

Adaptation behaviour of Pro Root™ MTA, Biodentine™, Ketac™ fil Plus Aplicap™ und Super-EBA® in different retrograde cavities

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Introduction

If it is not possible to treat a re-symptomatic, endodontically treated tooth by an orthograde revision; an indication for a root-tip resection is given.

The primary therapeutic goal is the complete healing of an existing pathological change in the periapical area. One of the basic requirements is a bacteria-proof sealing of the retrograde filling. Although apex resection is a long-established therapy in dentistry, the need for retrograde filling and the use of various restorative materials is still being debated^{1,2,3}. However, the preparation of the retrograde cavity is also of particular importance, as studies have shown that the sealing capacity of filling materials does not depend exclusively on the material used, but also on a properly prepared cavity⁴.

The objectives of the investigation

The aim of this in-vitro study was to investigate the adaption behaviour and the homogeneity of retrograde root canal filling materials as well as the impact of various cavity preparations.

Experimental methods and material

A total of 135 human single-rooted teeth were filled with gutta-percha after endodontic treatment. The specimens had been randomly assigned to one of nine series (n=15). Specimens without retrograde root filling were used as control group. The other specimens were divided into two subgroups according to the sonically supported retrograde preparation form (parallel or retentive preparation) which contain four material groups in each case (Biodentine™, Pro Root™ MTA, Super-EBA®, Ketac fil™ Plus Aplicap). Afterwards three histological cuts were prepared at 1 mm, 2 mm, and 3 mm distance from apex. The following criteria were examined using an optical microscope (5x zoom): imperfect margin, maximal marginal gap, and the number of air pockets in each section.



Abb. 1: schematic view of the preparation of the retrograde cavity with diamond-coated sound tips

Essential results

The statistical evaluation revealed significantly better results for retentive retrograde preparation regarding the proportion of imperfect margin and the amount of air pockets than parallel preparation ($p \leq 0.05$, Tukey's test). The pairwise comparison of maximal marginal gap showed no significant differences ($p > 0.05$, Tukey's test). For the groups with Ketac fil™ Plus Aplicap fillings, there were a significantly higher proportion of maximal marginal gaps compared to all other materials ($p \leq 0.05$, Tukey's test). Furthermore, significant difference could be found considering imperfect margins compared to Pro Root MTA fillings, and air pockets compared to the fillings with Pro Root MTA, Biodentine and the control group ($p \leq 0.05$, Tukey's test).

	imperfect margin(%)	maximal marginal gap(μm)	number of air pockets (%)
parallel	5,06 ± 11,51	37,68 ± 111,48	5,86 ± 14,54
retentive	2,79 ± 6,12	38,00 ± 131,06	3,02 ± 3,02

Tab.: exemplary results depending on the configuration of the retrograde cavity (%)

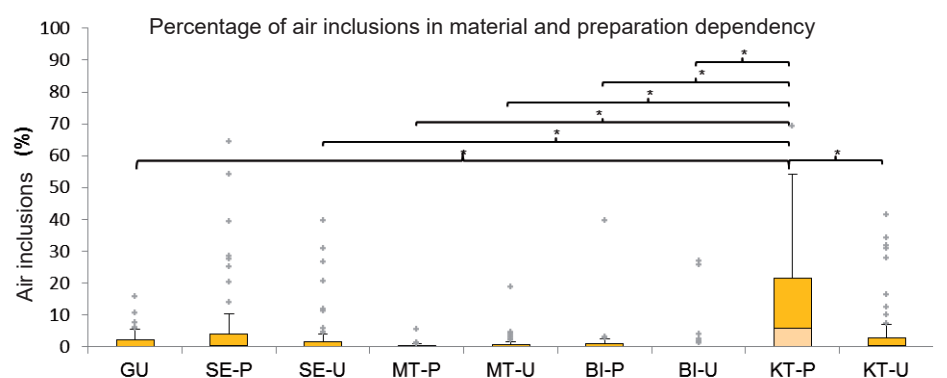


Abb.2: Graphical representation of the measured values as well as the significance using the example of the criterion of air inclusions

Conclusion

The preparation form and the selection of the retrograde root filling material during an apicoectomy can have a significant influence on the adaptation behaviour and the homogeneity of the retrograde root filling and therefore might have an influence on the clinical outcome.

Literatur

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