



Transitional anterior esthetic restorations for patients with enamel defects

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The past decade has witnessed significant advances in the diagnosis and treatment of children with enamel defects. However, the emphasis in pediatric restorative care for this population has been focused largely in managing the primary dentition with treatment recommendations, ranging from resin strip crowns to stainless steel crowns with resin facings. Limited reports exist in the dental literature that address those patients in late childhood with the need for transitional care prior to complete eruption of the permanent dentition.¹⁻⁸ It is during this preadolescent period that patients with developmental dental defects can present with an array of problems, including rapid dental deterioration, severe esthetic concerns, hypersensitivity to thermal, chemical, and mechanical stimuli, and alterations in vertical dimension of occlusion.^{9,10} Ideally, many of these issues are addressed best by using definitive restorations, but substantial challenges arise when the child is in the mixed dentition and teeth are still undergoing active eruption (e.g. the cuspids are not present and the central and lateral incisors are not fully erupted). Nevertheless, clinicians are faced with children and parents that desire treatment to ameliorate the functional and esthetic problems presented by a defective dentition. The two most common restorative approaches for young permanent incisors include composite resin restorations and stainless steel crowns with resin facings. The following report presents an alternative transitional treatment approach not previously described for the esthetic management of children in the mixed dentition with severe enamel defects.

Case report

A 10-year 9-month old male was referred to the University of North Carolina School of Dentistry with a chief complaint of poor esthetics and dental abscess formation secondary to generalized enamel defects. The patient was extremely self-conscious concerning his small teeth and was being teased about his dental appearance at school. He had a history of spontaneous abscessed teeth and was receiving care for the completion of apexification for teeth #8 and #24. These dental manifestations were secondary to and are common features of the trichodontoosseous syndrome. This autosomal dominant hereditary condition is characterized by kinky curly hair at birth, thin and or pitted enamel, taurodontism, and increased density and or thickness of bone.¹⁰⁻¹²

Clinical management

The child was in the mixed dentition and presented with decreased vertical dimension of occlusion, mild gingival inflammation, and severe enamel hypoplasia (Fig 1). Both the primary and permanent dentitions were affected. Carious le-

sions were present in the first permanent molars. The temporal mandibular joint was carefully evaluated for pathology and normal opening prior to treatment to ascertain that an increase in vertical dimension of approximately 4mm would be tolerated well by the patient. Radiographic examination revealed generalized taurodontism, as well as periapical pathology on tooth #24. Apexification of teeth #8 and #24 had been completed but required final root canal treatment. Large taurodont pulp chambers and a lack of radiographic contrast was evident between the enamel and dentin (Fig 2).

The major restorative issues for this patient included decreased vertical dimension of occlusion, short clinical crowns, small teeth, and generalized dental spacing, all secondary to the trichodontoosseous syndrome. Therefore, the treatment goals were to address the patient's chief complaint of poor esthetics and to protect the developmentally defective teeth. Both of these goals were achieved by using an indirect resin crown (IRC) technique to restore the maxillary incisors. Placement of stainless steel crowns on the posterior teeth would provide protection from further attrition, prevent potential abscess formation secondary to micro-pulp exposures occurring from attrition, and be used to increase the vertical dimension of occlusion. Increasing the vertical dimension of occlusion was a prerequisite for having adequate vertical space necessary for placing the anterior IRC restorations. Due to the patient's severe anxiety to dental care, attention deficit hyperactivity disorder (ADHD), and the extent of work required, the patient and parent elected to have the reconstructive dental treatment completed with the aid of general anesthesia.



Fig 1. Severe developmental dental defects with marked interdental spacing and short clinical crowns, as seen in this patient, presents a tremendous restorative challenge.

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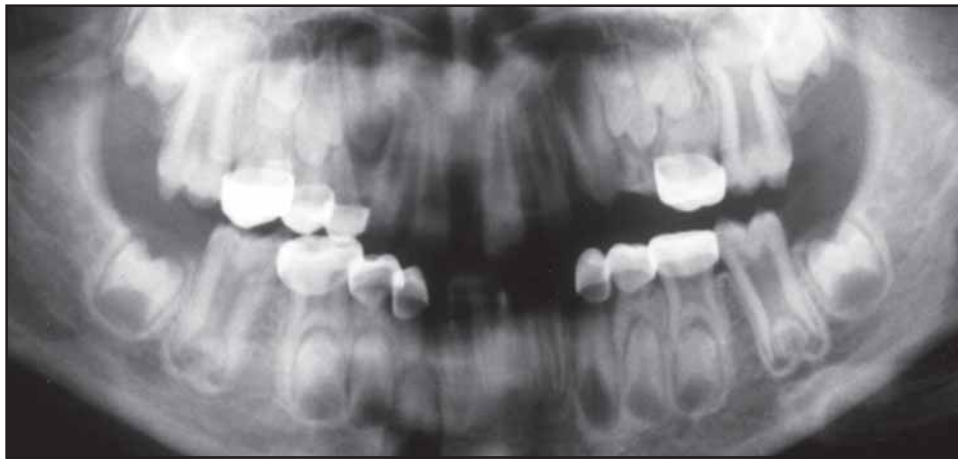


Fig 2. Pre-operative radiograph illustrating thin enamel and large pulp chambers that require complete coverage to prevent abscess formation.

Prior to surgery, impressions were obtained for the fabrication of maxillary IRCs. Denture mold and teeth shade (A2) were selected clinically, using Dentsply IPN Portrait, York, PA, denture teeth to match the patient's profile and complexion. The four maxillary incisors were minimally prepared on the working models and a separating agent (alcote) was placed on the prepared teeth. The inner surface of the denture teeth was removed with an acrylic bur and the teeth relined with cold cure Jet Acrylic, Wheeling, IL, to fit the prepared incisors on the model (Fig 3).

During the surgery, all permanent six-year molars were restored using Unitek, Monrovia, CA, stainless steel crowns. They were specifically fit to increase the vertical dimension of occlusion by 4mm, thereby permitting sufficient space for the restoration of the anterior dentition (Fig 4). The premolars and remaining second primary molars were treated by bonding composite resin (Z-100 shade A2) to the exposed clinical crowns to increase esthetics and allow for improved masticatory function. Root canal therapy was completed on teeth #8 and #24. The maxillary incisors were minimally prepared using a diamond bur to produce a feathered marginal finish. The IRC restorations were tried on the prepared teeth and found to fit extremely well without modifications. If IRC restorations are found to seat inadequately on the prepared teeth, they can be modified by relieving the crown interior with an acrylic bur.

The maxillary incisors were acid etched with 37% phosphoric acid for one minute. After the teeth were rinsed and

dried they were coated with prime and bonding agents and cured. The IRC restorations were coated internally with a thin layer of bonding agent for 30 seconds. Composite resin (Z-100 shade A2) was added to the inner surface of the crowns. The IRC restorations were then placed on each tooth and fully seated to express material from the cervical margin. After seating, each crown was light cured from the facial and lingual surfaces for 10 seconds. The excessive cervical resin was then carefully removed and the crowns were finally cured from the facial and lingual aspects for two minutes (Fig 5). Mandibular incisors were restored with Millenium Art Glass, VanNuy, CA, crowns.

Post-operative evaluation

It is important to evaluate IRCs postoperatively in order to assess the patient's occlusion, gingival health, and integrity of the bonded restorations. At two-week and three-month evaluations, this patient presented with good oral opening, dental interdigitation, and retention of all IRCs. No TMJ pathology was evident secondary to the increase in vertical dimension of occlusion. Intraorally, the gingiva demonstrated no signs of inflammation or irritation and the IRCs were intact. The patient and parent reported great satisfaction with the esthetic and functional results of the maxillary crowns. The mandibular Millenium Art Glass crowns, however, had been poorly retained and the patient returned for replacement of these crowns using a composite resin crown technique.



Fig 3. Indirect resin crowns (IRC's) fabricated on working model.



Fig 4. Increased vertical dimension of occlusion after placement of posterior stainless steel crowns.



Fig 5. Excellent esthetic result, enhanced tooth morphology and gingival health after placement of IRC's.

Discussion

Children with dental developmental defects pose a major treatment challenge to the dental profession. The IRC technique presents an alternative approach to provide optimal, transitional dental care for children with both esthetic and functional dental needs. This technique may be indicated in children with severe dental anomalies and adequate interdental spacing, where minimal tooth preparation is required. More extensive preparation of the teeth would be required in cases with limited interdental spacing. IRCs may be contraindicated in teeth with normal morphology and no interdental spacing.

There are several distinct advantages to the IRC technique compared with other methods. This technique can address the major restorative issues often seen in children with dental developmental defects. IRCs are equal or superior in esthetics to composite resin crowns and stainless steel crowns with facings. It is a simple method for increasing the incisal-gingival crown length to obtain a more normal tooth morphology. Continued tooth eruption and/or gingival recession leading to exposed gingival margin are readily and easily managed by adding composite resin to the exposed margin. For the cooperative patient, a preliminary try-in period is possible, allowing the patient to evaluate the esthetics and function prior to final cementation/bonding. In addition, the placement of IRCs is not as technique-sensitive compared with other restorative techniques.

The low cost of fabricating and placing IRC restorations is also an attractive feature. Resin denture teeth cost approximates \$4.50 and the indirect approach minimizes the clinician's chair time. However, this technique does require an additional appointment for impressions and a laboratory phase. This may be an issue in situations when patient cooperation is limited. While preliminary evidence suggests that IRCs are well retained, long-term data is not available to document retention and wear. This clinical procedure, however, is meant to be transitional and these factors may not be as critical, given that the goal is to provide intermediate treatment until definitive fixed prostheses can be placed.

As clinicians, we are challenged to continually modify and expand our repertoire of transitional treatment approaches for children with developmental dental anomalies. One of the most important goals of providing oral health care for these children is to maximize their psychological development. Oral disfigurement can negatively alter normal development, leading to emotional and behavioral difficulties that typically result in diminished self-esteem.¹³⁻¹⁵ For these reasons, it is

imperative that optimal oral esthetics be provided to pediatric patients despite the complexities that arise from mixed dentition treatment.

In summary, indications for the IRC restorative technique include patients in the mixed dentition with generalized interdental spacing and morphologically small teeth who desire increased crown length. Numerous developmental defects such as amelogenesis imperfecta, ectodermal dysplasias, trichodentoosseous syndrome, and generalized microdontia can present with these manifestations. This technique provides an intermediary treatment option that addresses esthetic concerns of the patient and parent during the critical mixed dentition developmental period.

Conclusion

1. IRC provides a transitional treatment modality for children in the mixed dentition with severe developmental dental anomalies.
2. IRC technique is cost-effective, esthetic, and easily modified at the gingival margin with continued tooth eruption, making it applicable for treatment of the transitional dentition.
3. Providing optimal dental esthetics during the transitional dentition is important to normal psychological development.

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