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**CLINICAL TECHNIQUE**

# Restoration of severely decayed primary incisors using indirect composite resin restoration technique

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**Summary.** Caries of primary incisors is a common problem in paediatric dentistry in some countries. The restoration of primary incisors which have been severely damaged by early childhood caries or trauma is also a difficult challenge for clinicians. This case report describes an indirect technique for the restoration of primary anterior teeth using composite resin reinforced with a fibreglass post. Over a one-year period, the crowns have demonstrated good retention and aesthetic results. The restorations were provided in two short chair-side sections, with satisfactory patient cooperation.

## Introduction

Caries and trauma are the main reasons for the restoration of anterior teeth in young children. The development of carious lesions in primary maxillary incisors is often related to night-time feeding (breast or baby bottle), poor oral hygiene habits and the consumption of a cariogenic diet after weaning [1].

The restoration of primary incisors which are severely broken down by dental caries is often a difficult procedure that presents a special challenge to dentists.

Premature loss of carious primary incisors may affect the patterns of speech by interfering with the pronunciation of tongue-tip consonants (i.e. 't', 'd', 's', 'sh' and 'ch'), and the labial sounds of 'f' and 'v'. Other implications of the loss of primary incisors are decreased masticatory efficiency and the development of abnormal tongue habits, and potentially, subsequent malocclusion. The child may also suffer from psychological problems if aesthetics are compromised [2].

For these reasons, a restorative technique that is able to provide efficient, durable and functional restorations, and that is simple to perform would enhance the management of patients presenting with carious maxillary primary incisors. Such a technique could help to ensure the child's cooperation and reduce the anxieties associated with restorative treatment. This case report describes the restoration of carious primary maxillary incisors using indirect composite resin crown restorations reinforced with fibreglass posts.

## Case report

A 2·9-year-old patient was referred for the management of carious and grossly broken down maxillary primary central incisors. The two teeth had been endodontically treated (Figs 1 and 2). The canals were filled with zinc oxide and eugenol cement. After clinical and radiographic examination, indirect composite resin crowns reinforced with a fibreglass post were selected as the best restorative technique. The technique was chosen in order to reduce the time spent in the surgery. Because only minimal cooperation was needed, the technique was also thought likely to minimize the difficulties (behavioural, compliance and operative) which might be associated with directly placed composite crown techniques.

Using a number 4 carbide burr (KG Sorensen, Barueri, SP, Brazil), a low-speed rotary instrument, the root fillings were removed by one-third of their lengths to receive the fibreglass posts and a shallow

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**Fig. 1.** Structure remaining after caries removal.

**Fig. 3.** Post selection and adaptation.

**Fig. 2.** X-ray of two endodontically treated central primary maxillary incisors.

**Fig. 4.** Filling of the canals with resin increments.

chamfer margin was placed in the enamel, 2 mm above the free gingival margin. An impression was obtained using a silicon material (Optosil P Plus/ Xantopren VL Plus, Heraeus Kulzer, Hanau, Germany) and special trays. Preformed wooden sticks were introduced into the root canals to improve the adaptation of the low-viscosity impression material. The canals were temporary sealed with cotton pellets, zinc oxide and eugenol cement.

Immediately following the clinical procedures, the impression was taken to the laboratory and poured with die stone. The canal diameters were measured on the cast, and appropriate posts (FiberKor Post, Jeneric Pentron, Wallingford, CT, USA) were selected and sectioned to the correct length with a diamond disc (Fig. 3). A thin coat of die isolation varnish was brushed inside the canals in order to prevent adhesion of the composite restoration material to the cast. A silane primer layer was applied to the post to improve its adhesion to the composite resin. The resin (Z100-3M, Shade 2 A, 3M/ESPE Dental Products, St Paul, MN, USA) was then built up in increments from the base of the canals, with the fibreglass posts inserted into the material. Each successive layer of resin was condensed around the post and polymerized for 45 s (Fig. 4). The crown was then built up free-hand in the same manner, and was finally finished with carbide finishing burrs and composite polishing discs (Fig. 5).

At the second appointment, the adjacent teeth and the remaining tooth structure of the central incisors were dried and isolated with cotton rolls. The root canal walls were conditioned with 37% phosphoric acid for 15 s, rinsed and dried, and the Single Bond Adhesive Dental System (3M™ ESPE™ Adper™, St Paul, MN, USA) was applied. The final restorations shown in Fig. 6 were cemented with adhesive resin cement (Rely X, 3M/ESPE). A postoperative periapical X-ray confirmed the position of the crown (Fig. 7). The post in the maxillary right incisor was

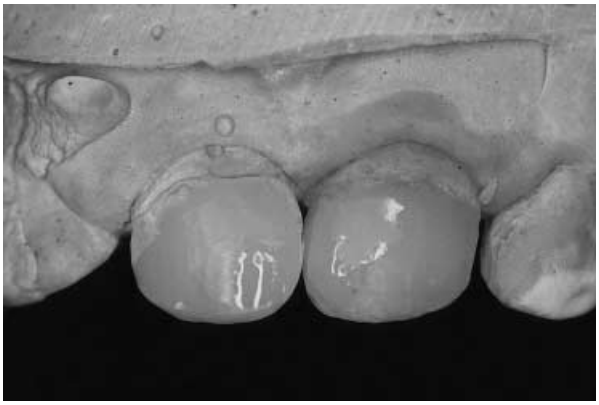

**Fig. 5.** Crowns built up freehand.

**Fig. 8.** Visible cervical line adaptation and facial surface with brown stains.

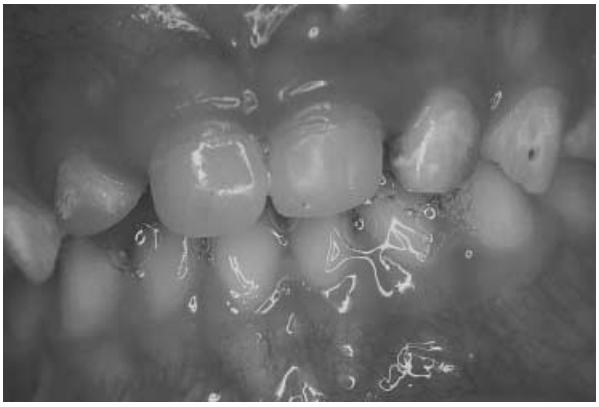

**Fig. 6.** Final facial aspect after the cementation of the crowns.

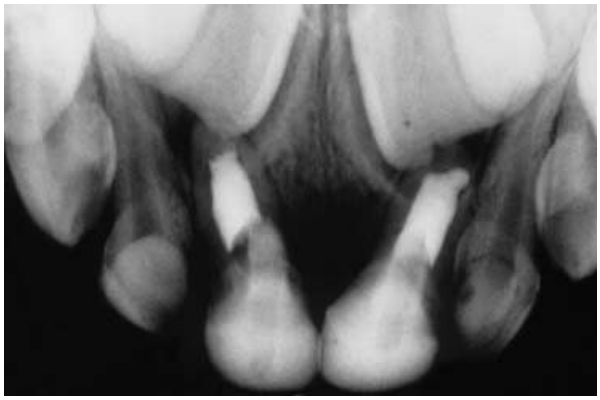

**Fig. 9.** Radiographic evaluation one-year post cementation revealing no sign of fracture or resorption.

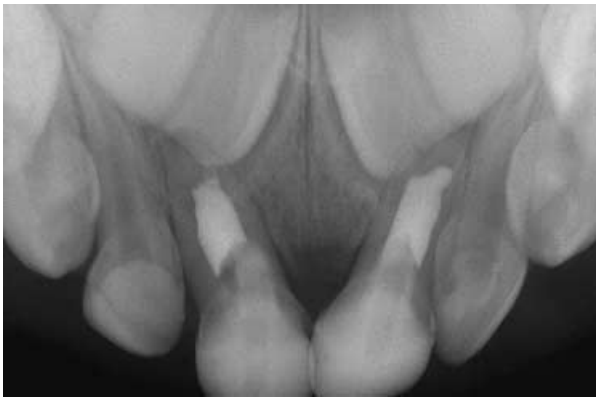

**Fig. 7.** Periapical X-ray confirming the adaptation of the crowns.

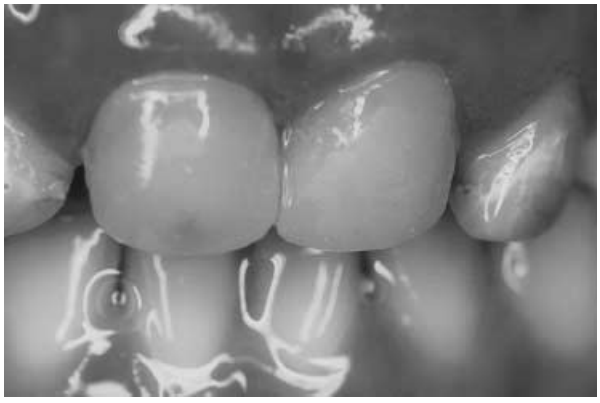

**Fig. 10.** Final restoration.

mesially inclined, but retentive and functional, and therefore, it was accepted.

A one-year evaluation of the restorations revealed discoloration of the labial cervical tooth–crown margins, but a radiograph showed no obvious signs of failure, resorption or fracture (Figs 8 & 9). The discoloration was corrected using composite resin add-on technique (Fig. 10).

## Discussion

The use of an intracanal post in endodontically treated teeth improves the retention of definitive restoration [3]. Post length may not be critical in all cases. In 1990, Judd *et al.* [4], reported a 100% success rate for composite crowns utilizing short posts for retention. Composite posts have low strength-to-load ratios and are indicated for the reinforcement of enlarged canals, as occur in immature teeth and in the primary dentition [5].

Different resin materials and techniques have been used for reinforcing large root canals. A direct composite resin restoration reinforced with mechanically retained orthodontic wire was described by Mortada and King in 2004 [6]. This technique may be performed in one visit to the surgery, and presents good adaptation and high strength. More resistant preformed and cast metal posts have been utilized; however, they are expensive and require an additional laboratory stage [7].

In a previous study on the use of metallic posts in 23 patients, it was reported that the posts improved the durability of the restoration [8]. This technique required the use of an opaque resin to mask the post, which may in turn affect the final appearance of the restoration. The use of metal posts in primary teeth could pose additional problems during the course of natural exfoliation. A more aesthetic option may be the use of biological posts made from extracted primary teeth [9]. The disadvantages of this technique include the need for a tooth bank, and for parental and child agreement by the donors and recipients of tooth fragments [10]. The technique may also not comply with stringent cross-infection control policies of the twenty-first century.

Recently, dental manufactures have developed fibreglass posts (FiberKor Post) which are available in different diameters. This material allows chemical and mechanical adhesion to the restorative materials, resulting in robust restorations with good aesthetics. Sharaf [11], reporting on a one-year follow-up period in 2002, found that restorations carried out on grossly broken down primary incisors using fibreglass posts remained intact. Laboratory studies have also demonstrated that this technique significantly improved the fracture resistance of teeth [11].

In this study, the posts were introduced inside the canals until the limit of the cervical third because, as described by Rifkin in 1983 [7], a larger length may interfere with the eruption of the underlying permanent tooth during the final stages of resorption of the primary roots.

Using fibreglass posts, the final restoration of the crown can be performed using a range of materials and techniques which include: a resin-veneered stainless steel crown [12]; natural teeth [13]; a composite resin prefabricated crown [14,15]; a porcelain crown [16]; a metal ceramic crown [17]; celluloid crown forms [18]; and composite resin using both direct and indirect techniques [19,20].

In this case, the restoration was performed with an indirect composite resin technique because of the patient's age and level of cooperation, and because most of the work could be carried out outside the patient's mouth.

The discoloration of the crown margins at the end of one year was the only problem arising. This was easily corrected with a further composite resin add-on (Fig. 10).

**Why this paper is important for paediatric dentists**

- This paper describes a technique to restore endodontically treated primary anterior teeth using an indirect technique.
- The technique required only limited co-operation and provided benefit to aesthetics and function in the case described.

## Conclusion

The indirect composite resin crown reinforced with fibreglass post restoration used in this case report has demonstrated good retention and aesthetic results after one year. This restoration was provided over two short visits to the dental surgery, with satisfactory patient cooperation.

**Résumé.** Les caries des incisives primaires sont un problème fréquent en dentisterie pédiatrique dans certains pays. La restauration des incisives primaires sévèrement détruites par des caries précoces ou des traumatismes est également un défi délicat pour les cliniciens. Le cas présenté décrit une technique indirecte de restauration des dents primaires antérieures à l'aide de résine composite renforcée par une armature en fibre de verre. Sur une période d'un an, les couronnes ont montré esthétique et bonne rétention. Les restaurations ont été réalisées en deux sessions courtes avec la coopération satisfaite du patient.

**Zusammenfassung.** In einigen Staaten ist Karies der Milchschneidezähne ein häufiges Problem der

Kinderzahnheilkunde. Die restaurative Therapie der durch Karies oder Trauma stark zerstörten Schneidezähne stellt für die Behandler eine schwierige Herausforderung dar. In diesem Fallbericht wird eine indirekte Technik beschrieben zur Restauration von zerstörten Milchschneidezähnen unter Verwendung von Komposit verstärkt durch einen Glasfaserstift. Über einen Zeitraum von einem Jahr zeigten die Kronen eine gute Retention und Ästhetik gezeigt. Die Restaurationen wurden in zwei kurzen Sitzungen mit zufriedenstellender Patientenkooperation erstellt.

**Resumen.** La caries de incisivos primarios es un problema común odontopediátrico en algunos países. La restauración de incisivos primarios severamente dañados por caries temprana en el niño o traumatismo es también un reto para los clínicos. Este caso describe una técnica indirecta para la restauración de dientes primarios anteriores usando composite reforzado con un poste de fibra de vidrio. Durante el período de un año las coronas han demostrado una buena retención y estética. Las restauraciones se realizaron en dos sesiones cortas de sillón con la cooperación satisfactoria del paciente.

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