An alternative aesthetic restoration for extensive coronal destruction in primary molars: indirect restorative technique with composite resin

Rita Tereza Serra Rabêlo* / Angela Scarparo Caldo-Teixeira** / Regina Maria Puppin-Rontani***

The indirect restorative technique with composite resin has presented efficient results when used in primary teeth. This technique enables the oral rehabilitation. Based on the results presented in the literature concerning clinical performance, this technique is presented as an alternative treatment to the primary teeth with extensive decay by showing a case of rehabilitation of primary molars. The oral rehabilitation using indirect resin composite restoration showed an important concept to be applied in primary dentition due to feasible, low cost, and lower chairside time.
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INTRODUCTION

Despite the development of preventive dentistry, dental decay is still one of the diseases of great prevalence, mainly in children. In pediatric dentistry it is common to observe the occurrence of fast and severe decay, i.e. feeding bottle caries, causing great loss of dental structure.

This process is easily understood when the constitutional characteristics of the primary teeth are analyzed, namely dimensions and structures of teeth. These factors lead to a fast progression of the caries disease resulting in great coronary destruction.[1]

For many years, stainless steel crowns and amalgam were the main alternatives for molar restorations in pediatric dentistry. However, with adhesive restorative dentistry, many materials and techniques have been developed for the restoration of these teeth.[2]

The adhesive technique is limited to the removal of the decayed tissue and the regularization of cavity walls. In this technique, contrary to what is performed in traditional treatments, there is no removal of enamel without support in order to offer retention to the material. This way, the use of this technique is indicated in atypical cavities, to produce a conservative and healthy dental structure besides the excellent aesthetic result.[3,4]

Despite the whole development of resin composites, the intrinsic characteristics of the material (low wear abrasion, shrinkage, and microleakage) limit the use in posterior teeth.

However, in an attempt to lessen the undesirable characteristics of the composite resins, the indirect restorative technique was developed. The purpose of this technique was to reduce the current problems of the direct restorative technique with composite resin.[5] The difference between the techniques can be observed during the procedure, since the indirect restorative technique is done using the curing light outside the oral cavity, and then bonded to the remaining dental structure.[6]

The aim of this work is to present the indirect restorative technique with composite resin in primary teeth as a restorative alternative to steel crowns, amalgam, and other existent restorative techniques, providing functionality and aesthetics, in order to restore the dental anatomy to a tooth affected by the dental structure loss due to decay or other pathologies.

* Rita Tereza Serra Rabêlo, DDS, MS, Pediatric Dentistry Specialist at Piracicaba Dental School - UNICAMP, Master in Pediatric Dentistry at Ribeirão Preto Dental School – USP, Brazil.

** Angela Scarparo Caldo-Teixeira, DDS, MSc, Pediatric Dentistry Specialist at Piracicaba Dental School - UNICAMP, Master in Dental Materials at Piracicaba Dental School – UNICAMP, PhD Student at Federal University of Santa Catarina – UFSC, Brazil.

*** Regina Maria Puppin-Rontani, DDS, MSc, PhD, Professor in the Pediatric Dentistry Department at Piracicaba Dental School – UNICAMP - Brazil.

Send all correspondence to Dr. Regina Maria Puppin-Rontani, Departamento de Odontologia Infantil FOP-UNICAMP, Av. Limeira, 901;13414-018 – Piracicaba – SP – Brazil.

Voice: 55-019-3412 5286
Fax: 55-019-3412 5218
E-mail: rmpuppin@fop.unicamp.br

Figure 1. Occlusal view of the mandibular teeth after 71 and 81 exodontics.

Figure 2. Occlusal view of the upper teeth before 52 and 62 exodontics

Figure 3. Extensive coronary destruction with lost of vertical dimension (left side).

Figure 4. Extensive coronary destruction with lost of vertical dimension (right side).

Figure 5. Illustration of the technique used to rehabilitate the teeth showed in a second lower primary molar (rubber dam used in the caries tissue removal).

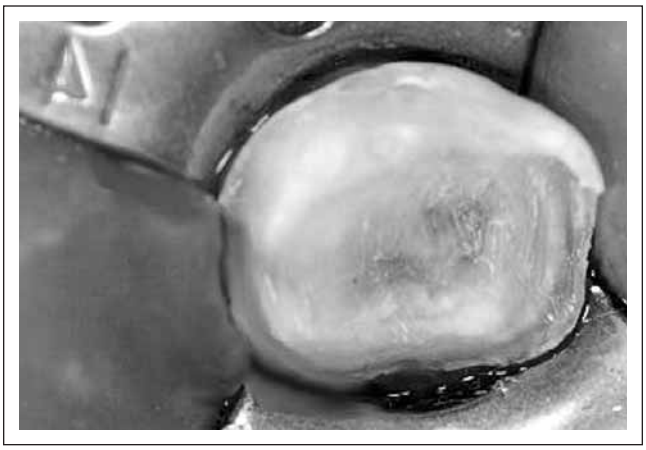

Figure 6. Photograph illustrating the final aspect of the cavity prepare after caries removal.

CLINICAL CASE

A 4-year-old male patient reported to the Pediatric Dentistry Clinic of Piracicaba Dental School, UNICAMP, searching for dental care. Extensive coronary destruction of primary molars was observed during the examination. With the radiographic study of all the teeth affected by the dental decay, teeth 52, 62, 71 and 81 were removed (Figures 1 and 2). The radiographic study confirmed that there was no pulp damage of the superior and inferior primary molars. We opted for the

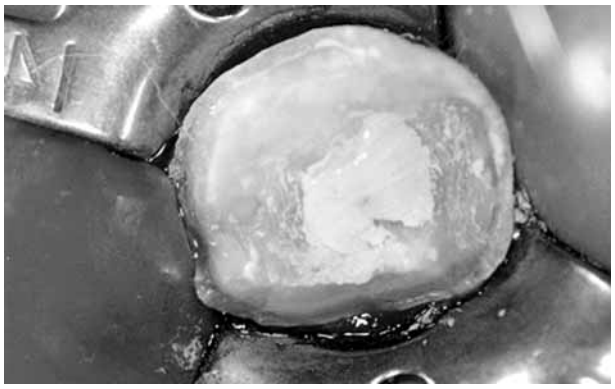

Figure 7. Area closest proximity to the pulp were protected with calcium hydroxide cement.

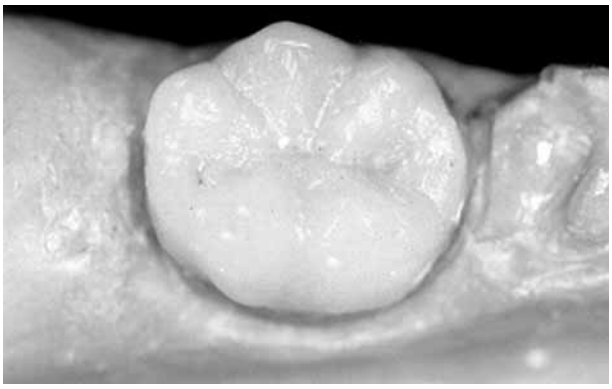

Figure 8. Photograph illustrating the final appearance of the indirect composite resin restoration.

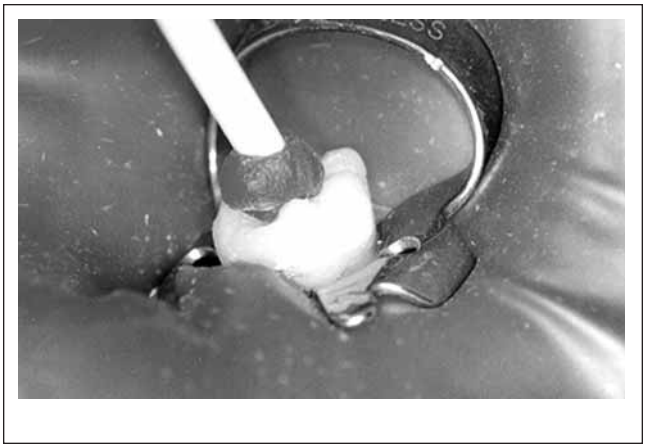

Figure 9. Onlay restoration positioned on the prepared tooth, checking marginal adaptation, color matching, and anatomical details.

indirect restorative technique with resin composite due to the need of extensive coronary reconstruction of several teeth and re-establishment of the occlusion and the vertical dimension (Figures 3 and 4), using a material that enabled to preserve the remaining dental structure, which was very little.

Consultation concerning dietary habits and oral hygiene was given to the patient and parent in the first session. Soon afterwards, tooth preparation was done removing great part of the carious dental tissue with a hand instrument and subsequent sealing of the cavities with conventional glass ionomer (Vidrion R - SS White), followed by 4 sessions of fluoride topical application, one every week.

OPERATIVE SEQUENCE

In the first clinical phase, cleaning was done with stone pumice and water, with the aid of a Robinson brush. To prepare the cavity walls, carious tissue was removed using a rotational instrument and cylindrical diamond tips. For this procedure, the patient was under local anesthesia and the area isolated in rubber dam (Figure 5). A trunk-conical diamond tip with a round end was used, with the purpose of providing a withdrawal form and rounding of all of the internal angles, so the cave-superficial angle would not finish in bevel.

After the cavity preparation (Figure 6), the areas of closest proximity to the pulp were protected with calcium hydroxide cement (Hydro C – Caulk/Dentsply; Figure 7), and light cured glass ionomer was inserted (Vitrebond-3M).

Then, impressions were taken from the cavities prepared, using condensation silicon (Optosil Xantopren-Bayer). We opted to use glass ionomer for the restoration (Vidrion R-SS White) due to the need of a temporary restoration capable of maintaining the integrity of the remaining dental tissue, and at the same time easy and fast to prepare.

The casts were poured in dental stone (Herostone). The delimitation of the cavity preparation was marked in lead and the cast was isolated with cyanoacrylate adhesive (Super Bonder, Loctite). The material chosen for the restoration was the TPH composite resin. The restoration was made in increments of approximately 2mm of thickness. Each increment was photo-cured for 40 seconds. The last layer of composite was carved in order to minimize the final finish procedure. The onlay was then submitted to additional photo-curing for 2 minutes on all the faces, including the internal portion, to optimize the polymerization and the mechanical characteristics of the composite resin (Figure 8).

In a second clinical phase the onlay restoration was checked. It was positioned on the prepared tooth and the proximal contacts, the color, and the anatomical details were checked (Figure 9). Once the restoration was well adapted, it was cleaned in its internal surfaces using a Robinson bristle brush, stone pumice, and water in order to eliminate possible contamination from the manipulation during the checking.

Afterwards, the restoration and the prepared tooth were acid-etched with 35% phosphoric acid (3M/ESPE Dental Products) for 30s and 15s, respectively. Scotch-

Figure 10. Photograph illustrating the indirect restoration after bonding and occlusal checking.

Figure 11. View of the mandibular teeth after rehabilitation using indirect composite resin restorations.

bond Multipurpose Plus (3M/ESPE Dental Products) was chosen for the bonding, following the instructions of the manufacturer. The product was applied on the internal surface of the onlay and on the dental surfaces.

Then, the restoration was placed in position and pressed against the tooth until the bonding agent overflowed. The excess was removed with an explorer on the buccal-lingual surface, and with a dental floss on the proximal surface. Each surface was light cured for 40s (Figure 10). The occlusal adjustment was accomplished with the aid of carbon paper to determine the premature contact areas. Finishing was accomplished using diamond tips of fine granulation (resin composite finish - KG Sorensen) and the polishing with tips of silicon, rubber cup, and polishing paste (resin composite finish - KG Sorensen; Figure 11).

DISCUSSION

There are several alternatives to restore primary teeth with little remaining dental structure. Stainless steel crown restorations are frequently used in Pediatric Dentistry, because it is an easy technique, low cost, good stability, satisfactory retention, as well as for the need of little wear of the dental structure.[7] However, the indication for stainless steel crowns has decreased because it is pre-fabricated, thus not possessing customized shape and of having deficient contact points. Besides it is not always possible to adequately restore the cervical diameter.[1] In agreement with the reports of Checchio, *et al.*[8] stainless steel crowns, when badly adapted, are triggering and stressing factors to periodontal diseases. Nevertheless, Silva *et al.*[7] the possibility of a better adaptation depends on the ability of the professional during the selection of the crown, the preparing of the tooth, proper and cementation.

Another material commonly used in posterior teeth is the silver amalgam. Amalgam restorations present some advantages: they are easy and fast to prepare, present low cost, and satisfactory clinical longevity. However, some professionals have criticized the use of silver amalgam, due to the presence of mercury. In addition to being anti-aesthetic, they request appropriate preparation with outline and retention forms, which require additional removal of healthy dental tissue.[9]

Other techniques, like restorations of adhesive amalgam, metal onlay restorations[10], and more recently the restorations with human dental fragments have been suggested as alternatives for restoration of primary molars.[11]

The search for materials and restoration techniques capable of restoring the anatomic-functional characteristics of the sound teeth as well as supplying the aesthetics has brought about changes in the basic principles of dentistry.

This way, composite resins are used as a common alternative to silver amalgam. In 1970, Mack,[12] used this material for the first time in primary molars. The clinical performance of composites in primary molars has been studied, ever since. The use of composite resins can be justified because deciduous teeth possess a short life span.[13-15] Furthermore, the composites possess resistance values to abrasion close to those presented by the deciduous teeth. This wear, which could be seen as contraindication, becomes desirable once the physiological wear that happens in the enamel of the primary teeth is an essential condition for the establishment of a permanent occlusion.[1]

On the other hand, even with the technological progress, problems related to intrinsic characteristics of the composite resin (as shrinkage and microleakage) are still not solved.[16,17]

The aim for the development of the indirect technique was to minimize the harmful effects observed in the direct restorations of composite resin.[18] Shrinkage and microleakage reduction made possible through the polymerization outside the oral cavity has made this technique a success in restoring dentistry[17,19] because it eliminated the C factor, reaching an appropriate proximal outline as well as reestablishing the anatomical characteristics.

Imparato, *et al*.[3] reported that there is not a consensus for the best techniques and materials for a temporary restoration. We have chosen to use conventional glass ionomer cement because it is fast and easy to prepare, and we believed that this material would be able to keep the integrity of the remaining dental tissue.

The finishing and polishing procedures of the indirect technique are easier because it is possible to visualize the outlines, so the excess is easily removed, allowing a better polish on the restoration surface.[20]

Although the indirect technique requires a larger number of steps for execution, the laboratory stage can be accomplished at the clinic by the professional himself and with the material indicated for the direct technique. This provides a faster rehabilitation, thus the patient has a shorter sessions of treatment, which is particularly advantageous considering that many infantile patients do not cooperate with the professional.

The indirect technique seems to be of great importance when applied to the restoration of primary teeth. It makes possible to re-establish properly the anatomy of proximal outlines and of cervico-occlusal height, restoring the function to teeth widely affected by the process of decay or other pathologies, as well as by endodontics therapeutics. Concerning very small children, who need a restorative treatment, the indirect technique is very suitable as it saves the professional and the patient from an emotional and physical stress because it is performed outside the oral cavity, allowing a better visualization without the interference of the oral structures.

This technique, though recently developed, is largely reported in the literature for use in permanent teeth. However, few citations can be found reporting the use of this technique in primary teeth. It would be useful to professionals if more clinical and experimental studies were conducted aiming to maximize the use of this procedure.

CONCLUSION

Among the restorative techniques proposed for restoration of primary molars, the indirect restorative technique with composite resin represents a viable procedure for the rehabilitation of primary teeth widely affected by caries and other pathologies.

As this is a relatively simple technique, it enables a faster and more efficient oral rehabilitation because it decreases the time of the clinical session with the patient as the process is accomplished outside the oral cavity.

Although it has been said that these restorations need additional work time and greater use of materials, thus making the cost higher when compared with the composite resin restorations by the direct technique and silver amalgam, restorations using adhesive materials present many advantages as conservative preparation, better definition of outlines, better proximal contacts, better marginal adaptation, and adequate recovery of the mesio-distal diameter and the cervico-occlusal height.

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