

AN ALTERNATIVE TECHNIQUE TO RESTORE A ROOT CANAL TREATED TOOTH

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Restorations of root canal treated teeth had been described in various texts, journals and articles. Sometimes as clinicians we have to stop to ponder for a while on the restoration which is best suited for a particular case due to its individual peculiarities.

In this article, I will try to describe a technique which will make use of 2 different classes of materials i.e. amalgam and composite resin to restore a root canal treated molar with a Class I cavity. We hope to achieve a more cosmetic tooth-coloured restoration without compromising the fundamentals recommended to ensure the success of the endodontic treatment. I have not attempted any Class II cavities due to the inherent difficulties in handling composite resin materials in such a clinical situation.

This technique involves the use of amalgam as the base material. The floor of the pulp chamber of a tooth, which is root canal treated and fit most of the criteria listed below, is thoroughly debrided and cleansed of all debris. Amalgam is chosen because it can be condensed into the orifices of the sealed root canals. Gate-Glidden drills No. 3/4 may be used to prepare the canals. Once the amalgam had achieved its initial set, it is carved and excess is removed from the occlusal cavity leaving a space of approximately 2-3 mm depth. The walls of the cavity are cleaned of the excess amalgam.

Any dentin-bonding agent system can be used to fill this cavity. The author had the experience of using many bonding systems. However, the author finds the Optibond (Kerr) system and All-bond 2 (Bisco), can cleanse the

cavity better before putting the restorative material but it takes a few more seconds compared to Prime & bond (Dentsply), Single bond (3M) or One-Step Bond (Bisco). Other bonding systems will come into the market and it is up to the preference of the individual to choose any one of them. Of course, it would be better to do all this under rubber dam for all the right reasons. The occlusion may be left intact or one may go one step further to analyse the occlusal relationship with a strong emphasis on understanding this subject and having the proper training as well as equipment to do so.

About 30-40 cases had been performed in the last 3-5 years. In all the cases (between 10-20) which the author had the opportunity to review, no fracture was detected. More cases need to be done and reviewed on a long-term basis before any conclusive evidence can be presented. The author hopes to compile the clinical data more systematically and be able to present the results more conclusively in future articles.

This technique has been used by the author for the following indications and only after carefully selecting the cases.

- * An endodontically treated tooth with an occlusal access cavity (Class I)
- * Sufficient sound tooth structure on the walls of the cavity i.e. there is no undermined or weakened tooth structure due to caries, old restorations or visible cracks (stained or not stained).
- * Ideally, no history of bruxism or any paranormal oral habits.
- * Ideally, no occlusal disharmony i.e. no severe slide in centric relation contact position. I will look for severe wear facets, temporomandibular disorders, multiple tooth fractures in the oral cavity as well as history of extracted or missing teeth due to tooth fractures.

- * Ideally, tooth to be treated is bound by adjacent sound teeth.
- * Most important when patient cannot afford a final restoration using a full crown.

The rationale for this technique is based on several fundamental principles in restorative techniques :

1. Pulp Chamber Space :

The pulp chamber space is an equally adequate and sound space for creating a core for a final restoration compared to fabricating or casting a metal core and post, which involve more removal of sound dentine. In doing the latter, one must achieve the ferrule-effect for retention of the post and core.

2. Use of Amalgam in the pulp chamber space :

The technique of using amalgam packed into the pulp chamber space as a treatment alternative in endodontically treated teeth and been clinically tested and repeated scientific evidence or studies had justified its long term success rate provided there is sufficient remaining sound dentine.

3. Use of Composite resins and dentin-bonding agents (DBA).

Composite resin using dentin bonding agents had undergone several generations of improvements in its physical properties and clinical uses. New materials are continuously being introduced. The latest being Surefil combined with Prime & bond and NT fillers (Dentsply). The fillers in the adhesive being 7µm in size. Studies done by Nakabayashi, Leinfelder, Nash, Summit (amalgam) and many other on restorative materials; and Trope on restorations of endodontically treated have shown many positive results. More recently, articles on the use of 4 meta adhesive systems such as Superbond or C & B (Parkell) have even advocated its use in fracture cases. The use of dentin-bonding

adhesive restorative materials is frequently mentioned as an alternative or one of the possible options in various texts and journals in the treatment of cracked teeth but there are obvious limitations, precautions and proper case selection.

4. DBA reduces marginal microleakage and therefore reduces coronal leakage to enhance the success of root canal treatment.

I quote from John Ingle: "Carefully conducted research has shown that microleakage occurs around virtually every coronal restoration and that the invading oral bacteria often reach and infect the periapical tissue, passing the full length of poorly compacted root fillings. We also know that all sealers in present use may partially or totally 'wash' away with time. We also now know how damaging pins and posts are to the future survival of the tooth. We are gaining more respect for the new adhesive resins that prevent microleakage". The fifth generation dentin-bonding agents have been tested in numerous studies. The hybridization process in the application of these agents have definitely been proven to reduce microleakage. In addition, they are thought to have anti-bacterial effects as well. However, more long-term studies are needed to substantiate them. However, more long-term studies are needed to substantiate them. The trouble with these materials is that they keep changing and before one study is completed, a new material comes into the market and claim to be better than the former.

"Amalgam bonding mechanism: several studies have shown its effectiveness in reducing microleakage. I have attempted it too but I do not like it because it is very technique-sensitive, sets too fast (i.e. insufficient working time for packing and condensing into the canals, pulp chamber and occlusal cavity) and not cost effective".

5. Esthetics of composite resin material to cover the occlusal surface of the restoration:

There is no doubt about the cosmetic effects

of tooth-coloured restorative materials compared to a silver-coloured amalgam material. It needs no further elaboration especially when we have done a RCT on a lower first molar which is very obvious when a patient smiles or speaks.

6. DBA in preventing a fracture?

Lastly, can the bonding strength be relied on to prevent a crack or split tooth? The author will not be able to claim that it can do so. Studies by Asmussen et al showed that bond strengths exceeding 20MPa are necessary to eliminate that gap formation produced during polymerisation shrinkage of composite resin. Bond strengths of enamel to composite resin had increased significantly from 5MPa to 40MPa in the fourth and fifth generation resins. DBA bond strengths between dentine and composite resins such as with NT fillers (Prime & Bond) had exceeded 20MPa in separate studies done in USA and Germany. These new generation of materials may in future, in addition to the increased bond strength to dentine and enamel and reduction in microleakage, will provide more answers to the resistance to fracture. It is still imperfect and we will have to exercise proper caution and advice in its use.

However, until there are repeated fractures present after performing this technique, no one can say that it is a failure. Since the author has not encountered any fracture in any of the cases that he had the opportunity to review and with a high incidence of cuspal fracture involving the use of only amalgam restoration then the technique will remain an alternative treatment

option.

In conclusion, I would like to say that the technique is not perfect and should not be used if the clinician is not confident of the properties and rationale of the treatment. A clinician can choose from a wide variety of other restorative options namely, an amalgam overlay or cast metal occlusal onlay or a full crown etc. The decision depends on the 'integrity' of the tooth to be restored, time factor, occlusion, para-normal oral habits, laboratory fees and financial consideration, though there are some who may debate about the importance of occlusion.

Based on the author's experience, it usually takes about 5 minutes to overlay a layer of composite resin with DBA on top of a well condensed amalgam base. After all we have already spent a few hours performing the root canal treatment, it makes sense for me to spend a few minutes extra to hopefully enhance the success of the RCT. The rubber-dam is already in place and no extra time is required to assemble that. The isolation will further enhance the success of the bonding process.

REFERENCES

1. John Ingle. A New Paradigm for the filling and sealing of root canals (Compend. Vol. XVI, No. 3, 306-319, 1995).
2. J. Burke et al: Directly Placed Esthetic Restorative Materials-The Comp. Aug, 1996.