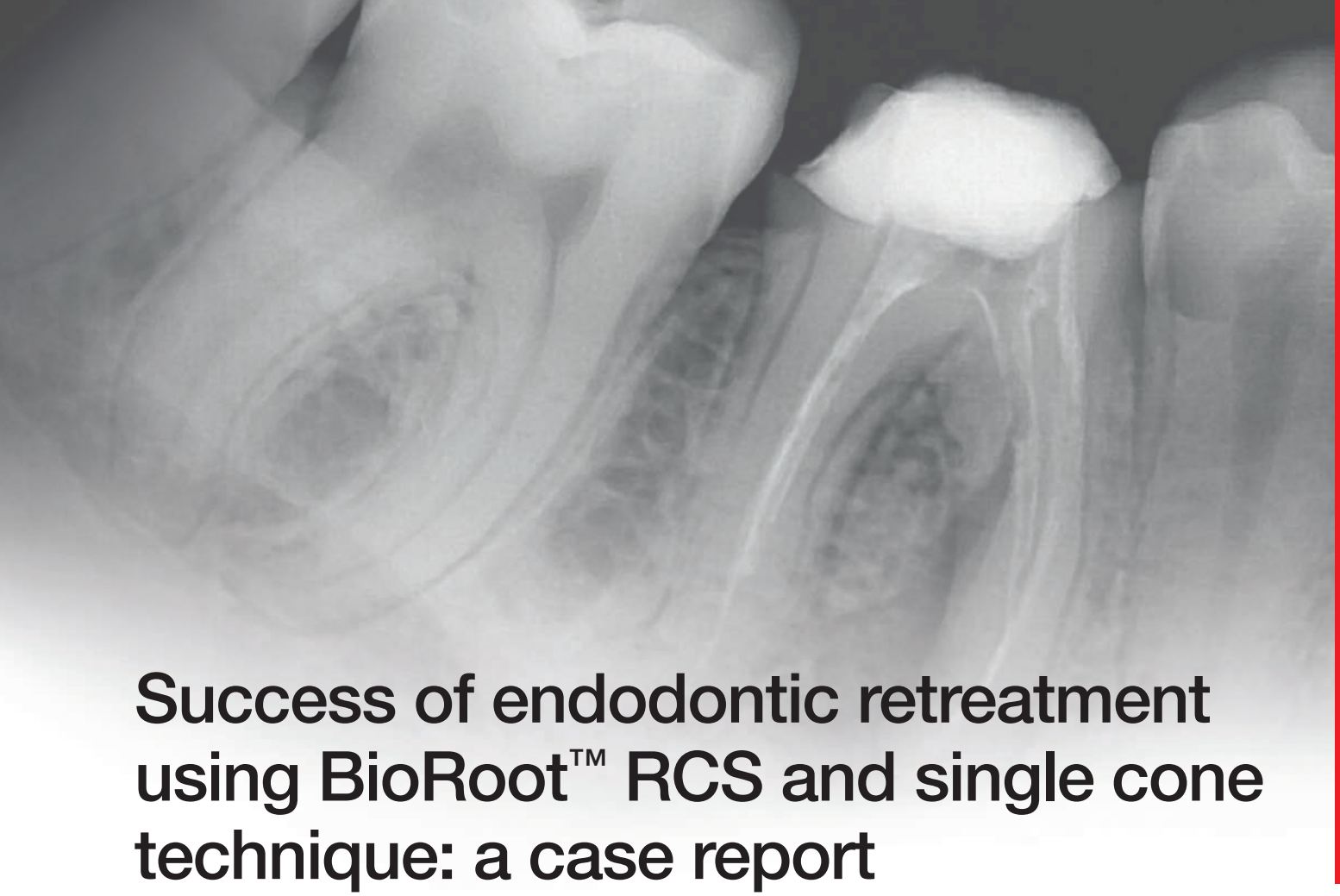

Success of endodontic retreatment using BioRoot™ RCS and single cone technique: a case report

Prof. Dr. André Luiz da Costa Michelotto

Summary

Introduction: The aim of the present study was to describe a case of endodontic retreatment in a mandibular molar with symptomatic apical periodontitis.

Methods: The treatment was carried out using contemporary techniques and a simple endodontic obturation with BioRoot™ RCS bioceramic endodontic sealer (Saint Maur Des Fosses, France).

Discussion: Bioceramic endodontic sealers have several advantages, including properties such as biocompatibility and bioactivity, stimulating bone formation. In cases of apical periodontitis, it is convenient to use a material with these characteristics. With the development of these sealers, a simple endodontic obturation can be used. Thus, in this case report, the single cone technique associated with a bioceramic sealer was used to perform the obturation of the root canal system.

Conclusion: The obturation with the single cone technique associated with BioRoot™ RCS bioceramic sealer provided success in the case of symptomatic apical periodontitis, with extensive bone loss.

Introduction

The objectives of endodontic treatment are the prevention and treatment of apical periodontitis. Maximum amount of organic, live, or decomposed substrate and microorganisms must be eliminated to achieve the root canal system disinfection. (1) It is essential for the success of endodontic treatment that all steps are performed correctly, and an error in one of them can lead to failure.

The final goal of endodontic therapy is to obtain a endodontic obturation that allows tridimensional sealing of the root canal system, using a nonirritant material to support periapical healing. Currently, endodontic sealers with bioactivity deserve special mention, that is, the ability to stimulate repair and deposition of mineralized tissue. Among these sealers it is possible to highlight BioRoot™ RCS, developed by Septodont (Saint-Maur-des-Fossés, France), based on calcium silicate and which presents zirconium oxide as a radiopacifying agent. Its components exhibit high purity and presentation in powder-liquid form. The development of these new sealers, whose physical-chemical properties improve in the presence of moisture and involve chemical adhesion to dentin (2,3) helped to popularize the single cone technique. This technique, with greater taper gutta-percha cones, made filling the root canals a faster and simpler procedure, while minimizing the forces applied to the root canals walls by the spreaders, without decreasing the quality of the apical sealing. (4) The reported results are similar to the classic techniques of lateral compaction and vertical compaction, either in relation to the percentage of voids volume (5) or to the depth of penetration of sealer into the dentinal tubules. (6) The obturation technique with a single cone basically consists of the insertion of a single cone in the root canal, usually of the same diameter and taper of the last instrument used for the apical preparation and thus adapted to the anatomical configuration of the prepared canal, associated with an endodontic sealer.

Therefore, the aim of this report was to present the diagnosis and endodontic management of a retreatment clinical case of permanent mandibular first molar with apical periodontitis, by using BioRoot™ RCS sealer and a single cone technique for the root canal system obturation.

Case report

The patient, a 32-year-old Caucasian woman was referred for endodontic retreatment of tooth 46. She was undergoing endodontic retreatment, but as the tooth remained sensitive, the dentist preferred refers the patient to another professional. Radiographic examination revealed the presence of remnant of filling material and extensive periapical lesion in the mesial root ***(Fig. 1)***. On clinical examination, the tooth was symptomatic, with spontaneous, moderate, and controlled pain

Fig. 1: Pre-operative radiograph. Note periradicular lesion in the mesial root.

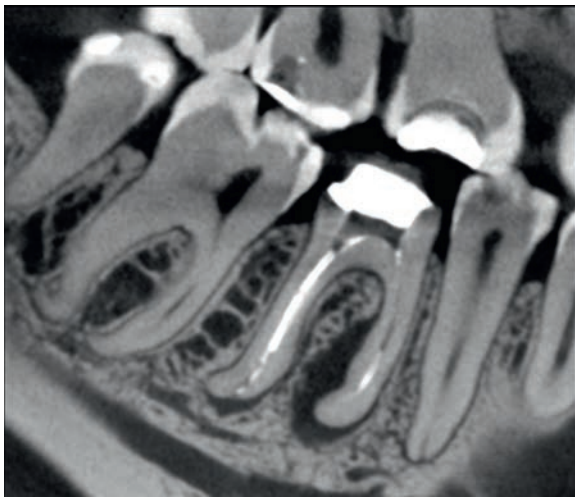

Fig. 2: CBCT sagittal image.

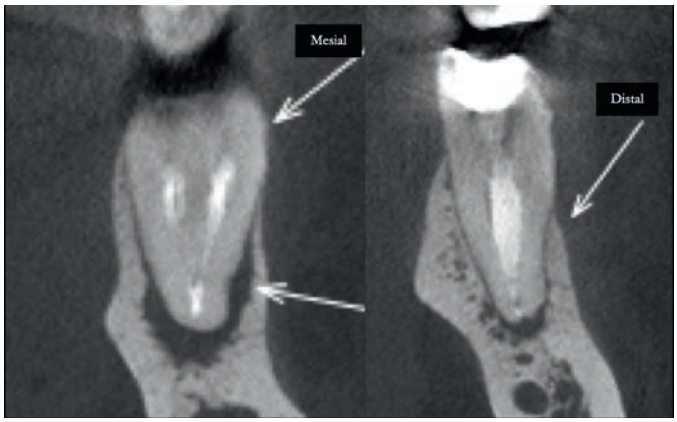

Fig. 3: CBCT coronal images.

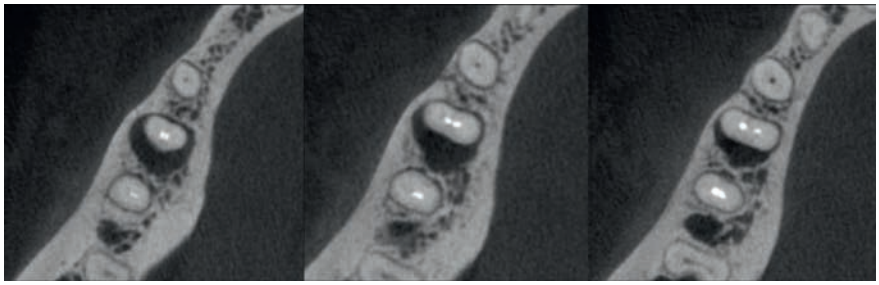

Fig. 4: CBCT axial images.

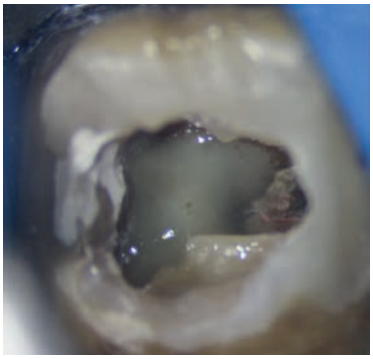

Fig. 5: After temporary filling removal, presence of purulent secretion.

with analgesic medication, characterizing as a diagnosis a symptomatic apical periodontitis. To establish a treatment plan and rule out the presence of crack in the mesial root, which would be suggestive depending on the aspect and extent of the lesion around the root, a CBCT (Prexion Elite, Tokyo, Japan) was requested. The scanning parameters were 90KVp, 5mA, a spatial resolution of 150 µm and a field of view of 50 x 50 mm. The tomographic image showed an extensive lesion in the mesial root and a smaller area of bone rarefaction in the distal root ***(Fig. 2, 3, 4)***. The presence of crack was discarded. From these data, it was proposed for the patient to continue the endodontic retreatment.

During the first visit, an inferior alveolar nerve block followed by buccal infiltration was performed with epinephrine 1: 100 000 and with 2% mepivacaine (Mepivalem AD, DLA Pharmaceutical, São Paulo, Brazil). The tooth was isolated with a rubber dam and the temporary restoration was removed with

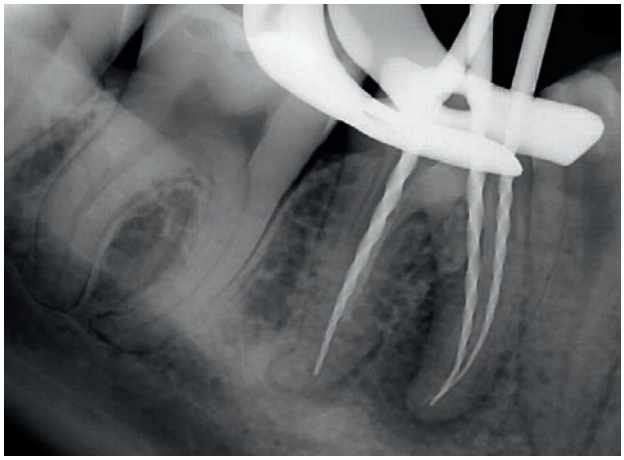

Fig. 6: Rx with Niti CM instruments after root canal preparation. The foraminal exit of the distal root does not coincide with the radiographic apex.

a round high-speed diamond bur (1014, KG Sorensen, Cotia, Brazil). After this, a little purulent collection was drained ***(Fig. 5)***. The four root canals were negotiated with C-Pilot # 10 and # 15 (VDW Dental, Munich, Germany) and the instrumentation was performed with NiTi CM Pro-T system (MK Life, Porto Alegre, Brazil) ***(Fig. 6)***. The canals were copiously irrigated with 2.5% sodium hypochlorite (8 mL per root

canal) and a final rinse with 17% EDTA for 3 min was performed before drying the canals with matched paper points # 30 (VDW Dental, Munich, Germany). An ultrasonic tip (Irrisonic, Helse, São Paulo, Brazil) was used to agitate the irrigating solution, with 3 cycles of 20 seconds for each solution. An intracanal dressing with calcium hydroxide paste (UltraCal XS, Ultradent) was applied for 30 days. The entire procedure was performed under an operating microscope.

In the second visit the tooth was without symptoms. The root canals were irrigated in the same way as in the first visit. After drying with paper points, the root canals were filled with gutta-percha and BioRoot™ RCS sealer (Septodont, Saint-Maur-des- Fossés, France) by using the single cone technique ***(Fig. 7, 8, 9, 10)***.

The patient considered continuing the prosthetic procedure only after the success of the endodontic treatment was confirmed. A 5-month follow-up CBCT was taken showing total repair in the distal root and in final stage in the mesial root ***(Fig. 11, 12, 13)***. A 7-month follow-up X-ray was taken, showing the presence of a filling core with fiber post, suggesting normal periapical tissues and the patient presents without symptoms ***(Fig. 14)***.

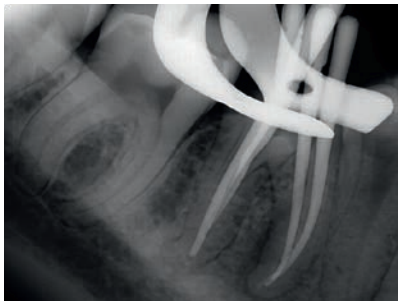

Fig. 7: Gutta-percha master cones fitted to length.

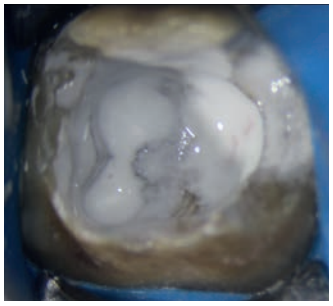

Fig. 8: Image after cutting the gutta-percha cones showing the BioRoot™ sealer.

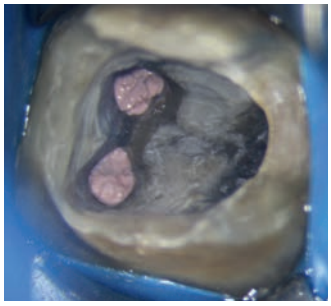

Fig. 9: Access cavity cleaned.

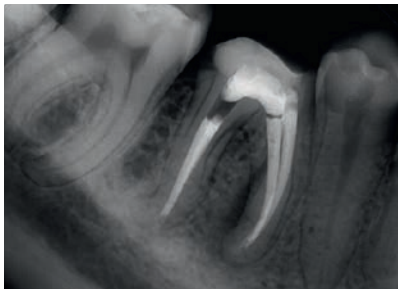

Fig. 10: Post-operative radiograph.

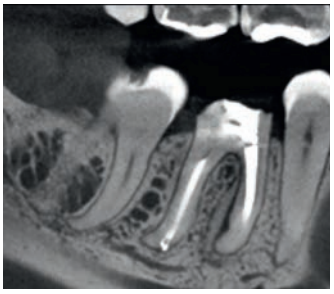

Fig. 11: CBCT sagittal image (5-month follow-up).

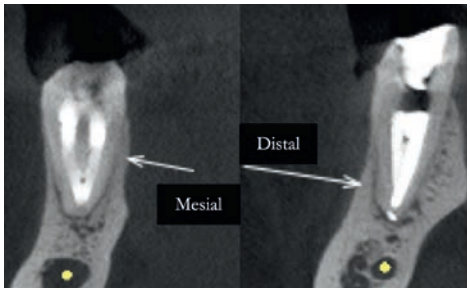

Fig. 12: CBCT coronal images (5-month follow-up).

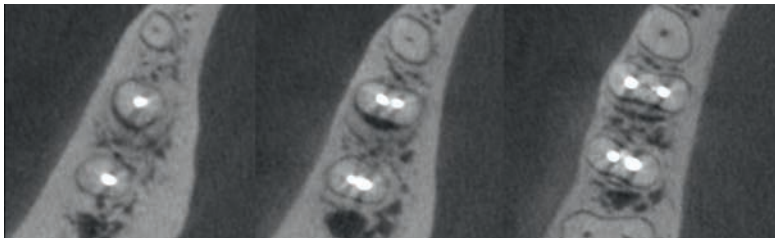

Fig. 13: CBCT axial images (5-month follow-up).

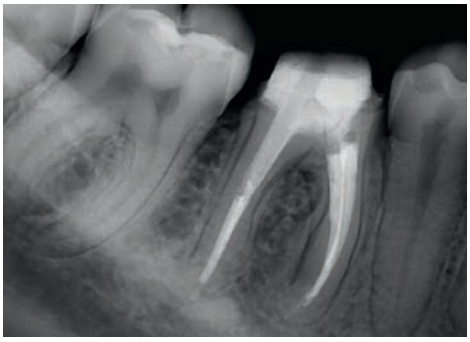

Fig. 14: 7-month post-op showing complete periapical healing.

Discussion

Correct cleaning and complete instrumentation of root canals are the factors that influence the success of endodontic therapy. Regarding the clinical management of the root canal system, the literature reports the importance of resources such as computed tomography for diagnosis, microscopic magnification, and the use of ultrasonic tips. In addition, preparation with rotatory NiTi systems is indicated, mainly due to the curvatures that may be present these root canals. All these resources were used in the present clinical case.

The final goal of endodontic therapy is a root canal filling that allows impermeability of the system with a non-irritant material that stimulates periapical healing (7). Gutta-percha associated with a sealer has been considered the choice material due to good tissue tolerance, good adaptation to root canal walls, satisfactory dimensional stability, radiopacity and easy removal. Currently, bioceramic endodontic sealers have been a material of choice mainly due to their bioactive property, inducing proliferation and binding of cells close to cement and have the potential to induce angiogenesis and osteogenesis, which are prerequisites for the regeneration of periapical tissues. (8)

BioRoot™ RCS has been increasingly popular since its introduction and has become one of the materials of choice in cases of open apices and extensive periapical lesions (9). Its popularity is due in large measure to its excellent biocompatibility, remarkable sealing properties, hydrophilicity, and its capacity to promote both healing and tissue mineralization (10,11). Due to these excellent properties, a simplified technique can be used to fill the root canals. The single cone technique, using cones with greater taper, can be applied in most cases, and because it is simple to perform, it facilitates and optimizes this step.

The biocompatibility of the sealer is also apparent in this case: despite the puff that were produced in the distal root canal, the patient remained completely asymptomatic. In addition, the repair that occurred after 5 months shows its bioactive potential by stimulating bone neo-formation. The success observed in the present clinical case shows that the use of BioRoot™ RCS endodontic sealer with a single cone technique is an excellent option for filling the root canal system.

Conclusion

The endodontic obturation performed with BioRoot™ RCS bioceramic sealer combined with the single cone technique, allowed to achieve success in endodontic retreatment in a case of symptomatic apical periodontitis with extensive bone loss.

Author:
Dr. André Luiz da Costa Michelotto
Specialist in Endodontics (Federal University of Paraná, 1998); PhD in Endodontics (University of São Paulo, 2009); Professor of Endodontics at the Federal University of Paraná (Curitiba, Brazil); Coordinator of Endodontics postgraduate program at the São Leopoldo Mandic School of Dentistry (Curitiba, Brazil); Private practice limited to Endodontics since 1997 (Curitiba, Brazil)

References

1. Siqueira JF, Roças IN. Clinical implications and microbiology of bacterial persistence after treatment procedures. J Endod. 2008; 34(11):1291-1301.
2. Moinzadeh AT, Zerbst W, Boutsioukis C, et al.: Porosity distribution in root canals filled with gutta percha and calcium silicate cement. Dent Mater 2015; 31:1100-1108.
3. Viapiana R, Moinzadeh AT, Camilleri L, et al.: Porosity and sealing ability of root fillings with gutta-percha and BioRoot™ RCS or AH Plus sealers. Evaluation by three ex vivo methods. Int Endod J 2016; 49:774-782.
4. Tasdemir T, Yesilyurt C, Ceyhanli KT, et al.: Evaluation of apical filling after root canal filling by 2 different techniques. J Can Dent Assoc 2009; 75:201a-201d
5. McMichael GE, Primus CM, Opperman LA: Dentinal tubule penetration of tricalcium silicate sealers. J Endod 2016; 42:632-636.
6. Jeong JW, DeGraft-Johnson A, Dorn SO, et al.: Dentinal tubule penetration of a calcium silicate-based root canal sealer with different obturation methods. J Endod 2017; 43:633-637.
7. Schilder H. Filling root canals in three dimensions. Dent Clin North Am. 1967 Nov:723-44.
8. Camps J, Jeanneau C, Ayachi IL, Laurent P, About I. Bioactivity of a Calcium Silicate–based Endodontic Cement (BioRoot™ RCS): Interactions with Human Periodontal Ligament Cells In Vitro. J Endod 2015; 41:1469-73.
9. Argueta JO. BioRoot™ RCS, a reliable bioceramic material for root canal obturation. Septodont Case Studies Collection 2017; 15:4-8.
10. Simon SFT. BioRoot™ RCS a new biomaterial for root canal filling. Septodont Case Studies Collection 2016; 13:4-10.
11. Koch JD, Brave D. Bioceramics. 2012 Part 1: The Clinician's Viewpoint. Dent Today.

BioRoot™ RCS

Indications: Permanent root canal filling in combination with gutta-percha points in case of inflamed or necrotic pulp.
Permanent root canal filling in combination with gutta-percha points following a retreatment procedure.
BioRoot™ RCS is suitable for use in single cone technique or cold lateral condensation.