



Restorative and orthodontic treatment of an adolescent patient with Amelogenesis Imperfecta

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The diagnosis of Amelogenesis Imperfecta (AI) in a young patient can present many complex restorative and orthodontic challenges for the pediatric dentist. These patients have traditionally been treated with a combination of extractions, composite bonding, stainless steel crowns, adhesive castings, over-dentures, and porcelain veneers.¹ They often have anterior open bites or vertical deep bites² which further complicate the restorative and orthodontic treatment considerations. This case report presents an alternative method of using stainless steel crowns, which have been pre-fitted and then professionally veneered, followed by limited orthodontic treatment in an adolescent female with Amelogenesis Imperfecta during the transitional growth period.

Clinical Treatment

A 13-year-old white female was evaluated with a chief complaint of wanting to improve the appearance of her teeth. On clinical examination, (Fig 1) the patient presented with a generalized form of defective enamel on all the teeth present. This mottled enamel appeared to be of normal thickness, and in many locations, the enamel had chipped away at the incisal edge leaving behind exposed dentin. The patient was not currently experiencing any signs or symptoms of sensitivity to either the enamel or exposed dentin. She presented with a Class I skel-



Fig 1. Intra-oral photograph of patient's dentition showing pre-operative enamel defects.

etal pattern with 100% overbite and 0 mm of overjet. Her past dental history was significant for the placement of stainless steel crown restorations on her four permanent first molars at eight years of age. The patient had four over-retained primary second molars, which on Panorex radiograph were shown to be preventing the eruption of the four permanent second



Fig 2. Pre-operative panoramic radiograph of patient's dentition.

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Fig 3. Initial placement of stainless steel crowns on patient's maxillary anterior teeth.



Fig 4. Delivery of veneered stainless steel crowns on patient's maxillary anterior teeth and initial placement of stainless steel crowns on patient's mandibular anterior teeth.



Fig 5. Delivery of veneered stainless steel crowns on patient's mandibular anterior teeth.

premolars (Fig 2). Radiographically, the enamel on the teeth appeared to have the same radiodensity as the dentin. Her past medical history was unremarkable for any systemic, metabolic, or endocrine condition that may have caused these enamel defects, and a diagnosis of Amelogenesis Imperfecta was established.

Following a comprehensive examination and consultation appointment, the patient and her parents were presented with several reasonable treatment plans that included various esthetic alternatives to deal with the patient's chief complaint. Initially, the four primary second molars were extracted to allow the four permanent second premolars to erupt. It was decided to restore the four permanent second molars with stainless steel crowns. This treatment served to provide full coverage to those very hypoplastic and defective molars, while at the same time, opening the vertical dimension of occlusion by approximately 30%.

With the patient's severe anterior deep bite now significantly reduced, attention was directed to restoring the maxillary and mandibular anterior segments. The maxillary canines, lateral and central incisors were prepared for traditional stainless steel crown restorations. Unitek crowns were then crimped and properly fitted to these teeth (Fig 3). The six crowns were then removed, sterilized, and shipped overnight to Cheng Ortho Lab for the application of the veneered facing. The patient was given appropriate post-operative instructions, which included the use of fluoride and desensitizing agents. It was decided not to temporize the preparations because the teeth required minimal enamel reduction to achieve a proper preparation. Additionally, the patient had not experienced any sensitivity preoperatively, despite the significant enamel defects and exposed dentin that was present. Within five days, the patient was reappointed for the delivery and cementation of the veneered crowns on the six maxillary anterior teeth as well as the preparation and fitting of stainless steel crowns on the mandibular anterior teeth (Fig 4). The following week, the mandibular six crowns with facings were delivered without any complications (Fig 5). All the crowns were cemented with Vitramere® luting cement.

At this point in the treatment process, the patient was very pleased with the esthetic improvement of her teeth; however, she desired an additional modification to the alignment and orientation of her teeth. It was decided to perform a limited orthodontic treatment on the maxillary incisors. An upper Hawley retainer was fabricated with four finger spring attachments that provided a force to mesialize the maxillary central and lateral incisors (Fig 6). The goal of this treatment was to eliminate the diastemas between the maxillary central and lateral incisors. The patient wore the activated Hawley retainer for a period of 12 weeks. Once the diastemas were successfully corrected, the patient was instructed to wear the retainer as a holding appliance and the finger springs were not reactivated.

At the completion of the phase I restorative and phase I orthodontic therapy (Fig 7), the patient was very pleased with the appearance and alignment of her teeth. The patient is being seen on a three month recall schedule for routine preventive treatment. At her last visit, the crowns were found to be retentive and the facings were intact and color stable.

Discussion

Treating a teenage patient with generalized dental defects of enamel, such as those seen in Amelogenesis Imperfecta, can be one of the most challenging dilemmas that a clinician will encounter. The dental practitioner must balance the many treatment alternatives with the goals of the patient as well as



Fig 6. Intra-oral photograph of Hawley retainer with finger spring attachments on the maxillary incisors.



Fig 7. Intra-oral photograph of patient's post-operative dentition.

those of the parents, in order to arrive at a reasonable and suitable plan.

The question of whether to do orthodontic or restorative treatment first was evaluated. It would be plausible to have initially done full banded orthodontics to develop the proper overjet, overbite, and alignment of the dentition, which could have then been followed by appropriate restorations. The patient was very unhappy with the idea of initiating 18-24 months of orthodontics, which in her mind did not address the chief complaint. Since there was generalized spacing throughout the dentition, with a Class I skeletal and dental relationship, it was decided to initially restore the teeth to their proper size and form and then to close the remaining space with orthodontic mechanics.

The next dilemma centered on how to properly restore the teeth. The patient's stage of growth and development as well as the parent's economic concerns were necessary factors to be considered. It was discussed and eventually decided that a limited form of temporary - permanent treatment would serve the patient well during this transitional growth period. The goal of this phase I restorative treatment was to get the patient through her adolescence with a satisfactory restorative outcome that would be both esthetic and functional and could then be replaced with more traditional crown and bridge as the patient approached adulthood. Another goal of the phase I restorative treatment was to provide as much full coverage as possible

for the defective teeth. This would help to prevent caries as well as the chipping away of the hypoplastic and defective enamel that is characteristic of teeth in patients with Amelogenesis Imperfecta.

Because of the patient's very deep bite and the desire to provide full coverage to all the teeth, composite bonding and veneers were not highly recommended as treatment alternatives. Porcelain fused to metal (PFM) crowns were discussed as an option to provide both full coverage and strength; however, the economic impact of treating all the teeth, with the possibility of having to retreat them in the future, made this treatment alternative less desirable. Additionally, PFM restorations would seem more appropriately suited as a phase II treatment option that could be discussed as the patient approached adulthood.

Stainless steel crowns were then discussed with the patient and her parents as possible restorative alternatives. In the posterior quadrants, stainless steel crowns were used to treat all four permanent second molars. This treatment provided the necessary full coverage. As an added benefit, the patient's vertical dimension of occlusion was increased, which made it easier to restore the anterior segments. Since composite strip crowns were not recommended for the anterior teeth, stainless steel crowns were considered because they could provide both full coverage as well as strength to the anterior teeth; however, an esthetic facing would have to be planned for in order to satisfy the patient's concerns. Stainless steel crowns with composite windows were not recommended due to the unesthetic metal margin that could be left along the periphery. At this point, pre-veneered stainless steel crowns were offered as a viable alternative that would satisfy all the treatment goals. Since these crowns were being used as temporary permanent restorations that may remain in place for many years an exceptional fit and retentive crown was essential. Concern was raised over the possibility that crimping of the preveneered surface to achieve the desired fit would lead to possible fracture of the veneer. In order to avoid this situation, the decision was made to use an alternative method of treatment. The permanent anterior teeth were prepared and then non-veneered crowns were crimped, cut and properly fitted. The crowns were then removed, sterilized, and shipped to Cheng Ortho Lab for the application of the veneered facing. Since the crowns had already been fitted and crimped, there would be no need to do any additional modification to the crown after the veneer was applied. As such, a well fitting crown with a professionally applied veneered surface could be delivered without risk of excess stress being placed on the facing due to crimping. This technique should serve to increase the longevity of the veneer and reduce the risk of its fracture, while at the same time producing a much better fitting crown.

The decision to utilize a maxillary Hawley retainer as the primary orthodontic modality in this case was motivated by a desire to avoid conventional orthodontic bonding and banding directly to the veneered surface of the stainless steel crowns. The forces that could be generated by straightwire orthodontic mechanics were felt to be potentially incompatible with the retention of the stainless steel crown or the veneered facing. Additionally, there was concern that during debonding of the brackets and bands, the veneered surface would be stressed and result in fracture. With these thoughts in mind, a maxillary Hawley retainer was fabricated with finger spring attachments

to mesialize the maxillary central and lateral incisors. The goal of this phase I orthodontic treatment was to evenly distribute the spaces that existed between the restored teeth.

Prior to treating a patient with these methods, the long term consequences, risks, and benefits of such treatment must be thoroughly explained to the patient and the parents. The patient must receive the proper oral hygiene instructions to keep these restorations clean and free of caries. Frequent preventive appointments are a necessity for this patient. Stainless steel crowns, by their nature, do not have well adapted margins and as such their long term use on permanent teeth must be carefully considered prior to their use.

The decision to use this type of pre-fitted and then professionally applied veneered stainless steel crown on permanent teeth may be viewed by some clinicians as a less than desirable treatment alternative. As with all techniques, case selection is critical to long term success. In this case, having already eliminated composite bonding, veneers, and porcelain fused to metal restorations as possible options, the pre-fitted and then professionally applied veneered crown was viewed as a reasonable solution that would allow the patient to finish growing, at which time more satisfactory restorations could be fabricated. The opportunity to pre-fit the crown and then have the veneer professionally applied allows for a better adapted crown that does not carry with it the danger of fracturing the veneer due to overzealous crimping at the time of delivery. Additionally, this technique eliminates the fear of having to sterilize the

facial after an unsuccessful try-in. The use of this technique may not be suited for every patient and like-wise it may have some application for use in the primary dentition.

Patients with Amelogenesis Imperfecta will often require extensive dental treatment in order to properly rehabilitate their defective dentitions. This process will often span many years and many restorative and orthodontic phases. Each phase should have specific goals set forth prior to its initiation. The goals of the phase I restorative and orthodontic treatment for the patient in this case were to provide esthetic restorations that could remain in place during the transitional growth period. These restorations had to be stable, retentive, economical, and esthetic. The technique of using pre-fitted and then professionally applied veneered stainless steel crowns combined with limited orthodontic movement using a spring activated retainer can provide pediatric dentists with reasonable treatment alternatives for patients with various enamel defects, such as those seen in Amelogenesis Imperfecta.

References

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ABSTRACT OF THE SCIENTIFIC LITERATURE



PRE-ANESTHETIC VIDEO FOR PARENTAL EDUCATION BEFORE SURGERY

Supplemental preoperative preparation is recommended for pediatric patients and their parents. This preparation has been shown to decrease anxiety in both parents and children. Little data is however available regarding whether the preoperative information actually increases parental knowledge of anesthesia. The present study was designed to assess the effects of viewing a preanesthetic educational video on parental anesthesia knowledge and anxiety, using validated measures in a randomized, controlled fashion.

Eighty five parents of healthy (ASA I) children scheduled for ambulatory surgery were enrolled in the study. Parents of children who had received general anesthesia in the previous 3 years were excluded from the study. The experimental group viewed the video "Your Child's Anesthesia", which provided detailed descriptions of anesthetic information, as well as simulated perioperative experiences of several children. The control group viewed the video "Nature Series: Penguins", which contained no medical information. Before and after viewing the video, parents completed measures of situational anxiety, preoperative anxiety and need for information, and anesthesia knowledge. Repeated-measures analyses of variance showed that the experimental group showed a significant increase in anesthesia knowledge, and a significant reduction in their state of anxiety, anesthesia-specific anxiety and need for information, when compared to the control group. Some limitations mentioned by the authors include the possibility of self-selection bias, where parents who declined to participate may have been the most anxious or least desirous of information. The authors recommend that future studies take into account the costs and benefits of supplemental preparation programs.

Comments: This study is interesting to pediatric dentists due to our involvement with pediatric dental anesthesia. A limitation mentioned in the article was that the video was shown approximately one week prior to the surgery, and there were no follow-up examinations of the results on the day of surgery. Therefore the authors could not comment on whether the anxiolytic and educational effects of the video were sustained. Parents of pediatric dental patients who will be returning for recalls, following treatment under general anesthesia, may be a suitable group to enroll in a similar study to determine the long-term effects of preoperative education. FKH

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Use of a preanesthetic video for facilitation of parental education and anxiolysis before pediatric ambulatory surgery. Cassady JF, Wysocki TT, Miller KM, Cancel DD and Izenberg N. *Anesth Analg* 88:246-50, 1999.