CASE REPORT · SCIENCE & CLINIC

Use of high-power intracavitary radiofrequency for osteogeneration in a patient at risk of molar loss

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Abstract

The case of a girl with periodontal disease due to a dental abscess in the lower left first temporary molar (tooth 74) is presented. Clinically she showed an acute apical abscess and, radiologically, a radiolucent lesion at the level of the dental furcation, with loss of periodontal bone tissue on the radiographic images. Treatment was paused for 30 days to assess progress; if the bone did not recover, dental extraction would be performed. To avoid this option, radiofrequency was applied with the Capenergy intraoral device. Radiographic analysis showed significant bone improvement compared with the images taken before radiofrequency treatment. Treatment consisted of 4 sessions, one per week of 15 minutes, at a temperature of 28–33 °C; in this case the best frequency was 1.2 MHz. Total treatment time was one month and was well tolerated. At 4-month follow-up, healing of the periapical lesion and bone regeneration were evident, allowing placement of the crown. This proposed radiofrequency treatment is well tolerated, without secondary risks, less aggressive, and with results evident over a short period of time.

Keywords: *dental abscess, alveolar bone resorption, intraoral radiofrequency, Capenergy.*

Introduction

Periodontal disease is the main cause of dental abscesses. New classifications of periodontal abscesses (PA) and endodontic-periodontal lesions (EPL) include prior existence of periodontitis. Periodontal diseases are a group of inflammatory diseases caused mainly by bacteria and their products. Plaque and its associated bacteria, which populate the periodontal pocket, release lipopolysaccharides and other bacterial products into the sulcus, affecting both the immune cells of the connective tissue and the osteoblasts. In immune cells, these products induce the production of local factors, including IL-1a, IL-1β, IL-6, prostaglandin E2 and tumour necrosis factor. These factors increase the formation and activation of osteoclasts and inhibit the function of osteoblasts.

If the progression of periodontal inflammation is not stopped, the supporting structures of the teeth, including the surrounding bone, are destroyed. Teeth eventually loosen and are lost, or need to be extracted. To avoid extraction of the molar, the option of applying intraoral radiofrequency was chosen, with the intention of increasing the quantity and density of the bone.

Background

Electromagnetic fields (EMF) are created through the interaction of electrically charged objects and permeate our entire reality. Research has long sought a way to harness their therapeutic potential. It is known that the effects of electromagnetic fields on living beings are complex. Bone has long been recognised as a suitable target for EMF treatment. In fact, EMFs have been investigated as a tool to promote bone healing in several preclinical studies of bone-defect repair in rodents. There is evidence that electromagnetic field stimulation could inhibit osteoclastogenesis and decrease bone resorption.

Case presentation

Dental treatment was carried out at the Cambra Nens Clinic, and the radiofrequency treatment at the Advanced Physiotherapy Centre. Clinical and radiographic controls were performed periodically from January 2021 to

March 2021, since the lesion persisted and the definitive reconstruction of tooth 74 could not be carried out. Finally, after one month of treatment (March–April 2021), favourable healing of the furcal-zone lesion was observed, and the preformed metal crown was placed.

Radiographic examination revealed numerous interproximal intraosseous defects alternating with areas of lesser bone loss. The radiograph taken after treatment with Capenergy C-500 intraoral shows how the low bone density disappeared and an increase in bone density was achieved, obtaining bone consolidation in 4 weeks of treatment.

Discussion

The patient is five years old. The lesion is located in the lower left first temporary molar. During the three months of conventional treatment (January–March) no improvement in bone density was observed, which contrasts with the improvement obtained with only 4 weeks of intraoral radiofrequency treatment using EMF. The increase in bone mass through the action of RF appears to have its main direct action on the osteoblast and, through this action in mixed bone-marrow cell cultures, inhibits osteoclastogenesis, preventing bone destruction and increasing osteogeneration.

Conclusion

The type of treatment used in this study revealed that EMFs applied intraorally, using the device designed for this purpose over four weeks, caused a notable increase in bone density in conditions where the existing alternative was molar extraction. Being able to save the molar and avoid extraction is a positive scenario. This implies that EMFs, using high-power equipment and an intracavitary oral electrode, shorten the healing period and improve the osteogeneration process. This is a well-tolerated treatment, without side effects and a high-value solution for the patient.

Reference

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