CASE REPORT

Conservative multidisciplinary management and CBCT follow-up of an extensive traumatic-inflammatory maxillary lesion: a clinical and radiological case report

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Abstract

Objective: The aim of this case report was to describe the conservative multidisciplinary management and CBCT-based follow-up of an extensive traumatic-inflammatory periapical lesion involving the anterior maxilla, associated with pulp necrosis, external apical root resorption, and compromised tooth stability.

Methods: A 58-year-old male patient presented with discoloration and mobility of the maxillary incisors following a history of dental trauma. Clinical and radiological examinations revealed a large periapical lesion associated with apical resorption and root canal calcifications. Endodontic treatment was performed using a reciprocating instrumentation system, followed by apexification and root canal obturation with a bioactive calcium silicate-based material. Dental stabilization was achieved using a fiber-reinforced composite splint. Surgical decompression of the lesion was performed through a palatal incision with placement of a drainage tube. Serial CBCT examinations with linear measurements were used to monitor the healing process during follow-up.

Results: Follow-up clinical and radiological evaluations demonstrated progressive reduction in lesion size and early signs of bone regeneration in the affected region. Tooth mobility decreased, soft tissue healing was completed without complications, and the patient remained asymptomatic throughout the observation period. Imaging confirmed favorable healing dynamics and stabilization of the involved teeth.

Conclusions: This case documents the multidisciplinary conservative management of an extensive traumatic-inflammatory periapical lesion and its clinical and radiographic evolution during follow-up. Serial CBCT assessment allowed detailed radiographic monitoring of lesion reduction and early bone healing, while the favorable outcome appeared to result from the combined effects of infection control, tooth stabilization, decompression, bioactive material application, and host tissue repair.

Keywords: Biodentine, pulp necrosis, bone resorption, external root resorption

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Introduction

The traumatic cyst is a benign bone cavity, that lacks the epithelial lining. Although more commonly associated with long bones, these entities are often encountered in the jaws due to high incidence of trauma and mechanical loading at this site. It arises as a consequence of intramedullary hemorrhage triggered by traumatic injury, as a result, in the absence of normal clot organization and subsequent bony repair, a nonepitheliazed space persists within the bone [1]. Clinically the lesion remains asymptomatic, however the entry of microbial pathogens originating from either the periodontium or the pulp chamber due pulp necrosis, an inflammatory response is triggered, leading to acute clinical signs [2].

Modern endodontics has been revolutionized by the introduction of bioactive materials. In contrast to traditional materials, that were chemically passive, current endodontic solutions interact with the surrounding tissues to promote healing. Modern endodontics has been significantly influenced by the development of bioactive calcium silicate-based materials, such as Mineral Trioxide Aggregate and Biodentine. These materials are commonly used in apexification, perforation repair, pulp therapy, root-end filling procedures, and the management of inflammatory root resorption due to their sealing ability, biocompatibility, and potential to support mineralized tissue repair. In complex traumatic-inflammatory endodontic lesions, Biodentine may contribute to the creation of favorable conditions for periapical healing while supporting conservative treatment strategies focused on tooth preservation [3,4]. Through its regenerative potential and its ability to support periapical bone repair, the material may provide a reliable alternative to conventional endodontic approaches, particularly in cases involving trauma and significant periapical tissue destruction [5,6]. The originality of the present case does not reside in the use of a single novel therapeutic technique, but rather in the combined conservative manage-

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ment of an extensive traumatic-inflammatory lesion involving structurally compromised anterior maxillary teeth. The case is particularly relevant because it integrates tooth preservation, endodontic treatment with bioactive material application, prolonged surgical decompression, and serial CBCT-based radiographic follow-up.

Case presentation

We present a descriptive clinical case of case 58-year-old male who accepted and offered the written informed consent for publication of this case report and all associated clinical data and images. The patient was informed about the purpose of publication and agreed to the use of anonymized information.

The patient presented to our dental clinic reporting discoloration of the anterior teeth and increased mobility that he had noticed approximately one to two months prior to the consultation. The patient was generally healthy, cooperative, and without relevant systemic medical conditions.

Regarding his dental history, the patient reported a traumatic incident approximately fifteen years earlier, during which he sustained a direct frontal impact in the maxillary anterior dental region. No immediate dental treatment was performed at that time.

Clinical examination revealed discoloration of the maxillary anterior teeth associated with increased mobility and the agenesis of the left lateral incisor (Fig.1). Periodontal probing depths were within normal limits, with no isolated deep periodontal pockets associated with the affected teeth. No sinus tract, fluctuant swelling, or intraoral suppuration was observed. Tooth mobility was graded as Grade II for teeth 1.1, 1.2, and 2.1. Pulp sensibility testing was performed using a cold test, which produced negative responses for all involved incisors. Electric pulp testing was not performed. Percussion testing revealed tenderness of the involved teeth, while palpation elicited pain both at the vestibular apical region and on the palatal aspect, suggesting the presence of underlying periapical inflammation. The vitality tests performed in cold were negative for all incisors. Based on the patient's history of trauma and the clinical findings, further radiological investigation was indicated in order to evaluate the underlying periapical structures. Written approval and consent of the patient for further investigation and including the case in future dental studies was also received.

The intraoral periapical radiograph confirmed agenesis of the left maxillary lateral incisor and revealed a large radiolucent lesion extending over the roots of the adjacent incisors (Fig.2). The lesion was associated with displacement of the involved teeth and correlated with the clinically observed mobility.

Considering the extent of the maxillary lesion identified



Fig. 1. Clinical assessment of teeth discoloration

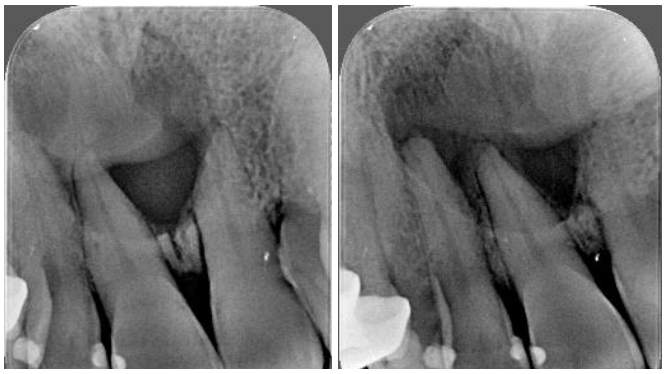


Fig. 2. Retroalveolar intraoral dental X-ray

on the intraoral periapical radiograph, a cone beam computed tomography (CBCT) investigation was indicated in order to obtain a detailed three-dimensional assessment of the lesion.

The CBCT examination revealed a large radiolucent lesion located in the anterior maxillary region, extending across the periapical areas of all 3 maxillary incisors. The lesion involved the apical regions of the affected teeth and was associated with significant bone destruction and thinning of the surrounding cortical plates. Additionally, tooth 2.1 presented an obliquely mesial oriented root resorption defect, accompanied by widening of the root canal lumen at the level of the resorptive process. These findings confirmed the advanced inflammatory nature of the lesion and its impact on the structural integrity of the involved teeth.

CBCT measurement protocol: serial radiographic assessment of the lesion was performed using cone beam computed tomography with standardized multiplanar reconstruction. The maximum lesion dimensions were recorded in the mesiodistal, buccopalatal, and vertical directions. Measurements were obtained using the digital measurement tools of the CBCT software in comparable anatomical sections during follow-up examinations. As no dedicated volumetric segmentation software was used, the assessment was based on linear CBCT measurements rather than true volumetric quantification.The lesion measured approximately 18 mm in the mesiodistal dimension, 14 mm in the buccopalatal direction, and 17.07 mm in height (Fig.3). The radiolucency was associated with significant bone destruction involving the alveolar process and resulted in thinning of the surrounding cortical plates. The lesion was observed in close proximity to the nasal floor and adjacent anatomical structures, without evidence of cortical perforation into the nasal cavity. These findings confirmed the extensive nature of the lesion and supported the need for a combined endodontic and surgical treatment approach.

Final clinical and radiographic diagnosis: extensive traumatic-inflammatory periapical lesion of the anterior maxilla, associated with pulp necrosis and external apical root resorption of teeth 1.1, 1.2, and 2.1. Due to the absence of histopathological confirmation, the lesion was described as cyst-like based on its radiographic appearance rather than as a definitively diagnosed traumatic bone cyst.

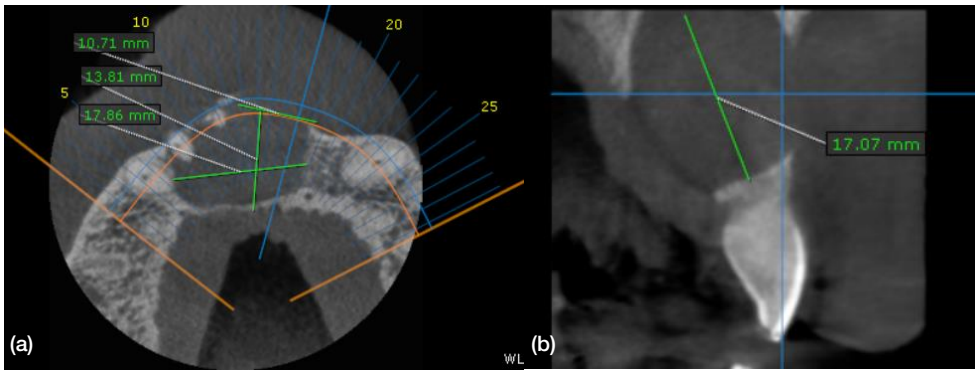


Fig. 3. CBCT images – (a) transversal section (b) sagittal section

Given that the vitality tests were negative and the affected teeth exhibited grade II mobility, a decision was made to stabilize the teeth using an Interlig (Angelus) fiber-reinforced composite splinting system, followed by the initiation of endodontic treatment. A splinting procedure was performed to stabilize the affected teeth, involving all three maxillary incisors, with extension to the adjacent canines, which did not present mobility. The fiber-reinforced composite splint was applied on the palatal aspect of the dental arch in order to ensure adequate immobilization and distribution of occlusal forces across the splinted teeth. All endodontic procedures were performed under rubber dam isolation. Root canal irrigation was carried out using sodium hypochlorite and 17% EDTA, followed by saline irrigation. Calcium hydroxide intracanal medication was placed between treatment sessions due to the chronic inflammatory process and complex canal anatomy. Final obturation of teeth 1.1 and 1.2 was performed using gutta-percha and AH Plus sealer with the lateral condensation technique. Tooth 2.1 was obturated with Biodentine because advanced apical resorption and the absence of an adequate apical constriction prevented predictable conventional obturation.

The subsequent treatment plan was established through interdisciplinary collaboration with an endodontist oral and maxillofacial surgeon.

The WaveOne Gold reciprocating file system (Dentsply Sirona) was selected for root canal preparation due to its enhanced flexibility and ability to effectively negotiate calcified and anatomically complex root canals encountered in this case. The reciprocating motion reduces torsional stress on the instrument and minimizes the risk of instrument separation, thereby increasing procedural safety during endodontic treatment. Furthermore, the system allows efficient and conservative canal shaping, which is particularly advantageous in cases associated with chronic inflammatory processes and extensive periapical bone destruction.

The working length of the root canal in tooth 1.2 was determined to be 15 mm and for 1.1, 14 mm. In contrast,

the root canal length of tooth 2.1 was measured at 7.64 mm (7 mm on apex locator) mm as a result of advanced apical root resorption. Consequently, the entire root canal of tooth 2.1 was obturated with Biodentine. CBCT examination revealed a deep apical resorptive defect oriented in a mesial direction (Fig.4). Apexification using Biodentine was selected for tooth 2.1 due to the presence of inflammatory apical resorption and the absence of an adequate apical constriction, which compromised the possibility of achieving a predictable conventional root canal obturation.

The bioactive properties of Biodentine allow the formation of a reliable apical barrier while promoting hard tissue regeneration and periapical healing. In addition, its favorable sealing ability and biocompatibility make it a suitable material for the management of teeth affected by traumatic pathology and extensive periapical bone destruction.

Due to the chronic inflammatory process and the presence of root canal calcifications, the endodontic treatments for 1.2 and 1.1 were technically challenging and required careful instrumentation and irrigation. Consequently, the procedures were completed over three consecutive clinical sessions in order to ensure adequate canal disinfection and proper management of the complex endodontic anatomy. All root canals were endodontic filled with AH Plus Sealer (Dentsply) and Gutta Percha using the lateral condensation technique.



Fig. 4. Tooth 1.2 following endodontic treatment and obturation with Biodentine

Subsequently, a surgical procedure was performed through a palatal incision to achieve decompression of the lesion. A drainage tube was placed to ensure continuous drainage (Fig.5) of the cystic cavity, facilitating pressure relief and promoting gradual reduction in the size of the lesion. The surgical procedure was performed under local anesthesia. A palatal mucosal incision was made in the anterior maxillary region to access the lesion and allow decompression. No extensive bone removal was required. Serosanguinous inflammatory fluid was observed during decompression; however, no tissue specimen suitable for histopathological analysis was obtained because the lesion was managed conservatively by decompression rather than surgical enucleation. Therefore, the diagnosis remained based on the clinical presentation and serial radiographic findings.



Fig. 5. . Drainage tube placement

The drainage tube was maintained in place for a period of 1.5 months in order to prevent premature closure of the mucosal incision and to allow adequate healing of the underlying tissues. During this period, the patient was advised to follow specific dietary restrictions and attended weekly follow-up appointments for local hygiene procedures and irrigation of the cavity using physiological saline solution and metronidazole. Subsequently, an additional CBCT investigation was performed to monitor the progression of the healing process and to evaluate the reduction in lesion size.

At the 3-month follow-up visit (Fig.6), a new CBCT examination was performed to assess the evolution of the lesion and to evaluate the healing process. The radiologi-

cal assessment demonstrated a mild reduction in the size of the lesion, accompanied by early signs of bone regeneration in the affected periapical region. Clinically, the involved teeth exhibited improved stability, with a noticeable reduction in tooth mobility compared to the initial examination. The patient remained asymptomatic, with no signs of infection or inflammation observed during clinical evaluation. Based on the favorable clinical and radiological findings, the overall outcome supported a favorable clinical evolution of the conservative multidisciplinary treatment approach.

Clinical examination at the next 3- and 6-months follow-up visit revealed complete healing of the palatal mucosa at the surgical site, without signs of inflammation, swelling, or fistula formation. The soft tissues appeared healthy, with normal color and consistency, indicating favorable tissue response following the drainage procedure. The lesion measured on the 3 months follow-up CBCT approximately 15,7 mm in the mesiodistal dimension, 13.6 mm in the buccopalatal direction, and 15.02mm and 16.5 mm in height in two 1mm distance sections.

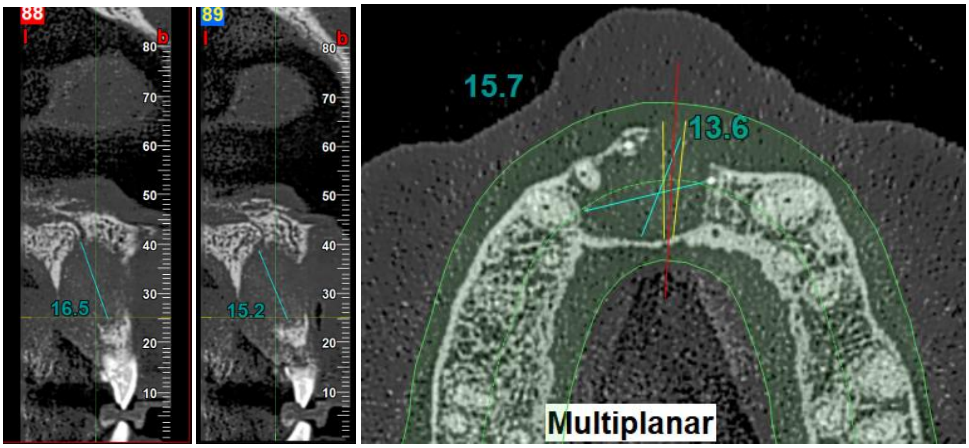


Fig. 6. 3 month follow up CBCT images

In addition, the patient reported no discomfort during mastication or oral hygiene procedures. The periodontal tissues surrounding the affected teeth showed improved stability, and no pathological mobility progression was observed. Overall, the clinical evolution suggested successful resolution of the inflammatory process and satisfactory healing of the soft tissues. The serial CBCT-based dimensional measurements obtained during follow-up are summarized in Table 1, demonstrating an early reduction in lesion dimensions after conservative multidisciplinary treatment.

Table 1. Serial CBCT-based dimensional assessment of the lesion at baseline and during follow-up.

CBCT Dimension	Baseline Measurement	3-Month Follow-up	Observed Change
Mesiodistal dimension	18 mm	15.7 mm	Reduction
Buccopalatal dimension	14 mm	13.6 mm	Mild reduction
Vertical dimension	17.07 mm	15.02–16.5 mm	Mild reduction

Discussions

The present case demonstrates the capacity of conservative multidisciplinary management to promote significant bone healing in extensive traumatic endodontic pathology. The combination of endodontic treatment, stabilization of the affected teeth, surgical decompression, and the use of bioactive materials created favorable biological conditions for periapical tissue regeneration and restoration of bone structure [7]. The novelty of this report should therefore be interpreted with caution. The case does not introduce a fundamentally new therapeutic concept, but it highlights the clinical value of combining several conservative strategies in a complex lesion that might otherwise have required extraction or more aggressive surgical intervention.

Bone healing in large periapical lesions represents a complex biological process that depends on adequate infection control, mechanical stabilization of the involved teeth, and the elimination of intracanal and periapical inflammatory stimuli. In the current case, successful disinfection of the root canal system and the maintenance of a stable environment through splinting and decompression allowed the natural regenerative capacity of the bone tissue to be expressed. The progressive reduction in lesion size observed on follow-up imaging supports the effectiveness of the chosen therapeutic approach [8,9].

The use of Biodentine played a significant role in supporting bone regeneration due to its bioactive properties and its ability to stimulate mineralized tissue formation. Bioactive calcium silicate-based materials have been shown to enhance periapical healing by releasing calcium ions, promoting osteogenic activity, and creating a favorable environment for tissue repair. In cases involving inflamma-

tory apical resorption or extensive bone destruction, the creation of an apical barrier with a biocompatible material is essential for achieving long-term treatment success [10]. However, the favorable healing observed in this case should not be attributed to Biodentine alone. The outcome was most likely multifactorial, resulting from adequate infection control, mechanical stabilization of the affected teeth, prolonged decompression of the lesion, the biological properties of the bioactive material, and the patient's intrinsic tissue repair capacity.

Another important factor contributing to bone healing in this case was the surgical decompression of the lesion through controlled drainage. Decompression reduces intracystic pressure, improves local vascularization, and facilitates gradual bone regeneration within the affected area. The maintenance of the drainage tube for an extended period allowed continuous evacuation of inflammatory content and supported progressive reduction in lesion size [11].

CBCT provided detailed visualization of the reduction in lesion dimensions and the progressive increase in bone density within the affected region. Compared to conventional radiography, three-dimensional imaging allows a more accurate assessment of bone regeneration and treatment outcomes in complex endodontic cases.

Overall, the clinical and radiological findings observed during follow-up confirmed progressive bone healing and stabilization of the affected teeth. The present case documents the clinical and radiographic outcome of a multidisciplinary conservative treatment approach combining endodontic therapy, tooth stabilization, surgical decompression, and the use of a bioactive material. Owing to the descriptive nature of a single case report, no conclusions regarding the superiority or general effectiveness of this therapeutic strategy can be drawn [12,13]. Several limitations of the present report should be acknowledged. The case represents a single clinical observation with a relatively short radiographic follow-up considering the initial size of the lesion. Although serial CBCT examinations demonstrated early radiographic improvement and progressive bone healing, complete healing of extensive periapical lesions often requires substantially longer observation periods. Therefore, the present findings should be interpreted as reflecting early healing dynamics rather than complete lesion resolution. Consequently, the diagnosis was based exclusively on the clinical presentation and serial radiographic findings, and the exact histopathological nature of the lesion cannot be established with certainty. In addition, CBCT assessment was based on serial linear measurements rather than dedicated volumetric segmentation software, and no reproducibility analysis of measurements was performed. The specific contribution of Biodentine cannot be separated from the effects of infection control, splinting, decompression, drainage, and host repair capacity. Consequently, the findings should be interpreted cautiously and considered primarily descriptive and hypothesis-generating rather than generalizable evidence of treatment predictability or superiority.

Conclusion

The present case illustrates the clinical feasibility of a conservative multidisciplinary approach for the management of extensive traumatic-inflammatory periapical pathology. Serial CBCT follow-up allowed radiographic monitoring of lesion reduction and early bone healing, while the favorable clinical evolution appeared to result from the combined effects of endodontic infection control, tooth stabilization, decompression, bioactive material application, and host repair capacity. Further studies are necessary to evaluate the reproducibility, long-term stability, and broader applicability of similar conservative treatment strategies.

Author's Contribution

AMS and ASC – conceptualization, data curation; formal analysis; investigation; methodology;
AMS - project administration; writing original draft;
EC and SV - writing – review, editing and formal analysis;
SV – review, editing, validation;

Conflict of Interest

Nothing to declare.

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