

PROBLEMS OF PRODUCING TEST SAMPLES FROM DENTAL CALLUS

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Abstract: *Owing to modern technologies dentists can remove the defect and fill the resulting hole with a composite by gluing the two surfaces. The article presents three ways of how to combine tooth composite and zirconium crowns. It also mentions problems related to obtaining samples of a particular size due to multilayer glue connections and anatomical structure of the tooth.*

Keywords: *dentin, zirconium, composite, bonding, samples,*

1. Introduction

The main problem of today's bonded connections: tooth - filler (composite), tooth – zircon, is their limited in vivo stability. Although manufacturers usually claim very high adhesion strength, clinical tests demonstrate that the endurance of these two surfaces combination is very low. The basic mechanism of complement or zirconium fixation is the process of turning minerals from the hard tissue of the resin monomers, which are micro - mechanically locked in a porous surfaces which is created. Preferred set of samples for the strength analysis of a filled and reconstructed tooth.

Literature review shows that each type of clinical research is conducted on specially selected healthy molars. Dental practice in which dentists build a crown or bridge on healthy teeth constitutes a very small percentage. In most cases, treatments are carried out on dead teeth after endodontic (root canal treatment) fig.1.

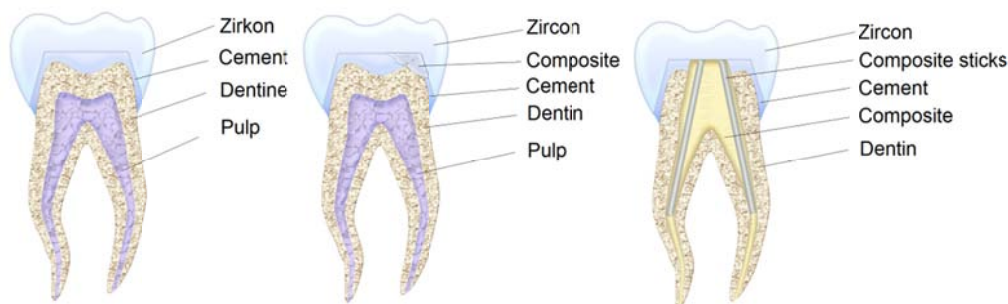


Fig 1. A schematic cross section representation of a tooth after root canal treatment, composite filler and zircon crown.

Analysis of the figure shows that after drilling and cleaning of the tooth canals, composite sticks are inserted to support the crown. This type of treatment is widely used to reduce the risk of separation of the crown from the tooth root. In the next step, the remaining hole is filled with composite filler and finally, the zirconium crown is appended. Another case demonstrates teeth which have had earlier fillings. Cavities of Class IV, V develop as a result of caries presence on the contact surface. Usually dimensions of these cavities are very large - they may occupy a half of the tooth. The loss may also result from tooth fractures. Taken the size of such a defect, an indirect (veneer, crown piece) or direct

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(filling) method of tooth reconstruction needs to be considered. There are sporadic cases of zirconium attachment in healthy teeth for stains which are hard to remove in whitening processes.

By modeling in vivo environment, where patients were previously treated for a tooth crown which is appended zircon, there is a bonded multilayer which could be schematically represented as in Fig 2.



Fig 2. A schematic representation of multilayer laminated connections

Evaluation of connection and adhesion strength for this type of join may be difficult and problematic. Therefore, a study for connection groups which constitute the complete bond as presented in Figure 2 is required: zircon - cement - composite, composite - bond - dentine, zircon - cement - dentine. The above mentioned components of the connection will be tested for fatigue. The main problem is to produce a micro study sample as each sample has to be cut along the axis of the tooth and needs to be maintained in parallel and perpendicularly to the walls. Literature review mentions the conclusion that the tested sample, due to its shape, must be placed either in a block of plaster, latex or acrylic and covered by it completely. Placing the tooth in the block cannot be random. The axis of the tooth needs to be maintained, which is not easy because each tooth from an anatomical point of view is different.

2. Summary

This paper describes three instances of tested samples with multi-layer adhesion. The article also mentions the problems associated with obtaining samples of a particular size. It is related to the anatomy of molars. Literature review leads to conclusion that the research shall be used only on and off healthy teeth after orthodontic extractions. Authors of the article realize that such cases are very rare, even purely for economic reasons. The research conducted on teeth that are already dead (root canal treated teeth) or teeth that have had cavities filled should not be detrimental to the results.

References

- Drummond J.L. (2008) Degradation, fatigue and failure of resin dental composite materials, *J Dent Res.*, Vol. 087, No. 8, ss. 710-719
- Ozkurt Z., Iseri U., Kazazoglu E. (2010) Zirconia ceramic post systems: a literature review and a case raport, *Dental Materials Journal*, pp. 233 – 245
- Staninec M., Kim P., Marshall G., Ritchie R, Marshall S. (2008) Fatigue of dentin–composite interfaces with four-point bend, *Dental Materials*, Vol. 24 ss. 799 – 803
- Tartaglia G., Sidoti E., Sforza C., (2011) A 3-year follow-up study of all-ceramic single and multiple crowns performer in a private practice: a perospective case series, *Clinical Science* 66(12) pp. 2063 – 2070
- Poitevin A., De Munck J., Cardoso M., Mine A., Peumans M., Lambrechts P., Van Meerbeek B. (2010) Dynamic versus static bond-strength testing of adhesive interfaces, *Dental Materials* Vol. 26 ss. 1068–1076