Case of the Month

Primary anterior tooth restoration using posts with macroretentive elements

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A problem commonly faced in pediatric clinics is the restoration of primary maxillary incisors severely destroyed by trauma or caries. Most cases are observed in children with "nursing-bottle caries."[1-3] The implications of this situation include neuromuscular imbalance with decreased masticatory efficiency, speech disturbances, and development of parafunctional buccal habits and psychologic problems.

Because of the reduced coronal tooth structure, direct adhesive restorative procedures do not always give satisfactory results. Shape, function, and esthetics can be better restored by means of prosthodontic techniques. The child's growth and development may also be improved.

Endodontic treatment associated with the use of intracanal retainers is necessary prior to coronal restoration. After placement of the intracanal retainers, the remaining coronal structure can be restored with direct or indirect techniques or with single-tooth prostheses such as celluloid strip crowns,[4-6] stainless steel crowns,[7-10] metal-plastic crowns,[10] porcelain veneers,[11] polycarbonate crowns,[12] and acrylic resin crowns.

In primary teeth, intracanal retention can be achieved directly by building up a resin composite post[12-14] or preparing an "inverted mushroom-shaped" undercut in the root canal prior to the build up of the resin.[15]

In the 1970s, a 0.5- or 0.7-mm alpha-shaped orthodontic wire, pressure bonded inside the root canal and cemented with zinc phosphate, was used to provide reinforcement and retention for the coronal restoration.[16] Later, it was suggested that the same technique would work as reinforcement for resin posts.[14] Metal tubing with resin composite has also been described in the literature.[10,12] Many prefabricated posts are documented, such as threaded posts,[16,17] which can be cemented, and stress-relieving posts, such as Flexi-Post (Essential Dental Systems).[18]

In a comparative study of intracanal retention between threaded posts and alpha-shaped orthodontic

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wires in primary teeth restored with resin composite, similar results were obtained for both; there was a 76.47% overall success rate after a 10-month follow-up period.[19]

More recently, natural teeth, stored in a tooth bank, have been prepared in a post shape for cementation in the root canal.[20,21]

In 1995, Rodrigues Filho and others[22] described the use of nickel-chromium (Ni-Cr) cast posts with macroretentive elements, obtained by the addition of acrylic resin pearls on the wax cast pattern surface. The cast pattern is built with a wax round strip, coated with nail varnish, and covered with acrylic resin pearls. Posts varied from 1.5 to 3.0 mm in diameter and were cemented with dual-cured adhesive or resin composite. The objective of that technique was to increase the resistance of the restored teeth to mechanical loading by bonding the intracanal retainer.

The purpose of this report is to present an alternative functional and esthetic restorative technique for primary anterior teeth: use of Ni-Cr posts with macroretentive elements in conjunction with indirect resin crowns.

PATIENT HISTORY AND ORAL HEALTH FINDINGS

A 32-month-old girl presented with severely damaged primary first molars and maxillary incisors and loss of vertical dimension, resulting from poor oral hygiene and lack of diet control. The patient's history was taken, a clinical and radiographic evaluation was performed, and a treatment plan was established (Figs 1 and 2).

TREATMENT

For restoration of the anterior teeth, it was necessary to reestablish vertical dimension. This was accomplished through gradual restoration of the first molars, which would be stabilized with the total eruption of the primary second molars (Fig 3).

At the same time, the maxillary incisors were endodontically treated. Canals were cleansed and prepared to one third of their length to receive intracanal retainers (Fig 4). Retentive Ni-Cr posts with the smallest diameter (1.5 mm) were selected and cut to the adequate length (Figs 5 and 6). The posts were etched for 15 seconds with 37% phosphoric acid to eliminate the oxide layer on the surface. They were cemented with a dual-cured adhesive material (Fig 7).

The cemented posts received a layer of opaque material (Fig 8) and were covered with resin composite, giving an indication of the future occlusion (Fig 9). Nonretentive preparations were performed, ending in a chamfer shoulder–type margin with rounded corners (Fig 10). The free marginal gingiva was displaced with a braided retraction cord compressed gently into the gingival sulci, and an impression was taken using a silicon material.

The crowns were prepared by a laboratory (Fig 11). After being evaluated for marginal fit, the crowns were cemented with a dual-cured cement and finished, and occlusal contacts were refined (Figs 12 and 13).

The child and parents were instructed on the importance of oral hygiene and diet, to preserve the primary teeth. They were also motivated to attend periodic appointments for prevention of caries in the posterior dentition.

TREATMENT OUTCOME

Radiographic evaluation of the restorations 10 months postcementation revealed no sign of fracture, which can eventually occur with other types of metal posts (Fig 14). The radicular absorption observed was probably the result of the trauma suffered prior to treatment. The 10-month clinical appearance is shown in Fig 15.

TREATMENT RATIONALE

Resin composite posts have low strength to loading. Reinforcement with mechanically retained orthodontic wires requires a certain level of ability by the clinician. Threaded posts represent an excessive cost for pediatric dentists because they are bought as a kit, which is never totally utilized. Furthermore, apical tensions are created, which may lead to root fracture during installation. Natural teeth posts are still a recent alternative. They are difficult to prepare, and may not be accepted by the patients.

The round macroretentive elements in Ni-Cr cast posts offer a better distribution of masticatory loading forces. The possibility of chemical/mechanical adhesion by using adhesive systems allows for the integration of restorations to the dental structure. These posts are indicated for the reinforcement of enlarged canals, considering that limited amounts of dentin tissue are available, which is a common situation during restoration of primary anterior teeth. They are prefabricated in several diameters, and therefore can be readily used.

In this case, the final restoration was performed with indirect resin crowns because of the patient's age and the number of badly destroyed teeth that required restoration. Although laboratory processes were necessary, resulting in an increase in cost and in the number of appointments, the child's chair time at each appointment was reduced, and cervical adaptation, general esthetics, and function were improved.

The technique described is simple and effective and represents a promising alternative for prosthodontic restoration in clinical pediatric dentistry. The technique can be used to restore severely carious or fractured primary anterior teeth. The use of Ni-Cr cast posts with macroretentive elements and indirect resin crowns resulted in clinical success, reestablishing function and restoring esthetics.

Fig 1 Anterior view of the teeth in occlusion at initial presentation. Note the loss of vertical dimension.

Fig 2 Initial radiograph of the anterior region.

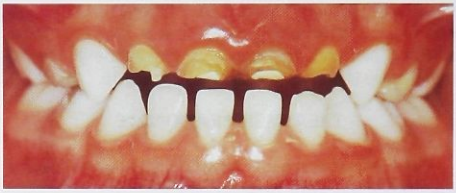

Fig 3 Vertical dimension recovered. There is enough space for restoration of the anterior teeth.

Fig 4 Root canals prepared after endodontic treatment.

Fig 5 Nickel-chromium cast posts. Note the round retentive elements and different diameters.

Fig 6 Post selection and adaptation.

Fig 7 Post cementation with dual-cured adhesive material.

Fig 8 Application of opaque material.

Fig 9 Coverage with resin composite for subsequent preparation.

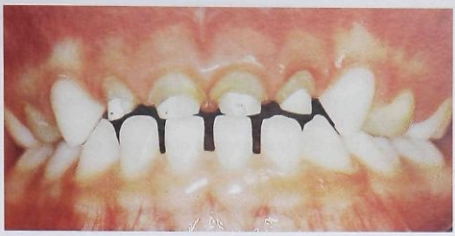

Fig 10 Prepared teeth.

Fig 11 Laboratory-fabricated resin crowns.

Fig 12 Palatal gingival margin adaptation after cementation of resin crowns.

Fig 13 Final aspect, after adjustments and cementation of resin crowns. Compare with Fig 1.

Fig 14 Radiographic evaluation 10 months postcementation.

Fig 15 Anterior view of the teeth in occlusion 10 months postcementation.

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How would you have treated this patient? Do you have any suggestions for alternative treatment options?

Interesting alternatives will be considered for publication in a future issue.

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