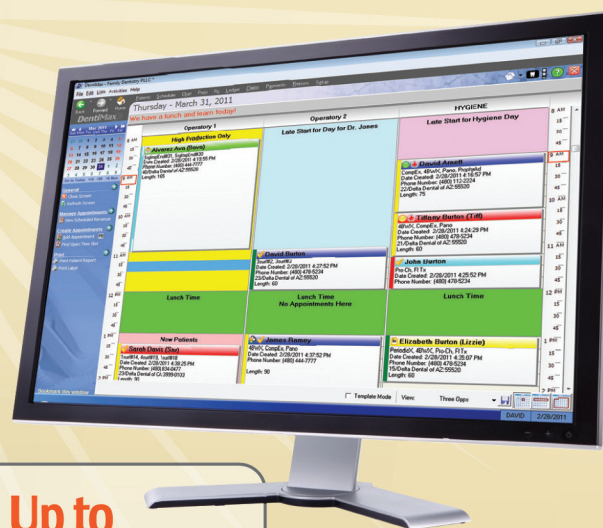
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and financial readiness will allow these patients the dignity to pursue ideal dentistry at a pace they can afford. This treatment paradigm is as relevant for restorative dentistry as it is for implant rehabilitation.

In order to effect rehabilitation for this young lady, the main issue in her treatment is to realize that it should allow for orthodontic care at a later date, when the family's finances permit. This means that we must inform the orthodontist where the cemento-enamel junctions (CEJs) of the teeth are for leveling at a later date. Creating an illusion of perfection, by masking the dento-alveolar and enamel malformations with composite resin, complicates future orthodontic treatment. We *do not* want to make it look perfect. The covering of the enamel with composite resin will remove the landmarks needed to correct curve of Spee and curve of Wilson at a later date, so we must preserve this information for the orthodontist. Proper composite placement will present itself clinically as a canted occlusal plane, reflecting the level of the existing CEJs. Since the CEJ of the lower left canine (tooth No. 22) is 4 mm apical to the CEJ of the lower right canine (tooth No. 27), the corresponding incisal heights should reflect this.

Records Obtained and a Direct Composite Mock-up

After receiving parental consent, records were obtained; this included lateral cephalometric, full-mouth and panoramic radiographs, as well as photographs and preliminary impressions. The diagnostic casts were mounted on a semi-adjustable articulator, and a direct composite resin mock-up was done (Figure 2). (Employing our dental laboratory team to fabricate a diagnostic wax-up, while desirable, would have utilized funds that were in short supply.) This mock-up was used to evaluate the interocclusal distance, tooth size and proportion, and to also allow for a realistic assessment of the desired outcome (Figures 2 and 3).

First Clinical Appointment: Treating the Maxillary Teeth

The altered passive eruption pattern and the lack of complete active eruption had led to asymmetrical tissue heights and an unaesthetic tooth display. After carefully packing a retraction cord to preserve a minimum of 2.0 mm for the biologic width, an electrosurgical device (Parkell) was used to create gingival

Table. Four Main Amelogenesis Imperfecta Types: Hereditary and Clinical Characteristics

TYPE	CLINICAL APPEARANCE	ENAMEL THICKNESS	RADIOGRAPHIC APPEARANCE	INHERITANCE
Hypoplastic (Type I)	Crowns size varies from small to normal, small teeth may lack proximal contacts, color varies from normal to opaque white/yellow-brown	Varies from thin and smooth to normal thickness with grooves, furrows and/or pits	Enamel has normal to slightly reduced contrast/thin	Autosomal dominant, recessive, or X-linked
Hypomaturation (Type II)	Varies from creamy opaque to marked yellow/brown, surface of teeth soft and rough, dental sensitivity and open bite common	Normal thickness with enamel that often chips and abrades easily	Enamel has contrast similar to or more than than dentin, unerupted crowns have normal morphology	Autosomal dominant, recessive, or X-linked
Hypocalcified (Type III)	Opaque white to yellow-brown, soft rough enamel surface, dental sensitivity and open bite common, heavy calculus formation common	Normal thickness with enamel that often chips and abrades easily	Enamel has contrast similar to or less than dentin, unerupted crowns have normal morphology	Autosomal dominant, recessive
Hypomaturation/Hypoplasia/Taurodontism (Type IV)	White/yellow-brown mottled, teeth can appear small and lack proximal contact	Reduced, hypomineralized areas and pits	Enamel contrast normal to slightly more than dentin, large pulp chambers	Autosomal dominant

Source: <http://ghr.nlm.nih.gov/condition/amelogenesis-imperfecta>Wright J. The diagnosis and treatment of dentinogenesis imperfecta and amelogenesis imperfecta. *Hellenic Dent J.* 1993;2:17-24.**Figure 2.** Direct composite resin mock-up to approximate contours.**Figure 3.** Stent of the mock-up use for intraoral evaluation.**Figure 4.** Cosmetic tissue recontouring to create gingival zenith.**Figure 5.** Retraction and preparation of the maxillary anteriors.**Figure 6.** Placement of an opaque nanohybrid composite resin (Esthet-X HD [DENTSPLY Caulk]) for dentinal layer.**Figure 7.** Placement of nanohybrid composite resin (Esthet-X HD [DENTSPLY Caulk]) enamel layer.

zeniths and to create proportionality in the remaining tooth structure (Figure 4).

Once the remaining enamel was exposed and the biologic width protected, the enamel was roughened both buccally and lingually with use of a gin-

gival retraction device (Zekyra [DMG America]) and an 850 Turbo FG and 863 Standard FG Turbo diamonds (Spring Health Products) were used to create a roughened surface and slight chamfer for ideal composite rehabilitation

(Figure 5). Micromechanical undercuts were added where there was sufficient enamel matrix to aid in the retention of the composite resin (Esthet-X HD [DENTSPLY Caulk]) (Figure 6).

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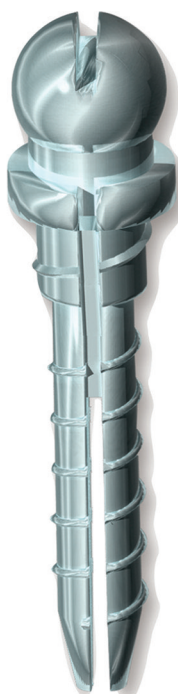
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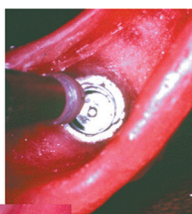
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The use of a vacuum-formed matrix (created from an impression and model of the direct composite resin mock-up) precluded the use of a rubber dam. The ability to create optimal aesthetics necessitated breaking contacts to create a favorable height-to-width proportion. Use of an aesthetic micro-matrix high-definition composite resin allowed for a cost-effective and beautiful layering. The redistribution of the nanosized particles allowed for dental and enamel colors with enough opacity and translucency to build these composite veneers in just 2 layers, thus providing a very good and acceptable aesthetic result (Figures 6 and 7). When cost is a major limiting factor, it would be unwise to take the time to provide tints and multiple shades in an attempt to create the ultimate in aesthetics; good quality aesthetics will suffice.

The most important attributes of an aesthetic smile center around the symmetry of the central incisors, harmony with the lower lip-line, maintenance of coincidental midlines, pleasing gingival display, and aesthetic incisal and gingival embrasure forms; just to name just a few. Once the first central incisor has been restored to size and contour, dental floss can be used to divide the face vertically from the forehead through the philtrum of the nose and dividing the chin to verify that the midline is correct, and there is no "cant" of this prototype tooth (Figures 8 and 9).

After the second central incisor was completed, incisal embrasure form was developed with a VisionFlex 934 diamond-impregnated disc (Brasseler USA) (Figure 10). Further finishing was accomplished with discs (Enhance [DENTSPLY Caulk]) and polishing points (Pogo [DENTSPLY Caulk]) until a high shine was achieved (Figure 11).

The length of the teeth was evaluated during speech to check the incisal edge positions with regard to the vermilion borders with "f" and "v" sounds.

This completed the maxillary anterior teeth in this first visit (Figure 12).

Second Clinical Appointment: Treating the Mandibular Teeth

The desired treatment goals for the mandibular teeth can be seen in Figure 13. The vacuum-formed matrix revealed the areas where gross tissue removal needed to be accomplished, as well as the proposed tooth augmentation according to the diagnostic direct composite mock-up.



Figure 8. Evaluation of the prototype central incisor.



Figure 11. High polish created with discs (Enhance [DENTSPLY Caulk]) and points (Pogo [DENTSPLY Caulk]).



Figure 13. Mandibular matrix in place.



Figure 16. Roughening the remaining enamel rods.



Figure 19. Postoperative full-face photo.



Figure 9. Establishing the midline with respect to the patient's face.



Figure 14. Probing done to determine maintenance of the biologic width.



Figure 17. Prototype of the mandibular central incisor.



Figure 10. Creating the incisal embrasure form.



Figure 12. Completed maxillary teeth.



Figure 15. Mandibular gingival crown lengthening completed.



Figure 18. Completed mandibular arch.

Sulcular probing depths were measured prior to the gingivectomy to ensure maintenance of the biologic width (Figure 14). The need to maintain an adequate zone of keratinized gingiva was also of concern, and the need for soft-tissue grafting was discussed with the family prior to excising this tissue. A probing depth of more than 5.0 mm meant that 3.0 mm of tissue could be excised to uncover more enamel; this would be done to expose adequate surface area for bonding as well as for an increase in tooth display (Figure 15).

It is important to note that we did not try to do orthodontics with our composite resins; instead, *we used our resins to facilitate future orthodontics.*

Fine diamonds (as noted above

with the maxillary teeth) were used to roughen existing enamel on the lingual and buccal surfaces, as bulk in the composite resin material would be required for the strength to withstand the forces of mastication (Figure 16). The matrix was used to establish proper height-to-width proportion, and was used to establish a prototype central for verification of midline (Figure 17).

The ability to allow the orthodontist to level the CEJs at a later date outweighs the needs for aesthetic perfection in a 12-year-old adolescent. If this had not been addressed, the placement of orthodontic appliances would have created asymmetrical root heights, concomitant crown-to-root ratio problems, and may have also led to over-

preparation of any remaining (and precious) enamel at the time of future crown placement (Figure 18).

CLOSING COMMENTS

The increase in self-confidence that this young lady experienced upon completion of her phase 1 treatment was remarkable. She acclimated to her change in phonetics and mastication. The jubilation that she had expressed highlights the need for all of us to think outside of the box and to help patients incorporate “upgradeable dentistry” holistically into their lives at any age.¹

This case report has highlighted what many dentists frequently face in the everyday practice. The compromised dentition may require a compromised treatment plan in order to assist patients in their difficult journey toward a stable occlusion and healthy periodontium.

If we won't treat our patients' aesthetic concerns when they need us the most, how can we guide them toward more optimal upgrade paths in the future? Our patients' completed restorations may not offer the pinnacle of aesthetics that can be achieved through crowns, but perhaps, just perhaps, we should be easier on ourselves as a profession and just improve lives (Figure 19 and After Image).♦

Acknowledgement

I would like to thank my brother, Bruce Winter, DDS, for encouraging my passion and working with me to create a practice that puts the patient first; just as our father Charles Winter, DDS, and grandfather Morris Paschen, DDS, did before him.

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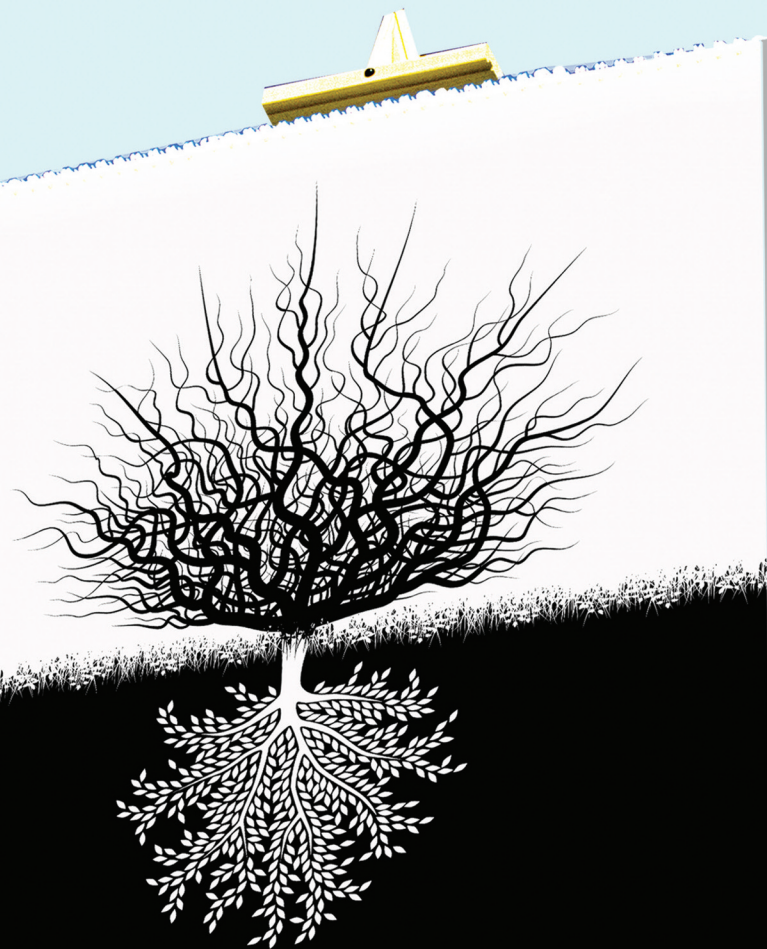
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