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Obturation protocol for general practice

Summary

Introduction
Recent advances in material sciences allow for straightforward obturation protocols in general practice.

Methods
Single-cone obturation using a bioactive calcium silicate-based sealer (BioRoot™ RCS; Septodont; Saint-Maur-des-Fossés, France) was used in two cases, which were followed up for up to 16 months.

Discussion
Practical benefits include the indication for single-cone obturation, easy post-obturation access to clear the cavity with water, and reduced treatment time and postoperative pain.

Conclusion
BioRoot™ RCS offers high chances of success for endodontic treatments in general practice.

septodont

Introduction

The primary objective of a root canal treatment is to shape, disinfect and obturate the root canal system to prevent further infection. Besides clinical effectiveness, treatment duration and the pain experience are important to patients as well.

One of the most significant advancements in endodontics in recent years has been the introduction of hydraulic calcium silicate (bioceramic) materials for obturation, like the fully synthetic tricalcium silicate sealer BioRoot™ RCS. Bioceramic sealers are known for their excellent biocompatibility and bioactivity, which means they can stimulate bone mineralisation, facilitate the repair of periapical tissues, and consequently promote the healing process.[1] Additionally, a recent systematic review and meta-analysis suggests that bioceramic sealers may be associated with less post-operative pain and discomfort for patients compared to epoxy resin-based sealers, contributing to a better patient experience.[2]

BioRoot™ RCS allows for effective sealing due to tag-like structures at the dentine interface when employing the cold single-cone technique.[3] As a result, this material can be used in the single-cone technique, reducing treatment time compared to the warm-vertical compaction technique.[4]

Taking the above-mentioned aspects into account, BioRoot™ RCS can be an effective material for use in general practice. The following case reports illustrate the effective use of BioRoot™ RCS in daily practice cases which can be effectively solved by general dentists.

Case report 1: Second upper molar with straight roots

Clinical signs and symptoms

A 43-year-old female patient presented to the Department for Oral Diagnostics, Digital Health and Health Services Research at Charité - Universitätsmedizin Berlin with moderate pain while chewing in the area of tooth 27. Additionally, the patient reported a partial fracture of the tooth. Clinically, there was no response to cold testing and no mobility, but tenderness to percussion was observed. The periapical radiograph ***(Fig. 1)*** revealed an extremely deep caries lesion reaching into the inner part of the dentine, but no signs of a periapical lesion were visible.

Fig. 01

Diagnosis

The clinical and radiographic findings indicated an extremely deep caries lesion with concomitant pulp necrosis and symptomatic apical periodontitis.

Procedure and treatement

At the first visit, non-selective caries removal was performed, and a pre-endodontic build-up was placed using a bulk-fill composite (SDR, Dentsply-Sirona, Charlotte, USA) ***(Fig. 2)***. Three root canals were successfully located, and the working length was confirmed

Fig. 02

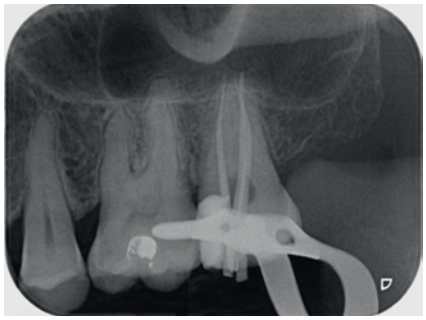

Fig. 03

Fig. 04a

Fig. 04b

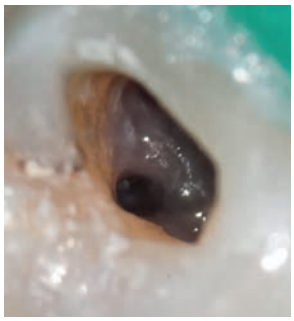

Fig. 04c

Fig. 05a

Fig. 05b

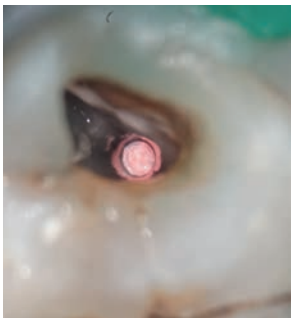

Fig. 05c

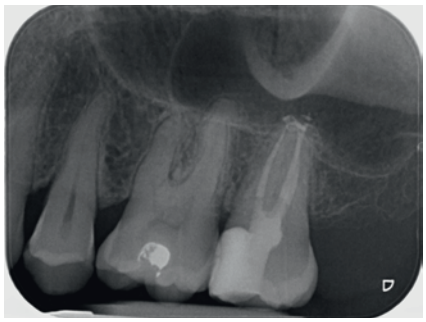

Fig. 06

radiographically *(Fig. 3)*. Subsequently, all root canals were enlarged with HyFlex CM (Coltène, X) up to 40.04. During the preparation, pus exudation was observed from the palatal root canal. All root canals were thoroughly irrigated with 3% sodium hypochlorite (NaOCl) and temporarily sealed with a calcium hydroxide intracanal dressing and glass ionomer cement.

After ten days, the patient was free of any symptoms. The final irrigation was done with activated 17% ethylenediaminetetraacetic acid (EDTA) and 3% NaOCl. Before obturation, all canals were rinsed with 0.9% saline solution and dried using paper points *(Fig. 4a-c)*. BioRoot™ RCS, which is a bioactive calcium silicate root canal sealer, was manually mixed with five drops of the liquid for a duration of 60 seconds on a sterile glass surface. The sealer was applied into the root canals using a gutta-percha point with gentle, oscillating movements, following the manufacturer's guidelines. Subsequently, the properly fitted gutta-percha points were coated with BioRoot™ RCS, inserted into the root canals, and trimmed at the orifice level using a heat-plugger. The upper part of the melted gutta-percha was meticulously condensed to ensure a suitable coronal seal. Ultimately, any excess material was flushed out with water and dried using compressed air *(Fig. 5a-c)*. The quality of the root canal filling was assessed through a postoperative periapical radiograph *(Fig. 6)*.

Follow up

16 months later, the root canal treatment was so far successful as the patient was still free of any symptoms and the radiograph showed no signs of an apical lesion *(Fig. 7)*.

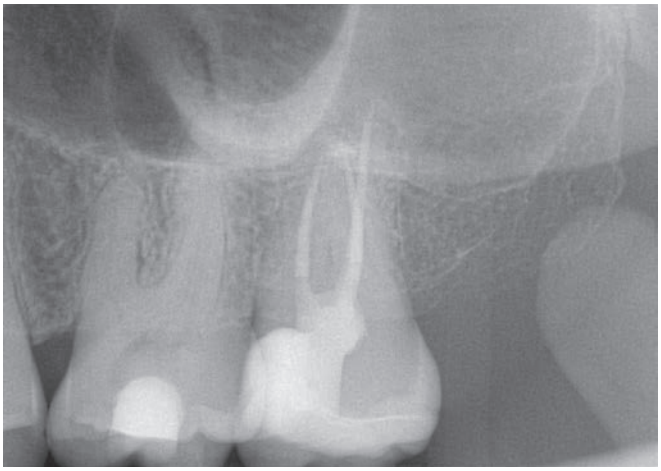

Fig. 07

Case report 2:
Lower first molar with straightforward anatomy

Clinical signs and symptoms

A healthy 30-year-old patient visited the clinic with a previously accessed tooth 46. During the first visit, the patient was pain-free, but she described a history of persistent severe pain before beginning root canal treatment. The preoperative radiograph ***(Fig. 8)*** shows the access cavity and an apical lesion at the mesial root.

Diagnosis

By amalgamating the patient's information and the preoperative radiograph, the initial diagnosis strongly suggested symptomatic apical periodontitis accompanied by an apical lesion.

Procedure and treatement

The treatment was scheduled for two appointments. At the first visit, the initial access cavity ***(Fig. 9a, b)*** was refined and the four root canals were located. Then, all root canals were carefully prepared up to 40.04 (HyFlex CM) under copious irrigation with 3% NaOCl ***(Fig. 10a-c)***. The preparation and working length were confirmed by a periapical radiograph ***(Fig. 11)***. Calcium hydroxide was placed into the canals, and the cavity was temporarily sealed with glass ionomer cement.

At the second visit, the patient was still symptom-free and all canals were obturated using BioRoot™ RCS, as previously described in Case 1 ***(Fig. 12a-c)***. Finally, the assessment of the root canal filling was conducted using a postoperative periapical radiograph ***(Fig. 13)***.

Follow up

At the follow-up visit 12 months later, the patient was pregnant, so a periapical radiograph was not indicated. Nevertheless, the patient remained symptom-free during the observation period.

Fig. 08

Fig. 09a

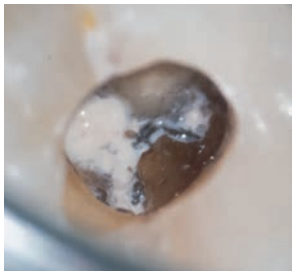

Fig. 09b

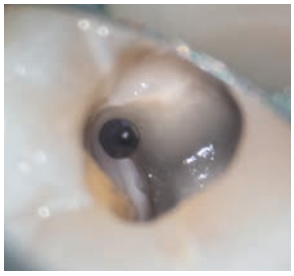

Fig. 10a

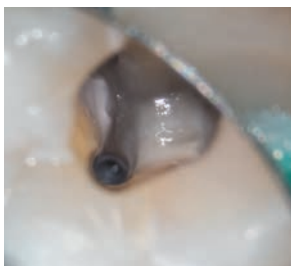

Fig. 10b

Fig. 10c

Fig. 11

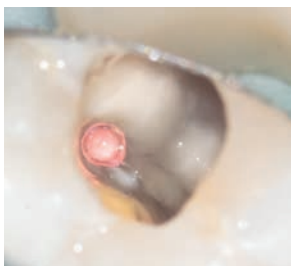

Fig. 12a

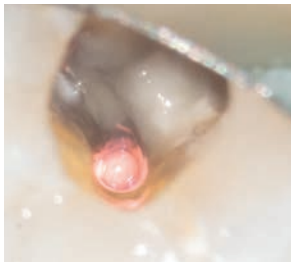

Fig. 12b

Fig. 12c

Fig. 13

Discussion

In summary, using a bioceramic root canal sealer offers general dentists a range of advantages, including enhanced biocompatibility and bioactivity compared to epoxy resin-based sealers, which display initial cytotoxic effects.[5] Bioactive sealers, on the other hand, have a favourable impact on immune cells and the inflammatory process.[1,6] Furthermore, the set material fosters periodontal ligament cell adhesion and aids in the healing process by releasing calcium and silicon ions, along with calcium hydroxide.[7,8]

From a practical point of view, the composition of BioRoot™ RCS enables straightforward post-obturation cleaning of the access cavity with water. When combined with the single-cone technique, this material can significantly reduce treatment time.

All the factors mentioned can enhance patient outcomes by reducing both treatment time and postoperative pain.[2,4]

Conclusion

The described single-cone obturation technique using BioRoot™ RCS allows for successful treatment and patient outcomes in general practice.

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