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In light of the scientific literature concerning the outcome of the endodontic treatment, it does not sound inappropriate that the restoration of the endodontically treated tooth was completed by the endodontist. In this context the following report presents an account of rehabilitation of a second premolar, including retreatment and definitive restoration.

Teeth that need retreatment are usually affected by decay due to caries, fracture and/or previous restoration. The endodontic treatment of such cases is a challenge concerning the isolation, overcoming different obstructions, perforation management (if they exist) and final restoration. The success rate for teeth that exhibit one or more technical problems, such as transportation, stripping, perforation or internal resorption, is reported to be 47 per cent. Perforations have the most negative incidence.

One of the factors that influence the outcome following non-surgical retreatment is the final restoration. Though some authors question the importance of the coronal restoration for the longevity of endodontically treated teeth, it is well accepted that the final restoration is as important for the outcome of the endodontic treatment as the quality of the treatment itself. Still, restoration of the coronally treated tooth remains a controversial issue. In the context of the increasing role of biomechanics, adhesively inserted indirect partial tooth-colored restorations are gaining more and more attention. The restoration or mimicking of the biomechanical, structural and aesthetic integrity of the teeth in a conservative manner is an advantage that must be used and preferred whenever possible. Still, these types of restorations demand well-organized and well-organized restorative modality, particularly endodontically treated teeth in severe cases, such as crows. This is a prerequisite for clinicians and dental technicians to ensure adequate endodontics.

Once the decision for tooth-coloured partial restoration is made, the operator must choose between two materials—composite or ceramics. The benefits of the former (less abrasiveness and brittleness, lower costs, easy to polish and repair, user friendly) encounter the strength, irritant and biocompatibility of the latter. While many studies indicate that ceramic and composite inlays provide similar fracture resistance on endodontically treated premolars, other suggest that when cuspal coverage is required composite resin may be more beneficial in endodontically treated posterior teeth compared to ceramics pertaining to its greater survival rate, fatigue resistance and more favorable failures. This can be explained by the more friendly stress distribution of composite resin inlays, confined above the cemento-enamel junction.

The present report describes the microscopic retreatment and the definitive restoration of a grossly decayed perforated maxillary premolar. The reasons for the applied treatment are discussed.

Case report
A 54-year-old male patient reported to the Department of Operative Dentistry and Endodontics, complaining of symptoms from another tooth. The radiographic examination (Fig. 1) revealed inadequate endodontic treatment and perforation with radiolucent area at the apex of tooth 15. The tooth was endodontically treated four years ago.

Medical history was non-contributory. Prophylaxis was within normal limits. Local anesthesi a with Lidocaine 2% was administered. After the removal of the old restoration (Fig. 2) and cleaning up the decay, a pre-endodontic buildup was accomplished.

Undercuts were not removed but were undulated on the composite resin. The operative field was isolated with rubber dam retractor inserted in Alci and Matrix band (Fig. 3). While keeping the root canal open with gutta-percha points and Cavit, the total etch technique was performed. Enamel and dentin were covered with adhesive (Prime & Bond NT, Denzertply) and polymerized for 10 seconds. Bulk-fill flowable composite was applied (SDR, Denzertply) and polymerized for 40 seconds in order to create a reservoir for the irrigants during endodontic retreatment (Fig. 4). After the removal of gutta-percha points and Cavit, the real canal (blue arrows) and the perforation (red arrow) were easily accessible (Fig. 5).

Since the artificial canal was previously obturated with a paste, cleaning, with a combination of hand files, ultrasonic (Pro Ultra 5 and 6) and irrigation with citric acid was used. To confirm the effectiveness of the cleaning procedure, an intra-operative X-ray was done (Fig. 6). Because of the different angulation of the beam, it seems as if the perforation is on the level of the crestal bone, which is not the real case.

For cleaning and shaping of the real root canal, the following protocol was used:
1. Glide path was established using SS K-files 08, 10, and Path Files 015, 016, 016 (DentoPlex Maillefer).
2. The upper two-thirds was prepared using S1 and S2 files from Pro Taper system (DentoPlex Maillefer).
3. The apical third—20 (04) GTX file (DentoPly Maillefer) was used.

Throughout the whole procedure, irrigation with Citric Acid (40%, Cermark, Poland) and NaOCl (2%, Cermark, Poland) was used.

We preferred S1 and S2 files because of their ability to brush against the canal wall, which is very useful in cases with oval cross sections, where it is of paramount importance to clean all aspects of the root canal spaces. For the apical one third we chose an automated file as the canal was very narrow and we had the possibility to transport the apical form. Both artificial and natural roots were obturated using warm vertical compaction of gutta-percha and MT-Puro (Filapex, Angelus, Brazil). On the post-op radiograph, the preparation and obturation seem short, but this was the reading we repeatedly got with our apex locator (BayPex5, YDW, Germany) (Fig. 7).

After the completion of the endodontic retreatment, the pre-endodontic buildup was left at place and the endodontic access was restored again with SDR, creating a core, on which an onlay preparation with diamond burs (Mani Inc.) was performed (Figs. 8 & 9). The enamel margins were exposed and unsup ported enamel prisms were removed using fine-grit diamond points. The remaining tooth structure was prepared to reate a buccal joint with the restoration margins. Internal line angles were rounded and the walls provided 5- to 15-degree path of divergence. The proximal boxes preparations extended to the existing composite, since they were located in the dentin.

The dimensions of the prepa ration provided at least 2mm intercuspal clearance, which could be verified on the impression. A condensable silico nite impression was taken (Fig. 10). A custom made provisional restoration was created using direct technique and temporarily cemented with a non-eugenol luting agent (Temp Bond NE) (Fig. 11). The fitting aspect of the restoration was sandblasted by the dental technician.

At the second appointment after assessment of the pre pared restoration, removal of the provisional and cleaning
of the preparation the fit and aesthetics of the overlay were evaluated. Rubber dam was placed and the preparation was cleaned with acetone, etched with 57 per cent phosphoric acid for 15 seconds, rinsed and dried. The filling aspect of the restoration was also cleaned with acetone prior to cementation. A dual-cure self-adhesive luting resin (SmartCem2, DENTSPLY) was applied to the walls of the preparation and the restoration was placed with firm pressure and fully seated. The excess cement was removed with an explorer, a #12 scalpel blade and dental floss in the interproximal area after five-second polymerization that brought the cement to a “rubbery” stage (Figs. 12 & 15). The restoration was covered with gauze and finally cured for 60 seconds from each side (Figs. 14 & 15). The minimal occlusal adjustments were done with fine diamond burs under water coolant. Finishing and polishing were accomplished with the Enlhave system (DENTSPLY) (Fig. 16).

Once finishing and polishing was done, a 57 percent phosphoric acid gel was applied for 15 seconds to clean the surface of the restoration and to acid etch the marginal enamel. After washing and drying, the nanofilled adhesive (Prime&Bond NT, DENTSPLY) was applied and permitted to rest for 10 seconds to permeate the surface and marginal fissures created by the finishing process. The adhesive was then thinned with water and polymerized for 40 seconds (Fig. 17). At the six-month recall, the tooth was asymptomatic and the patient was completely satisfied (Figs. 18,19).

Discussion
This case report demonstrates endodontic retreatment and composite overlay as definitive restoration for a compromised tooth with minimal coronal tooth structure.

An endodontically treated posterior tooth presenting with extensive decay is most frequently restored with a post and a crown. That is incontestable, because crowns are well-established and known, clinically proven restorative modality, and still a considerable amount of research is being performed in 2089.

On the other hand, partial toothcoloured restorations are recognized as valuable alternatives to full crown procedures, and questions are raised if intraocclusal posts are necessary at all for an endodontically treated tooth.

Since their introduction in 1980, indirect laboratory processed composites are being continuously improved in their physical and mechanical properties. Now this restorative option offers adhesive, biomimetic approach far less aggressive than crowns and far less technique sensitive than ceramics.

Achieving a perfect marginal quality with composite overlays, when gingival margins are located in the dentin, continues to be critical even when new adhesive techniques and systems are used.3 The application of a composite base underneath indirect composite restorations represents a feasible non-invasive alternative to surgical crown lengthening to relocate cavity margins from an intra-cervical to a supra-gingival position. This also permits the placement of rubber dam for absolute isolation. Surgical crown lengthening also compromises the periodontal tissue support of neighbouring teeth.2 We did this relocation simultaneously with the pre-endodontic build up with SJ. This material has the option to maintain the integrity of low viscosity resin and in the same time polymerization shrinkage stress similar to regular viscosity composite.

To simplify the procedures for bonding indirect restorations, resin cements have been introduced recently that are promoted as self-adhesive.5, i.e., do not require a separate adhesive application step. Manufacturers claim that these cements are hydrophilic when mixed (acidic phase) but become hydrophobic (neutral pH) upon reaction with the tooth structure. The bond strengths to the tooth structure are questioned.

In our case we decided to additionally etch the enamel margins of the preparation, although not recommended by the manufacturer, because the procedure is simple and, as Duarte et al.9 and de Andrade et al.10 demonstrated, improves the bond strength of the restoration.

We preferred condensation-type silicone impression material for its better ability to reproduce the surface characteristics of low viscosity resin reported by Takano et al.11

The surface and margins of the restoration were sealed with a filling adhesive. This treatment improves the marginal adaptation,2 and it could be demonstrated that adhesives are superior to specially designed resin coating materials.

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The answers and critiques published herein have been checked carefully and represent authoritative opinions about the questions concerned.

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