

## Endodontic retreatment and bioceramics: A case report

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**The success rate in endodontic retreatment can be significantly boosted by using materials that guarantee both intimate adhesion to the canal walls and long-term stability. Bioceramic cements used in root filling show interesting properties including extraordinary sealing capacities, antimicrobial activity that stimulates periapical healing and the continuous production of hydroxyapatite for a long time. This case report deals with the application of bioceramic cement in endodontic retreatment. The Bioroot RCS (Septodont), thanks to its ability to firmly adhere both to the gutta-percha and to the walls of the canal and to definitively seal the apical third, can allow to obtain extraordinary healing in a relatively short time by exploiting its antimicrobial abilities. However, further studies are needed to assess the effectiveness of this technique over the long term.**

Primary endodontic treatment does not always lead to clinical success. The causes are many and can be determined by three main consequences: incomplete cleaning, modeling or filling of root canals, the presence of radiologically visible lesions and pain during both percussion and during palpation and chewing (1-16).

Retreatment is the best therapeutic approach to solve these clinical situations and if well performed, the literature reports a success rate of 85%. The goal is to improve the initial therapy by modeling, cleaning and filling the parts that may not have been treated with the aim of drastically reducing the contamination of bacteria present in root canals, responsible for endodontic lesions (17-29).

Endodontic retreatment is recommended in the presence of radiologically visible lesions, iatrogenic damage, incongruous treatment, even in the absence of symptoms or persistent painful symptoms even in the absence of lesions (30-40).

It is mandatory to follow a systematic approach: isolation with rubber dam, removal of the previous restoration and any decomposed tissue, obtaining proper access to the root canal system, removal of materials within the endodontic space and shaping, cleaning and filling of the channels.

The success rate in endodontic retreatment is certainly lower than the primary treatment because inside the canals you can find some bacterial species, such as *Enterococcus faecalis* and *treponema denticola*, which are much more resistant to the various mechanical and irrigation phases that characterize a rework and for their ability to penetrate the dentinal tubules and reactivate after a long time. Therefore, the success rate can be significantly increased by using materials that guarantee both intimate adhesion to the canal walls and long-term stability (41-45).

The gold standard of the endodontic seal was Schilder's vertical hot condensation, whereas today

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the trend is to believe that the single cone cold closure associated with bioceramic cement (46) can provide us with the three-dimensional stability of the long-term endodontic seal we are constantly looking for (47-62).

In fact, with hot sealing, gutta-percha contracts as it cools, creating a gap between itself and the walls of the canal, which over time will potentially allow any residual bacteria to recolonize the endodontic space; bioceramics, on the other hand, are cements that have exceptional properties. In fact, they showed no resin presence and therefore no shrinkage, no vacuum in the interface, no tubular infiltration and allowed the formation of hydroxyapatite and dentine mineralization.

### *Clinical case*

39-year-old male Caucasian patient, MLR, reported by a colleague who could not completely remove a fiber post in the distal root; he was performing reprocessing because the root canals, under radiographic examination, seemed to be undersized and poorly prepared. The patient complained of pain during palpation and percussion, as well as the presence of an active vestibular fistula. The radiographic examination showed an extensive periradical lesion of the mesial root. Once the operating field is isolated, the pin is removed from the distal root through the use of the operating microscope and the d.l. channel has been found and treated; at the same time the old filling material is



**Fig. 1.** A Large osteolytic lesion at the medial root of 3.6 with partial and incomplete treatment of the root canal system and fiber pin on distal root.



**Fig. 2.** Closure of the four root canals present on 3.6 (Mv, Ml, Dv and Dl) with abundant leakage of Bioroot on the medial root.

removed from the m.v. and m.l. channels, which proved to be undersized in the preparation, creating an adequate preparation under continuous alternating washing of hypochlorite and 17% EDTA constantly activated with sonic tips (63-70).

The root canal closure was performed cold with gutta-percha cones, chosen according to the new canal preparation, and Bioroot RCS. The control rx performed 3 and 5 months after the closure shows that, even in a very short time, there was a complete restitutio ad integrum of the hard foil obtaining a surprising healing. (Fig. 1-4).

### DISCUSSION

Bioceramics are today quite well-known materials in the literature, especially because they represent an important step forward in the search for the ideal root canal sealant. Bioroot RCS guarantees countless properties including good sealing capabilities, antimicrobial activity that stimulates periapical healing. It is a bioactive material that continues to produce hydroxyapatite for a long time after mixing, adapting to the dentinal walls and optimising its sealing capacity. It is an interesting material because it adheres tenaciously to both dentin and gutta-percha, so it can be used in cold sealing techniques. At first the cone is prepared according to the diameter and taper that is given to the canal so as



**Fig. 3.** *Three-month control X-Ray indicating a healing process with activation of remineralization bone.*



**Fig. 4.** *Five-month control X-Ray showing complete healing and complete remineralization of the bone.*

to have the correct tie-rod back to its working length, while the cement is mixed to obtain a viscous/fluid consistency (71-74).

Then the cone is wetted with cement and inserted several times until the channel is submerged by the cement and the surfaces of the master cone are completely covered by it. In this way we will be sure that our Bioroot RCS cement will seal the apical part of the canal where the greatest chance of endodontic success is played. Cold sealing, as other endodontic cements on the market can be absorbed over time, has always been considered an ineffective technique. On the other hand, with the advent of bioceramics, cement plays a crucial role because it permanently

seals the apex of the canal by itself. The gutta-percha cone - which must be brought to the apex - has the function of being only a guide for possible future reprocessing (75-80).

The case described above shows us how the Bioroot RCS, thanks to its ability to adhere firmly to both the gutta-percha and the walls of the canal and to permanently seal the third apical, can allow us to achieve extraordinary healing in a relatively short time by exploiting its antimicrobial capabilities. Further clinical studies must be carried out to evaluate the long-term effectiveness of this technique.

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