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CASE REPORT/CASO CLINICO

Nonsurgical management of complex endodontic cases with several periapical lesions: a case series



Gestione non-chirurgica di casi endodontici complessi con lesioni periapicali: case series

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KEYWORDS

Endodontic lesion;
Operative microscope;
Non-surgical approach;
Ultrasonic tips;
Three-dimensional obturation.

Abstract

Aim: Today, thanks to modern technologies as operative microscope, ultrasonic tips, devices to activate irrigation and tridimensional obturation performed with thermo plasticized gutta-percha, excellent results could be obtained.

Materials and methods: In this study, we present 5 patients with the presence of periapical lesions in molars and incisors with history of pain. Modern endodontic technologies were used. The rationale of using these technologies was to obtain a chemo-mechanical cleansing and obturation of the entire endodontic system and to gain the lesion resolution with a non-surgical approach.

Results: A success rate of 100% was obtained. Radiographs and clinical examinations were done until 10 years. All the cases highlighted the success achieved in the short and long term through the complete resolution of the lesions and therefore the reconstitution of the lamina dura.

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PAROLE CHIAVE

Lesione endodontica;
Microscopio operatorio;
Approccio non
chirurgico;
Punte ultrasoniche;
Otturazione
tridimensionale.

Conclusions: The positive results highlighted by these clinical cases demonstrate how the use of modern technologies is essential to avoid iatrogenic damage and to gain safe and reproducible results.

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Riassunto

Introduzione: Oggi, grazie alle moderne tecnologie, microscopio operatorio, punte ultrasoniche, dispositivi per l'attivazione degli irriganti e all'otturazione tridimensionale si possono ottenere risultati ben più che soddisfacenti.

Materiali e Metodi: In questo studio presentiamo 5 pazienti con presenza di lesioni periapicali su molari e incisivi con storia di dolore. Il razionale nell'uso di queste tecnologie è stato nell'ottenere la detersione chemio-meccanica e l'otturazione tridimensionale dell'intero sistema endodontico con una completa risoluzione della lesione evitando l'approccio chirurgico.

Risultati: È stato ottenuto un successo del 100%. Radiografie ed esami clinici sono stati effettuati su ogni paziente fino a 10 anni. Tutti i casi presentati hanno evidenziato il successo ottenuto nel breve e lungo termine attraverso la scomparsa completa delle lesioni e di conseguenza la ricostituzione della lamina dura.

Conclusioni: Gli esiti positivi, evidenziati da questi casi clinici, dimostrano come l'utilizzo delle moderne tecnologie siano indispensabili nell'evitare danni iatrogeni e garantire, invece, risultati sicuri e riproducibili.

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Introduction

The rationale of the endodontic treatment is to eradicate the infection, prevent microorganisms from infecting or re-infecting the root and/or periradicular tissues by filling or obturating the cleaned and shaped systems, finally prevent future recontamination of sealed root canals.^{1–3} Consequently, failure to achieve these criteria results in root canal therapy failure or continued presence of inflammation and infection.^{4,5} Therefore, the prognosis for the endodontic therapy is based on several factors that can be divided into three categories: preoperative, operative, and postoperative causes.^{6–8}

Preoperative causes that influence endodontic therapy outcome include misdiagnosis, errors in treatment planning, poor case selection, or treatment of a tooth with a poor prognosis.^{9,10} Often, radiographic interpretation or lack of proper radiographs can interfere with the operator's ability to predict the outcome, resulting in poor operative execution.¹¹ Sjogren et al.¹² indicated that one of the most important factors influencing the prognosis of endodontic treatment was the preoperative status of the tooth. He, furthermore, referenced studies demonstrating that the success rate in endodontic therapy is significantly influenced by the presence or absence of a pretherapeutic radiographic lesion.¹³ Teeth with an apical radiolucency may show up to a 20% lower success rate than teeth without such lesions. Regardless of how the tooth presents, proper interpretation and subsequent treatment planning prior to initiating endodontic therapy will allow for better care and outcome.^{14,15}

Operative causes that influence the prognosis of the root canal therapy can be divided into two categories: mechanical

and biological. Mechanical considerations include: cavity preparation/access, cleaning and shaping, instrument separation, perforation, missed canals, and obturation quality.^{16,17} Biological objectives involve removal or reduction of existing and potential irritants from the pulp space, sealing of the space, microbial control, and management of periapical inflammation.¹⁸ Understanding the complex endodontic microbiology, so that it could be most eradicated during endodontic therapy can ensure that the biological objectives can be met clinically.¹⁹ Interestingly enough, there are several microorganisms that are self-sustaining and resistant to antimicrobial treatment and can survive in the root canal after biomechanical preparation.²⁰ So, the presence of persistent infection following the root canal therapy can be attributed to the presence of the aforementioned microorganisms.²¹

Postoperative causes that have an effect on the endodontic treatment outcome occur when (a) there has been a delay in the restoration of a tooth following root canal treatment; (b) the coronal temporary filling, placed immediately following root canal treatment, is compromised; (c) the tooth is fractured and the canal system is exposed prior to final restoration; (d) the final restoration, regardless of type or design, lacks ideal marginal integrity or cannot withstand the forces of occlusal function, and deteriorates; or (e) recurrent decay is present at the restoration margins. A combination of any of the aforementioned causes may ultimately dictate outcome.^{22–24}

Prognosis with endodontic therapy and variability of treatment will dictate that each case be assessed individually, taking into account all relevant factors. Regular follow-up and subsequent restorative completion are, furthermore, recommended.²⁵

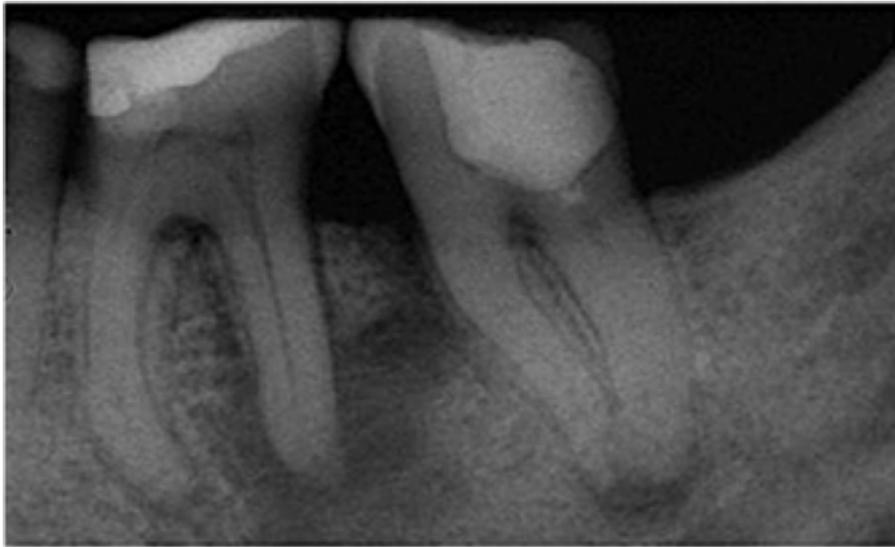


Figure 1 Pre-operative X-ray of teeth 3.6 and 3.7.

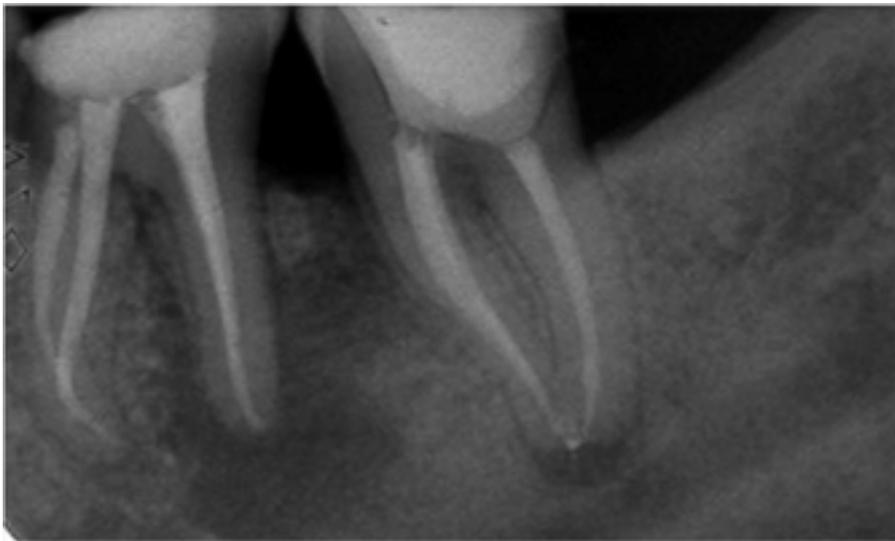


Figure 2 Post-operative X-ray of teeth 3.6 and 3.7.

The aim of this study was to show all the technology we have available today to increase the degree of chemo-mechanical debridement and obturation of the whole endodontic system. The purpose was to describe the treatment, orthograde and retrograde retreatment of complex endodontic cases with several periapical lesions.

Materials and methods

Several patients were referred to the Endodontic Department of the University Federico II of Naples with periapical lesions with history of pain. The patient's past medical and social history were non-contributory, and they had good oral hygiene, laboratory investigations were substantially normal. All the patients had no contraindications to the endodontic treatment.

Case 1

A male 65 years old patient came to our observation complaining of pain borne by chewing of the teeth 3.6 and 3.7. Radiographic examination showed a previous endodontic therapy with periapical lesion of 3.7 and a periapical lesion of medium size of 3.6 (Fig. 1). The percussion test was positive while the periodontal probe was negative. The diagnosis was of chronic apical periodontitis.

Endodontic treatment of 3.6 and orthograde retreatment of 3.7 were started under rubber dam isolation. Under constant magnification and lighting we performed a correct access cavity, removing calcifications and previous fillings. Having performed chemo-mechanical preparation of the root canal system with Ni-Ti files and three-dimensional irrigation sonically and heating activated, we proceeded with three-dimensional obturation with hot gutta-percha (Fig. 2).

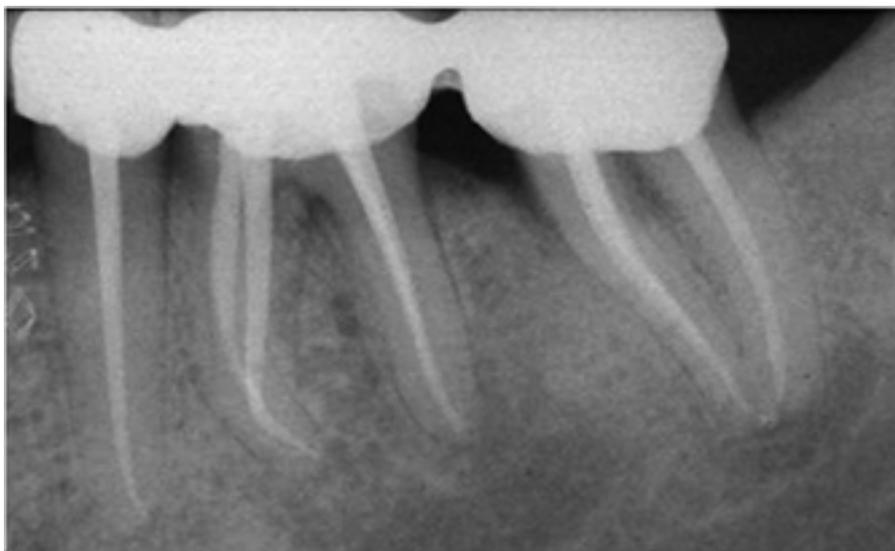


Figure 3 4 years follow-up.

Endodontic treatment and retreatment were performed in a single session. The patient was followed up at 4 and 8 years and a complete remission of the lesions was observed (Figs. 3 and 4).

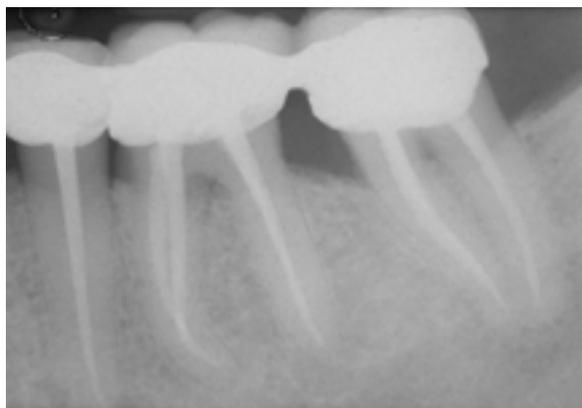


Figure 4 8 years follow-up.



Figure 5 X-ray of teeth 3.3, 3.2, 3.1, 4.1, 4.2, 4.3 with extensive periapical lesion.

Case 2

A 50-year-old male patient came to our observation complaining of pain borne by chewing of the teeth 3.3, 3.2, 3.1, 4.1, 4.2, 4.3. The conventional X-ray examination showed extensive periapical lesion of all teeth mentioned above (Fig. 5). While a through 3D radiographic exam, the disappearance of the outer and inner cortices of the mandible was revealed (Fig. 6). In a previous dental examination an orthograde treatment of all teeth from 4.3 to 3.3 and then surgical removal of the lesion with apicoectomy of teeth was proposed to the patient. Thermal test and electric pulp test (EPT) were performed to all mentioned teeth and only 3.1 was not vital. Then we proceeded to root canal therapy of 3.1.

Under rubber dam isolation and constant magnification and lighting we performed a correct access cavity, three-dimensional irrigation sonically and heating activated and finally three-dimensional obturation with hot gutta-percha. Endodontic treatment was performed in a single session (Fig. 7). The patient was followed up at 4 years and a complete remission of the extended lesion was observed (Fig. 8).

Case 3

A 43-year-old male patient came to our observation complaining of pain borne by chewing of the teeth 4.6. Radiographic examination showed a previous endodontic therapy with a periapical lesion (Fig. 9). The percussion test was positive while the periodontal probe was negative. The diagnosis was of chronic apical periodontitis.

We proceeded with an orthograde retreatment of the tooth. After isolating the tooth with rubber dam the old obturation has been removed. Under magnification and lighting, specific ultrasonic tips have been used, the isthmus that connects the mesiobuccal mesio-lingual canals was prepared and the middle mesial canal identified (Fig. 10). Having

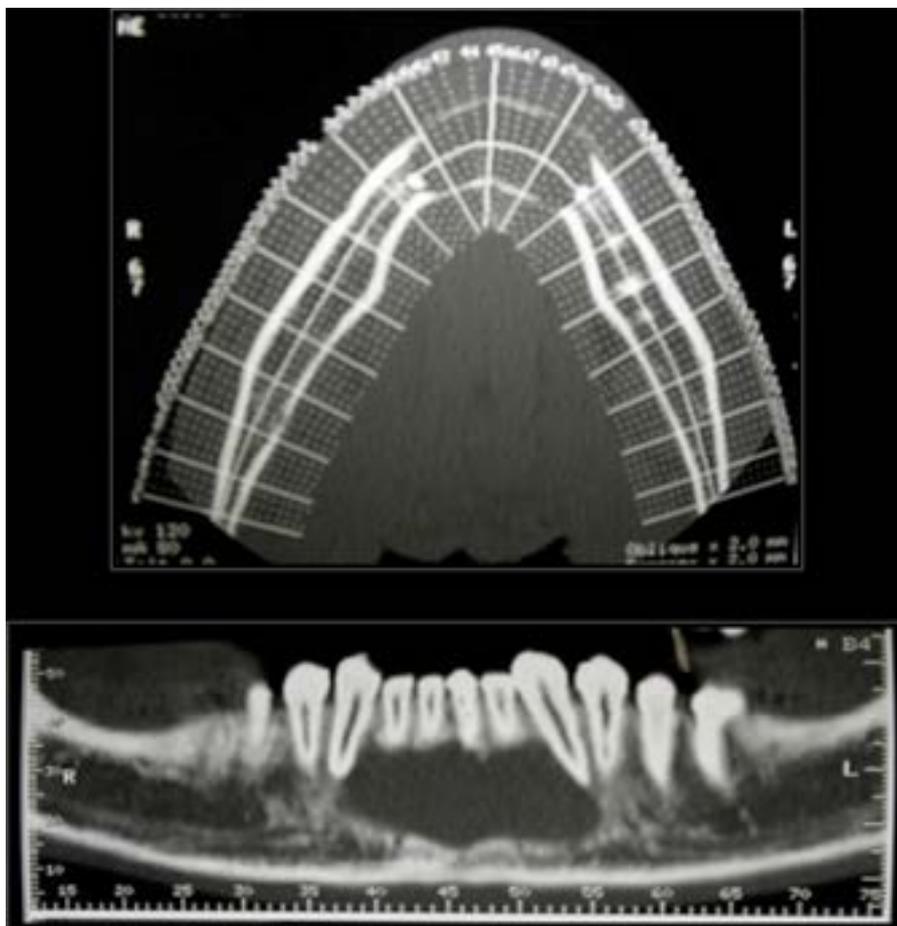


Figure 6 3D radiographic exam with disappearance of the outer and inner cortex of the mandible.

performed chemo-mechanical preparation of the complete root canal system three-dimensional obturation with hot gutta-percha was completed (Fig. 11). Endodontic retreatment was performed in a single session. The patient was

followed up at 4 and 8 years and a complete remission of the lesion was observed (Figs. 12 and 13).

Case 4

A 40-year-old female patient came to our observation complaining of pain borne by chewing of the teeth 2.6 and presence of swelling in correspondence of the tooth. Outside of the cheek the patient showed a cutaneous fistula (Fig. 14), which allowed to show through fistulography the responsible tooth. Radiographic examination showed a previous root canal therapy and a periapical lesion of 2.6. The percussion test was positive while the periodontal probe was negative. The diagnosis was of chronic apical periodontitis.

We proceeded with orthograde retreatment of the tooth. After isolating the tooth with rubber dam the pulp chamber access was performed under magnification and lighting, specific ultrasonic tips have been used. Performed chemo-mechanical preparation of the complete root canal system three-dimensional obturation with hot gutta-percha was completed. Endodontic retreatment was performed in a single session. The patient was followed up at 6 years and a complete remission of the lesion was observed (Fig. 15).

Case 5

A 44-year-old female patient came to our observation complaining of pain and swelling borne by chewing of the teeth



Figure 7 Post-operative X-ray of tooth 3.1.

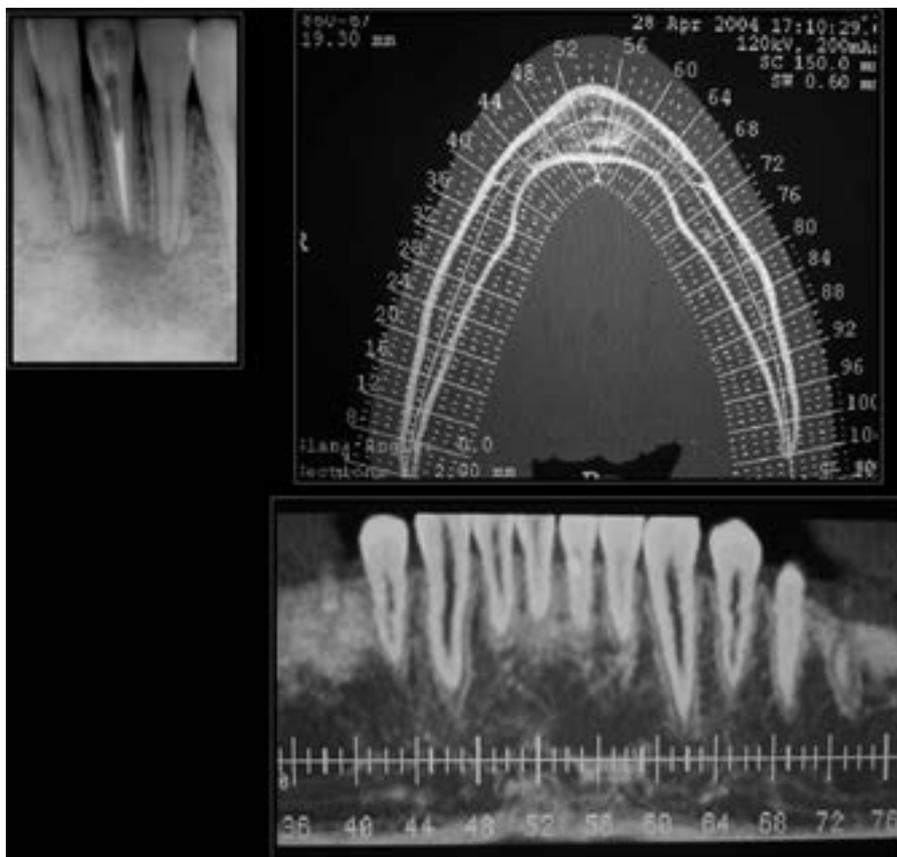


Figure 8 4 years follow-up.



Figure 9 Pre-operative X-ray of tooth 4.6.



Figure 10 Identification of middle mesial canal under magnification.

4.6. Radiographic examination showed a previous endodontic therapy with a silver cone in the mesial root of 4.6 and a periapical lesion (Fig. 16). The percussion test was positive while the periodontal probe was negative. The diagnosis was of chronic apical periodontitis.

At first clinical examination the tooth had already heavy losses at the structural level of the crown, hence to avoid further damage of the tooth during orthograde retreatment we opted for a surgical retreatment. The endodontic surgery



Figure 11 Post-operative X-ray of tooth 4.6.

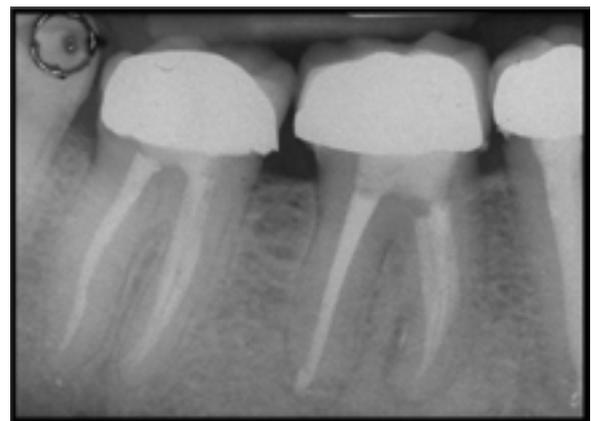


Figure 12 4 years follow-up.

was performed under constant magnification and lighting and with appropriate ultrasonic tips (“retrotips”). Finally, as retrograde obturation was used super Eba (Fig. 17). The patient was followed up at 10 years and a complete remission of the lesion was observed (Fig. 18).



Figure 13 8 years follow-up.



Figure 14 Cutaneous fistula.

Results

A success rate of 100% was obtained. Radiographs and clinical examinations were done until 10 years. All the cases highlighted the success achieved in the short and long term through the complete resolution of the lesions and therefore the reconstitution of the lamina dura. The positive results highlighted by these clinical cases demonstrate how the use of modern technologies, operating microscope, ultrasonic tips, rotary files of new generation, systems enhancing cleansing and methods used to obtain a valid tridimensional seal, are essential to avoid iatrogenic damage and ensure, however, safe and reproducible results.

Discussion

The complete cleansing (complete removal of organic and inorganic substrate) of endodontic systems is currently a difficult goal to achieve.²⁶ The irrigants have difficult access



Figure 16 Pre-operative X-ray of tooth 4.6.

in some canals for the anatomical complexity and their action is reduced.^{27,28}

Gutarts et al.²⁹ have demonstrated that, by carrying out ultrasonic irrigation after rotary or manual instrumentation, a much more effective cleansing of canals and isthmuses was obtained. Jensen et al.³⁰ have not detected any significant difference between the use of a sonic and ultrasonic irrigation.

Moreover, thanks to the heating irrigant its action could be increased and enhanced by obtaining a nearly complete three-dimensional cleansing of the endodontic space.³¹ The irrigants, in this way, are able to gain most of the complex anatomical space, unreachable with conventional irrigation techniques.³²

To significantly improve the clinical outcome is fundamental proper preparation of the root canal system, through chemical and mechanical properties.³³ Only in this way the infection will be reduced by preventing the bacterial invasion and recolonization of the filled endodontic space.³⁴

Instead, in reference to the type of approach in the presence of periapical lesion or endodontic failure, Torabinejad et al.³⁵ showed that nonsurgical retreatment generally is prioritized before surgical endodontic treatment. Microsurgical endodontic treatment is superior to traditional surgical endodontic treatment and has high survival rates, hence



Figure 15 6 years follow-up.

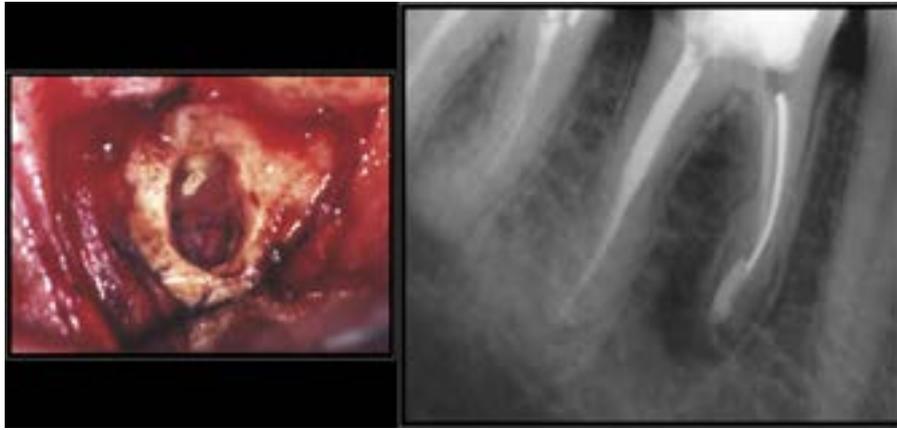


Figure 17 Post-operative X-ray of tooth 4.6.

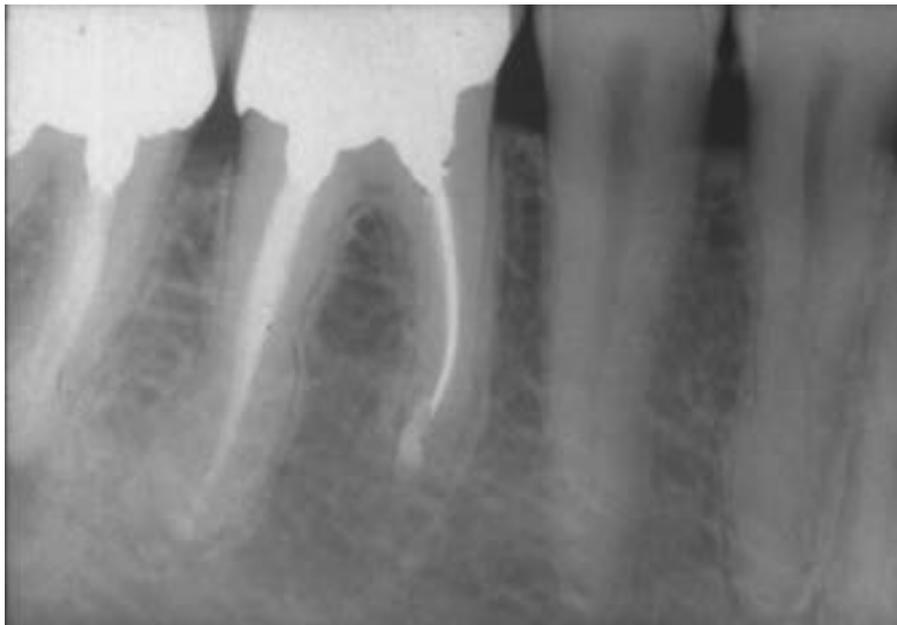


Figure 18 10 years follow-up.

the first-line treatment option after failure of initial root canal treatment is nonsurgical retreatment, and this is what our study wants to demonstrate.

Moreover, clinical and radiographic evaluation was recommended by other researchers, to evaluate the endodontic treatment outcome.³⁶ The presence of anatomical noise, the two-dimensional image, and geometric distortion are the major drawbacks of periapical radiographs that remain so far the routinely employed method. In some cases CBCT (Cone-Beam Computed Tomography) provides more significant information than periapical images and eliminates the superimposition of anatomical structures.^{37,38} A digital intraoral radiography was used in this study rather than a conventional X-ray film. Thus, the resulting image of digital periapical radiography could be easily enhanced (brightness and contrast) to improve the interpretation of the image. Several studies have shown no significance difference between both techniques.^{39,40}

Conclusions

The key to achieving long-term success in developmental anomalies is accurate diagnosis. Clinician's awareness of existence of such a situation may help to avoid misdiagnosis and improper treatment of the tooth.

Conflict of interest

The authors have no conflict of interest.

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