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Evaluation of the methods for microscopic investigation of quality of temporary filling marginal seal

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Introduction

Endodontic treatment requires the temporary closure of access opening. There is a large offer of different materials on the market.

Objectives

The aim of the study was to find a microscopic method of teeth preparation suitable for evaluation of marginal seal quality of temporary fillings.

Material and Methods

Cavities of class I and V were filled with different temporary filling materials (zinc-oxide cement, Cavit, Caviton, GIC). The dye penetration method (methylene blue) was used.
Preliminary investigation - fractured surfaces of teeth were not suitable for detailed investigation under SEM.
1. The teeth were cut using Accutom 50 (Struers), embedded into acrylic resin, ground and polished for microstructural analysis.
2. The teeth were embedded into acrylic resin, then cut using Accutom 50, ground and polished for microstructural analysis.
3. The teeth were embedded under vacuum (Epovac Struers) into slow-setting epoxy resin, then cut using Accutom 50, ground and polished for microstructural analysis.

Results

The results obtained in the preliminary study (Figs. 1-4) were not satisfactory; analysis under SEM was not possible. Methods 1 (Figs. 5-6) and 2 (Figs. 7-8) allowed the investigation under SEM nevertheless it was very difficult due to the presence of many artificial cracks. Quality of the surface obtained by method 3 was very good, without any cracks or voids and it can be recommended for further detailed studies on quality of temporary filling marginal seal (Figs. 9-28).

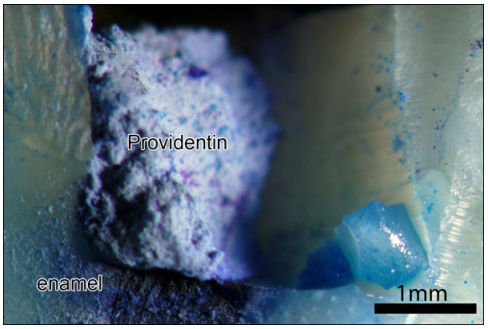


Fig. 1

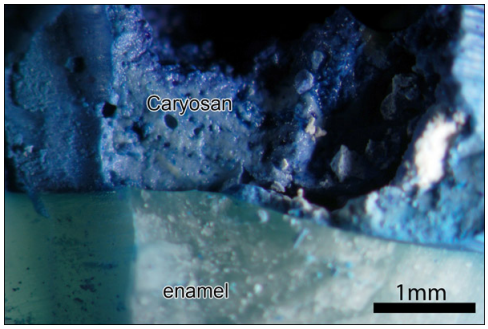


Fig. 2

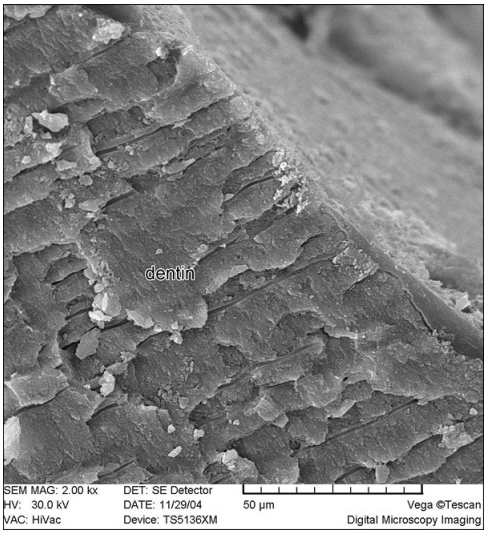


Fig. 3

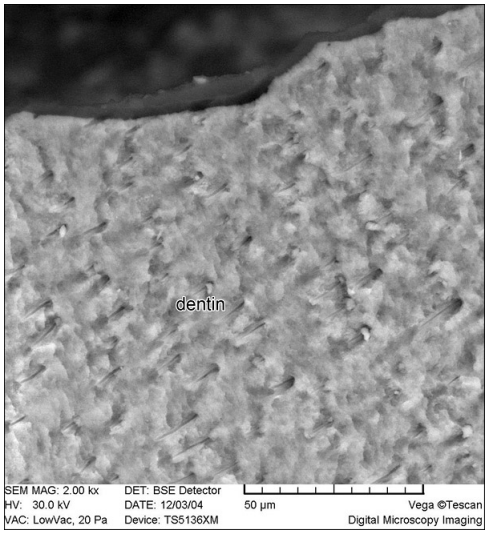
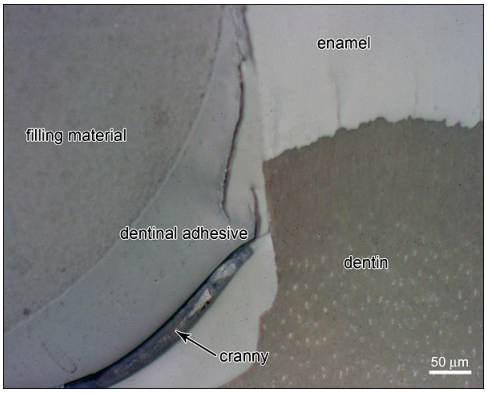


Fig. 4



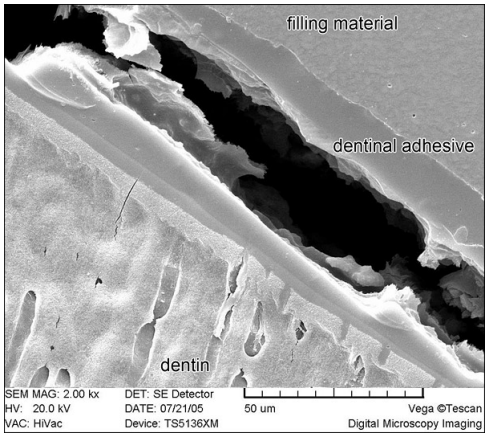
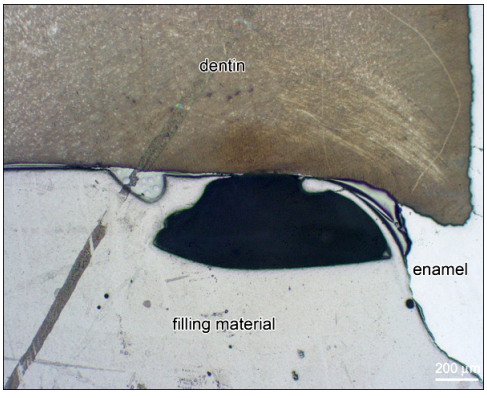


Fig. 5-6: Testing marginal seal quality



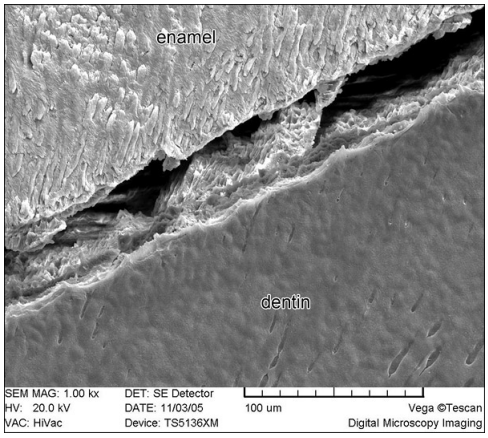
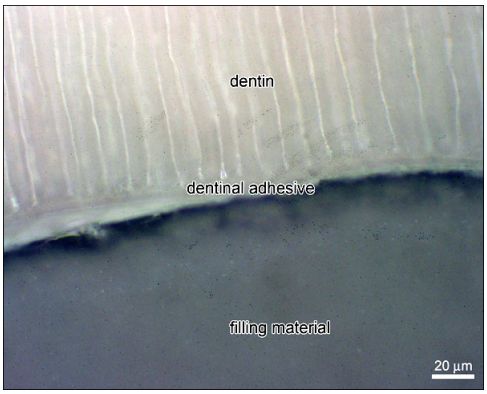


Fig. 7-8: Testing marginal seal quality



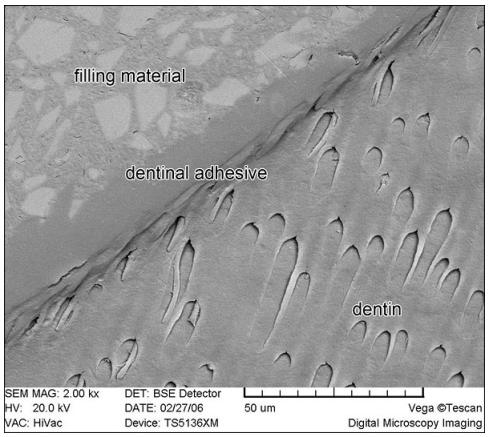
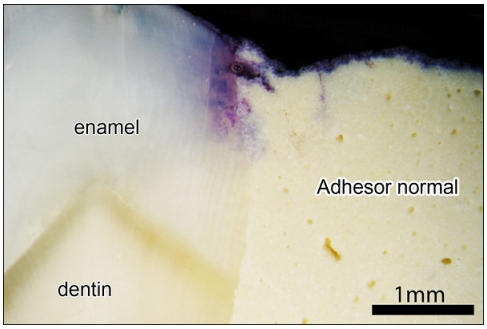


Fig. 9-10: Testing marginal seal quality



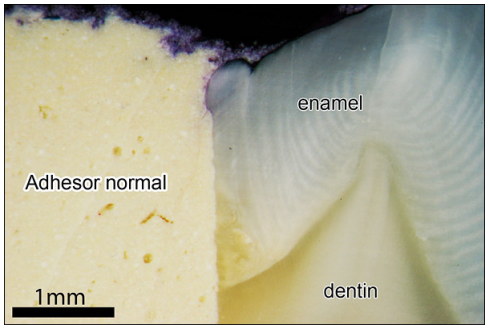
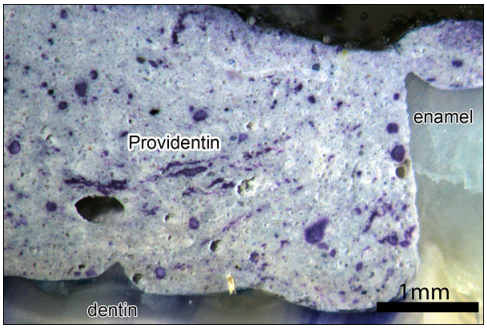


Fig. 11-12: Testing marginal seal quality



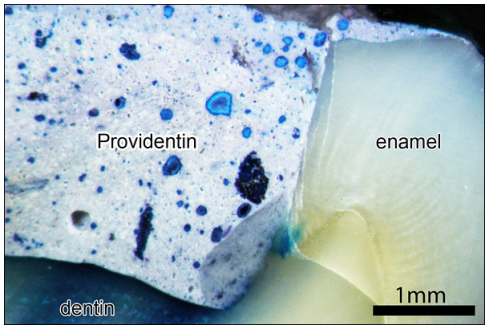
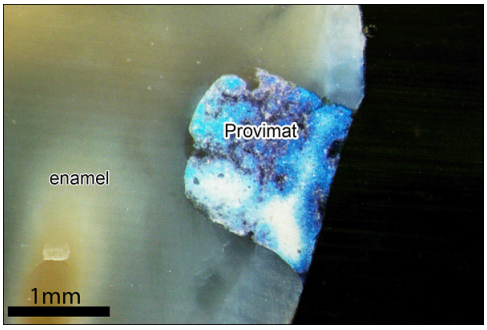


Fig. 13-14: Testing marginal seal quality



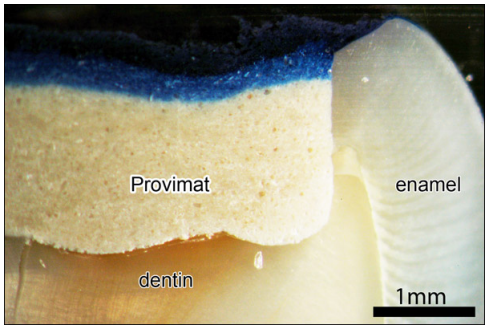
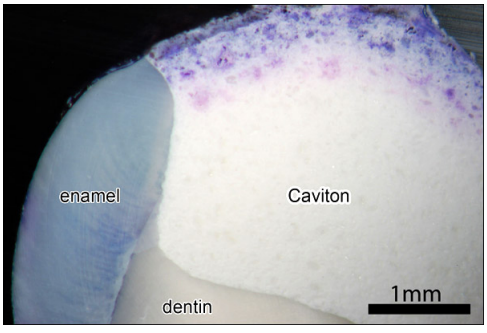


Fig. 15-16: Testing marginal seal quality



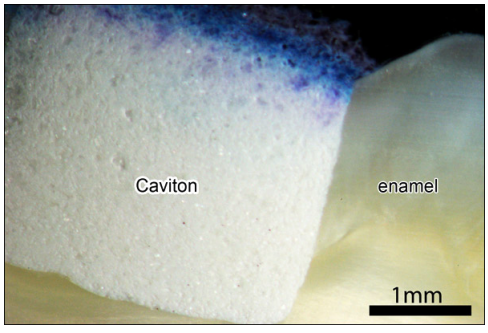
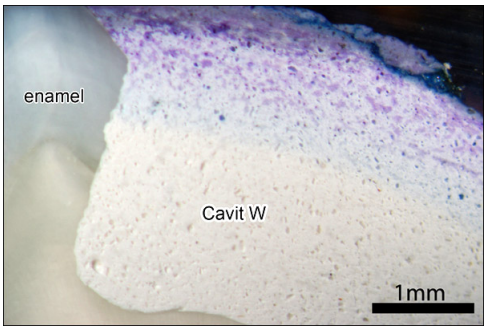


Fig. 17-18: Testing marginal seal quality



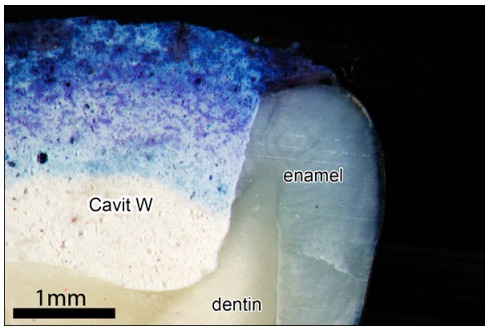
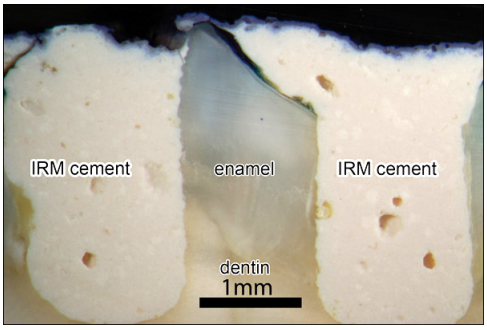
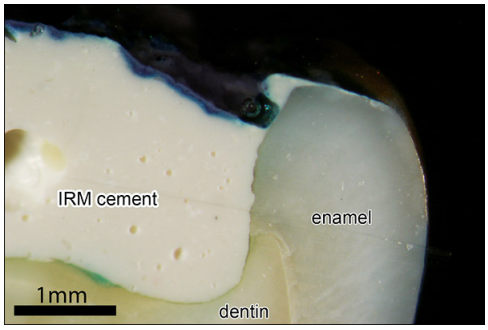


Fig. 19-20: Testing marginal seal quality





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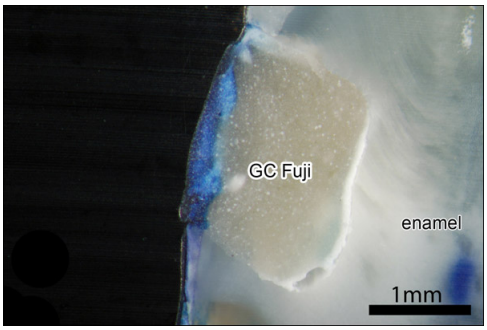


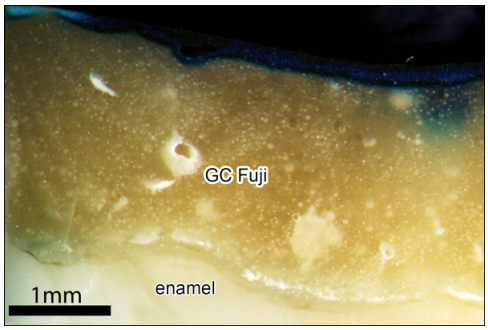
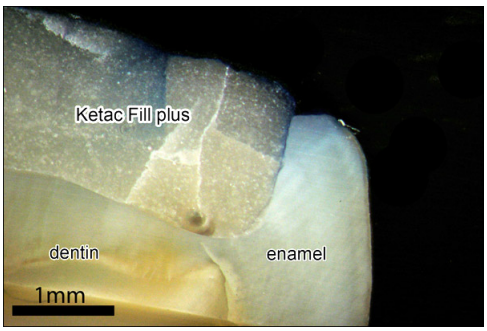


Fig. 23-24: Testing marginal seal quality



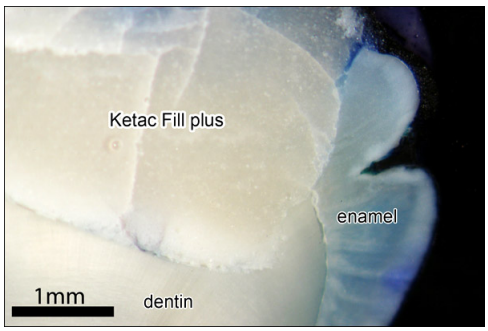
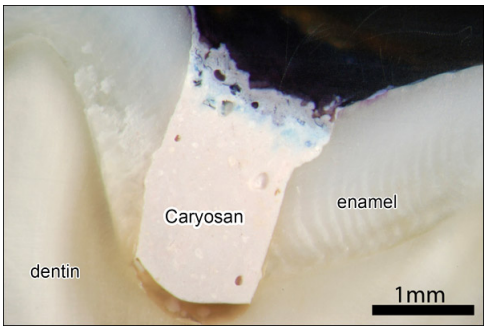


Fig. 25-26: Testing marginal seal quality



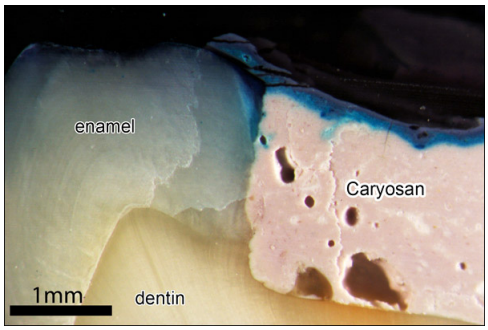


Fig. 27-28: Testing marginal seal quality

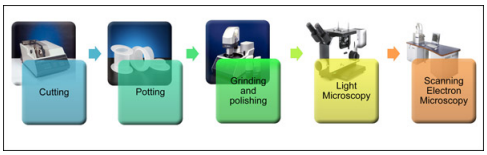


Fig. 29: Method 1

Fig. 30: Method 2

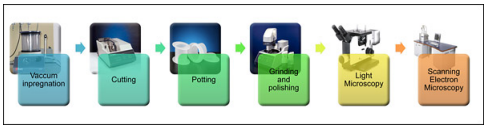


Fig. 31-32: Method 3

Conclusions

Many temporary materials have been studied to determine their ability to seal the cavity. Samples for microscopic investigation were most frequently prepared using slow speed diamond saw without any embedment material [1], [2] or the teeth were broken into half parallel to their long axis [3]. Better results were obtained when the specimens were immersed into cold curing resin and after polymerization were sectioned with a low speed diamond cutter [4]. In our study three procedures of sample preparation for microscopic investigation were evaluated. The method of sample preparation using vacuum system was found the most suitable for marginal seal evaluation.

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3. Suehara, M.; Suzuki, S.; Nakagawa, K. Evaluation of wear and subsequent dye penetration of endodontic temporary restorative materials. Dental Materials Journal. 2006, 25, 2, s. 199-204.
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Abbreviations

GIC: Glass Ionomer Cement
SEM: Scanning Electron Microscopy

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Poster Faksimile: