

Diagnosis and treatment of resistant periapical pathoses at the maxillary anterior region: a case report

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Abstract:

The objective of this study was to report a clinical case of periapical pathosis at the maxillary anterior region which was resistant to conventional endodontic treatment and discuss the contribution of the magnetic resonance imaging (MRI) to the diagnostic process. Female patient aged 43 years old was referred to specialised dental care following unsuccessful endodontic treatment of tooth #11, which had been carried out after presumptive diagnosis of granuloma or root cyst. For a better evaluation, periapical radiography, cone beam computed tomography and MRI exam were all indicated. By means of these exams, one could observe the presence of another lesion at the region of tooth #13, which was suggestive of residual cyst. On MRI scan, the T2WI of the lesions showed hypersignal areas compatible to inflammatory process. Surgery excision of the lesions and apicoectomy of tooth #11 were the treatments chosen, including further referral for histopathological exam. Final diagnosis of both lesions was non-specific inflammatory process or dental granuloma. Clinical-radiographic control showed area of new bone formation, thus evidencing bone repair process. One can conclude that the diagnosis and treatment of periapical pathoses may be challenging and that MRI contributed by providing important information on the nature and content of these lesions.

Keywords: Diagnosis, Oral; Periapical Granuloma; Magnetic Resonance Imaging

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INTRODUCTION

Periapical pathoses may or may not be of endodontic origin and may involve one or more teeth. The majority of the periapical lesions of endodontic origin seen in clinical dentistry are diagnosed as granuloma or root cyst¹.

Para-dental granuloma is considered an asymptomatic chronic lesion, although sporadic acute cases associated with secondary infections have been reported elsewhere^{1,2}. The immune response in periapical lesions is frequently investigated to understand not only the relationship between their pathogenesis and microbiota, but also why some lesions are resistant to non-surgical endodontic treatment^{3,4}.

The objective of this study was to report a clinical case of dental granuloma at the maxillary anterior region which was resistant to conventional endodontic treatment and to emphasise the contribution of the magnetic resonance imaging (MRI) to our case.

CASE REPORT

Female 43-year-old patient with no relevant medical history was referred to specialised care for dental diagnosis following unsuccessful endodontic treatment of tooth #11, which had been carried out after presumptive diagnosis of granuloma or root cyst.

During clinical and radiographic control of the lesion, the patient had a relapse of painful symptomatology, which justified referring her to specialised dental care. After clinical exam showing presence of oedema at the periapical region of tooth #11, another periapical radiograph was taken (Figure 1/A), which evidenced a well-defined radiolucent area surrounding the root apex of tooth #1, loss of lamina dura at the apical third and presence of well-defined radiolucent area at the region of tooth #13, thus suggesting a residual cyst.

In order to assess the latero-lateral and superior-inferior extensions of the lesions, including the resulting effects on neighbour structures, a panoramic radiograph was taken. By means of radiographic image it was possible to observe significant dimension and proximity between the lesions of teeth #11 and #13.

In order to evaluate the lesion three-dimensionally, cone beam computed tomography (GXCB-500™, powered by i-CAT®) was performed at FOV of 16 x 6.0 cm and voxel size of 0.2 mm. The resulting images showed well-defined hypodense areas surrounding the

root apex of tooth #11 and at the region corresponding to tooth #13. Presence of two lesions separated by cortical bone and disruption of the cortical bone separating the lesions were also observed in the images (Figure 1/B,C,D).

In order to assess the internal content of the lesion and study the inflammatory condition, MR images were also obtained with a Sigma machine (1.5 Tesla, General Electric, Milwaukee, USA) using head coil at several anatomical planes (i.e. axial, coronal and sagittal), with sequences weighted in T1 (TR = 478 ms, voxel size of 0.72 mm isotropic, TE = 16 ms, FOV of 1.0 x 21.0 cm, slice gap = 2.0 mm) and T2 (TR = 6.5 ms, voxel size of 0.72 mm isotropic, TE = 90.0 ms, FOV of 21 x 21 cm, slice gap = 2.0 mm) obtained with an 8-channel phased array head coil.

MRI allowed us to delimitate the lesions and their relationship with the surrounding soft tissues. Axial T1WI showed an intermediate signal intensity image circumscribed within the region of the lesions. It was possible to observe well-defined limits of the lesions without invasion of the muscle tissue. T2WI showed the same aspects of T1WI, that is, evidencing hypersignal areas within the lesions corresponding to a secondary infection due to lesion impairment, which characterises the diagnostic hypothesis of resistant granuloma or root cyst (Figure 2).

The therapeutic procedures adopted after clinical and imaging examinations were surgical excision of the lesions and apicoectomy of tooth #11 on an outpatient basis under local anaesthesia, with the lesion tissues being submitted to histopathological examination (Figure 3).

Microscope slides show fragments of dense connective tissue and presence of moderate mononuclear inflammatory infiltrate in both lesions, indicating a final diagnosis of non-specific chronic inflammatory process (dental granuloma) (Figure 4).

Four months following the surgical extension of the lesions, apicoectomy and endodontic re-treatment of tooth #11, another periapical radiograph was taken and an area of new bone formation was found, thus evidencing repair process and good prognosis (Figure 5).

DISCUSSION

Inflammatory periapical lesions of endodontic origin have a high prevalence in the dental clinical setting, thus being one of the most diagnosed and treated conditions by surgeon-dentists⁵. The diagnosis

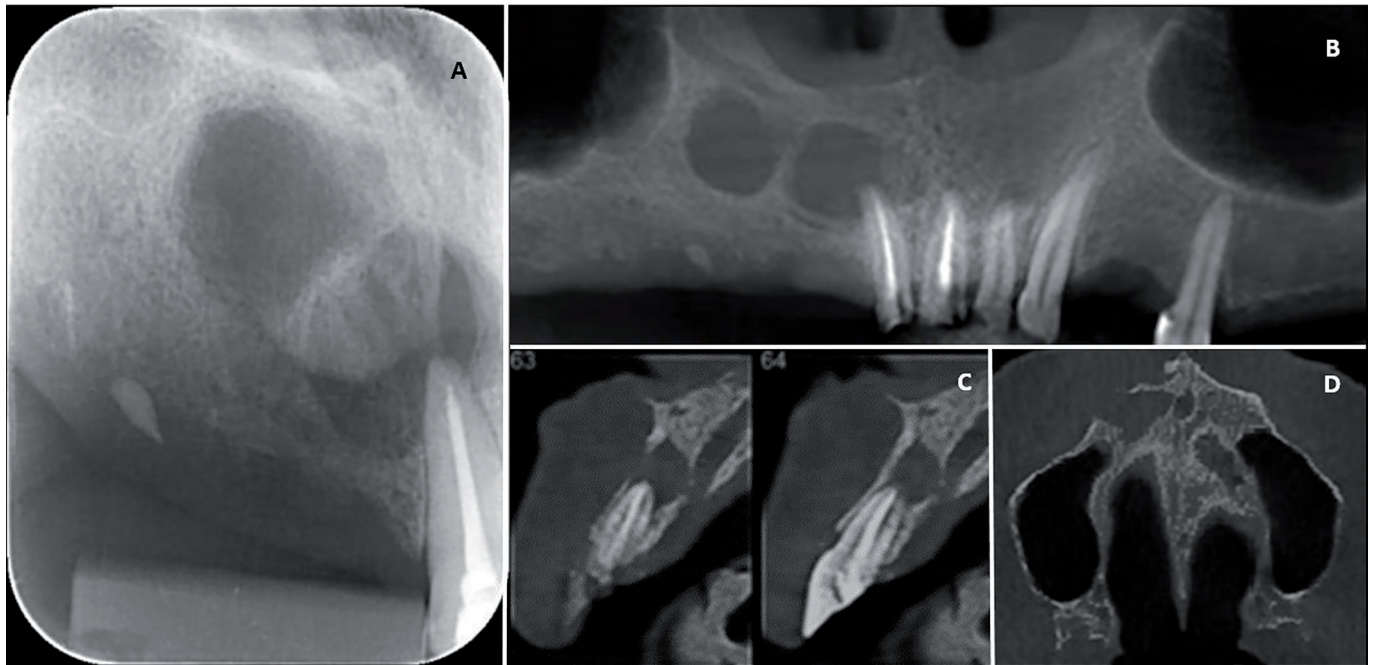


Figure 1. Periapical radiograph. Rounded well-defined radiolucent area at the periapical region of tooth #11 and of the region corresponding to tooth #13 (A) and Tomographic images. Panoramic re-construction (B), transversal sections (C) and axial section (D).

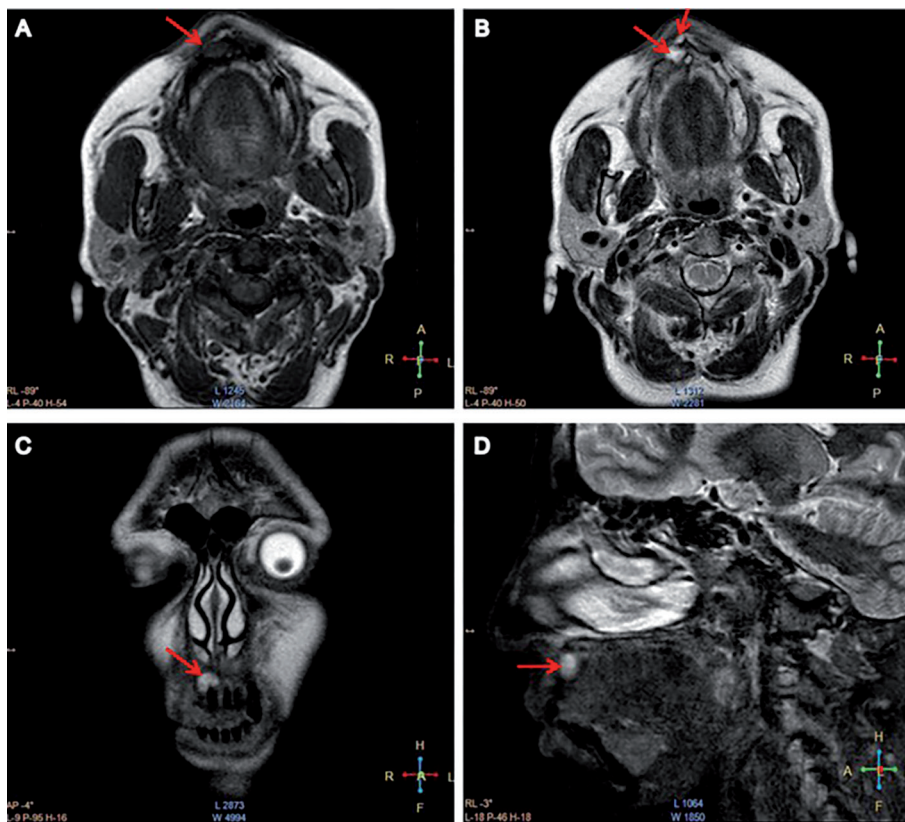


Figure 2. MR images. Axial view in T1WI (A); axial, coronal and sagittal views in T2WI (B, C and D).

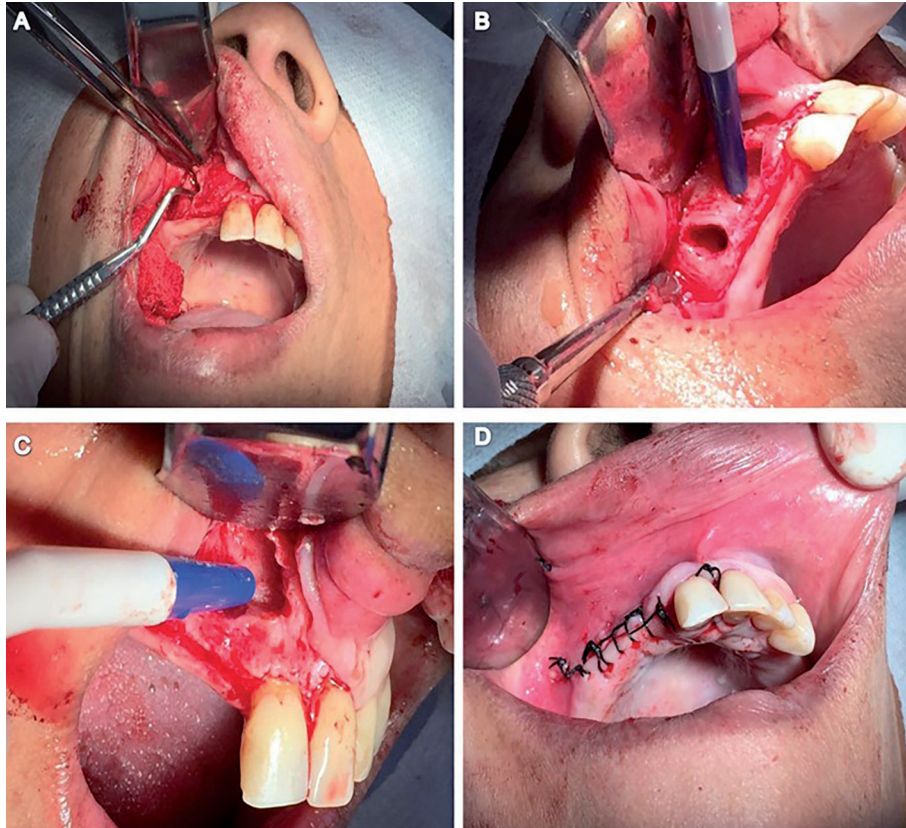


Figure 3. Surgical treatment. Enucleation of the lesions (A), presence of distinct bone cavities (B), apicoectomy of tooth #11 (C), and suture (D).

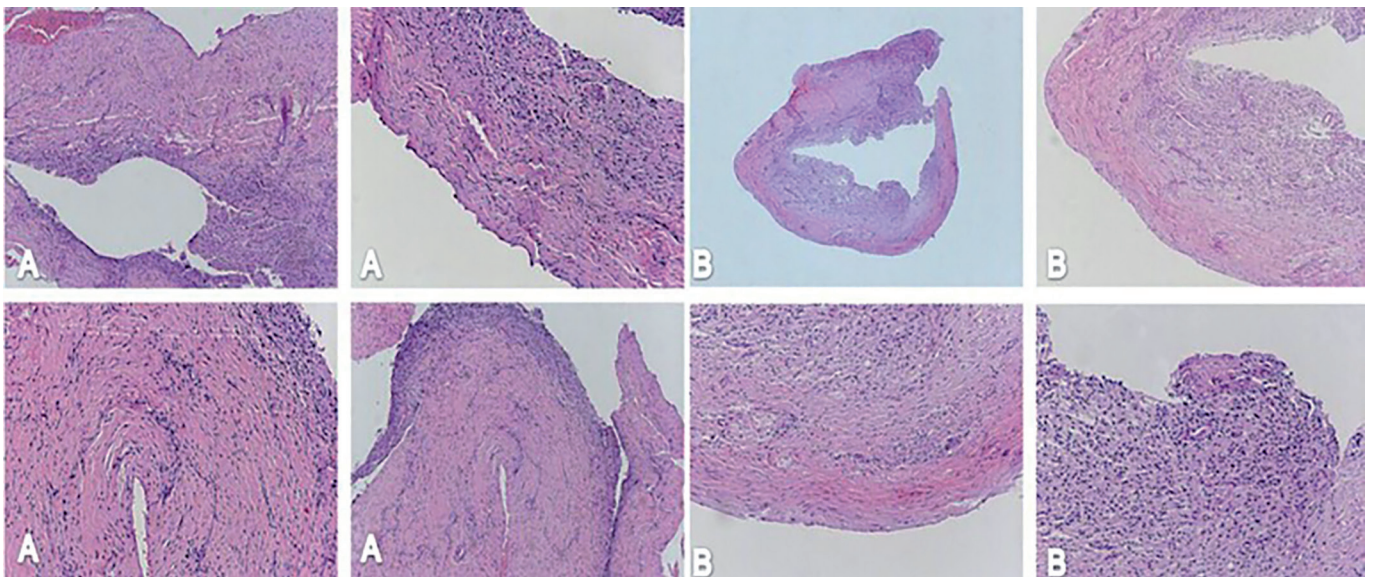


Figure 4. Microphotograph of the lesion stained with haematoxylin and eosin (H&E) at a scale of 80 μm. Histological sections of the lesion at the periapical region of tooth #11 (A) and histological sections of the lesion at the region corresponding to the root of tooth #13 (B).

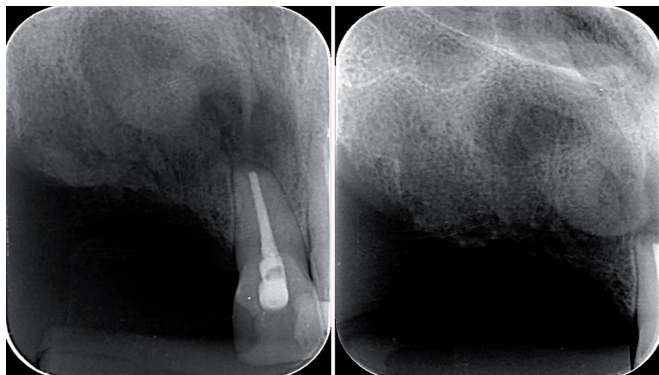


Figure 5. Radiographic aspect after four months from the treatment.

of these lesions is simple to perform in the majority of times thanks to their peculiar clinical and radiographic characteristics³⁻⁵. Endodontic treatment, whose aim is to eliminate infections from the root canal and prevent re-infection by sealing the root canal hermetically, is the most recommended initial therapeutic procedure as it is highly efficient despite the fact that success is not always achieved, as in the case reported here⁶.

There are several causes for the failure of the conventional endodontic treatment. According to Song et al.⁷, among these causes, one can highlight the presence of voids between gutta-percha and root dentine (30% of the cases) and absence of filling material within one of the root canals (20% of the cases). Nevertheless, in the present clinical case, one can observe that microbiological, inflammatory and immunological factors were significant, since anterior teeth are less anatomically complex for endodontic treatment and better located than the posterior teeth⁸.

When conventional endodontic treatment does not achieve the expected result, it is important to investigate the possible causes of failure. This investigative process requires systematic analysis of the data obtained as each detail can define the prognosis of the case. In our case, after checking the patient's medical history, we have observed some clinical and imaging characteristics compatible to either granuloma or cyst (residual cyst at the region of tooth #13)^{9,10}.

The lesion described here was symptomatic, with non-corticalised borders and hypersignal areas corresponding inflammatory process. These characteristics are more consistent with a clinical picture of root granuloma. However, the resistance to non-surgical endodontic treatment is a characteristic suggestive of root cyst because of its ability to persist even after the antimicrobial action of antiseptics, antibiotics and especially calcium hydroxide.

MR images were obtained during the diagnostic process, which were useful to determine the presence of inflammatory process as the T2WI protocol (time of echo and time of repetition) is usually used for evaluation of regions with inflammation¹¹.

Histological results showed that both lesions were actually dental granulomas. Although cystic lesions can be more resistant to endodontic treatment, granulomas can also have such a resistance and therefore they require a more radical intervention, such as enucleation, apicoectomy and endodontic re-treatment^{10,11}.

CONCLUSION

The present clinical case reinforces the complexity of determining the diagnosis and treatment of periapical pathoses and whose visualisation by means of MRI can contribute to diagnosis by providing important information on the nature and content of the lesions, including presence or not of inflammatory process at the region, thus providing distinct imagiological findings, especially in those cases involving poorly characterised findings.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interests regarding the publication of this paper.

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