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CP1

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Clinical Posters

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RETREATMENT AND OUTCOME OF UPPER SECOND PREMOLAR WİTH VERTUCCİ TYPE VIII CANAL CONFİGURATİON: A CASE REPORT

CP01

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Aim

The goal of this presentation is to outline the procedure used for root canal therapy as well as the diagnosis process for a patient's triple canal maxillary second premolar teeth. It is intended to show how missed canals affect the outcome of treatment for upper premolar teeth.

Introduction

Knowing the root canal morphologies and the frequency of their occurrence is the simplest requirement for successful root canal treatment. In the Turkish population, Kartal et al. (1998) found that the root canals of the upper premolar teeth were 69.64% single rooted, 29.66% two-rooted and 0.66% three-rooted for the second premolar teeth. According to Vertucci (1984), this rate is 0.5%. In this case report, root canal retreatment of the upper 2nd premolar tooth, which failed due to the presence of missed root canal, was explained.

Case Presentation

A 28-year-old male was referred to Health Science University, Faculty of Dentistry, Department of Endodontics. The patient's medical history was noncontributory. His main complaint was the consistent sinus track formation at right buccal posterior area. Orthodontic treatment began two months ago. Clinical and radiographic examination revealed a secondary carious lesion under the old filling of the tooth no #25. The tooth was nonsensitive to percussion and exhibited normal mobility. The patient was asymptomatic. Preoperative radiographic evaluation showed periapical lesions related to untreated root. Based on these findings, a diagnosis of asymptomatic apical periodontitis was made.(Fig. 1)

Methodology

The tooth had three roots, as seen on the pre-op periapical radiograph. One canal was not cleaned, as this X-ray showed. (Fig. 1) Under local anesthesia, rubber dam placed andnT shaped cavity for the endodontic access was prepared. Old canal filligns were removed from the pulp chamber floor to the canal orifices using a size 012 tungsten carbide bur. The D1, D2, and D3 retreatment (DentsplyMaillefer, Ballaigues, Switzerland) were used to remove the canal filling in the palatal and buccal roots, respectively. Mesio-buccal canal orifice was seen in the buccal section of the tooth. To manage canals, a precurved 10 K hand file was used. Using the Propex Pixi (DentsplyMaillefer, Ballaigues, Switzerland) apex locator, the working lengths of three root canals were measured and confirmed with a periapical radiograph. Reciproc R25 and R40 were used to instrument canals (VDW, Munich, Germany). 5.25% sodium hypochlorite (NaOCl) solution was used to irrigate.

A periapical radiograph was taken to verify that all of the gutta percha had been removed. (Fig. 2) After the biomechanical preparation of the root canal is complete, intermittent passive ultrasonic irrigation (PUI) is activated using an UltraX ultrasonic device (Eighteenth, Changzhou City, China), and calcium hydroxide is placed inside the canals for two weeks as an intracanal medication. The sinus tract had not healed by the second appointment. Gutta-percha is inserted through the sinus tract to determine which canal it originates from. (Fig. 3) Root canal disinfection procedures (master apical size K file cleaning, irrigation, and activation) were repeated. After two weeks, an intraoral examination revealed that the sinus tract had healed. The cold lateral compaction method was used to fill the root canals with AH Plus (Dentsply DeTrey, Konstanz, Germany) sealer and gutta-percha (Diadent Group International, Chungcheongbuk-do, Korea). The root canal treatment was completed in a multiple-visit appointment (Fig. 4). 8 monts follow-up periapical radiograph shows periapical lesion size reduced and patient is still asymtomatic. (Fig. 5)

Conclusion & Clinical Relevance

A second buccal canal and root are a rare anatomical variation seen in maxillary premolars. Endodontists should always consider the possibility of an unusually large number of roots and canals in order to treat infections and related symptoms. A T-shaped endodontic cavity is ideal for cleaning and gaining easy access to the pulp chamber and canals of three-rooted premolar teeth.

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Regenerative Endodontic Procedure in a Immature Dens in Dente

CP02

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Aim

To present a clinical case report of a regenerative endodontic procedure in an immature Dens in Dente upper right lateral incisor.

Introduction

The apexification technique with calcium hydroxide and MTA-like materials, has traditionally been the clinician's first choice. Although this technique has a high success rate regarding periapical healing, it does not allow the root to grow neither in length nor width or thickness, leaving the tooth with short roots, and with thin walls that can easily fracture (1).

Regenerative endodontic procedure was proposed to overcome the drawbacks related to the clinical management of necrotic immature permanent teeth and is gaining relevance over traditional apexification among clinicians (2).

Case Presentation

Patient data: 12-year-old Caucasian male. Relevant medical history: none. Chief complaint: discomfort in the right lateral incisor. Clinical inspection: abscess in 1.2 with a sinus tract. X-ray study: periapical radiolucent lesion surrounding tooth 1.2. Immature Dens in Dente Percussion and bite tests: positive, cold sensitivity test: negative.

Presumptive diagnosis: apical periodontitis. Treatment plan: regenerative endodontic procedure (tooth 1.2) under magnification and rubber dam isolation.

Fig. 1. Radiographic images. (A) initial; (B) CBCT sagittal. (C) CBCT coronal. (D and E) CBCT axial.

Regenerative endodontic therapy procedure 1st visit:

1) Anaesthesia with vasoconstrictor.
2) Tooth cleaning, field isolation and disinfection with CHX.
3) Cavity access and elimination of Dens in Dente performed with burs. Avoid instrumentation.
4) Irrigation with 5.25% NaClO (20 ml.), sterile physiological saline (5 ml.) and 17% EDTA (20 ml.)
5) Dry with sterile paper points.
6) Placement of calcium hydroxide.
7) Coronal sealing.

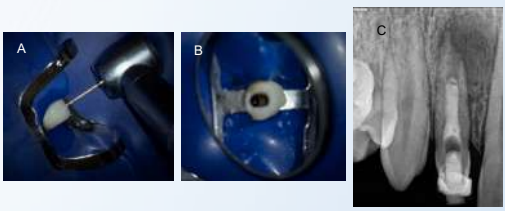

Fig. 2. (A) Access cavity. (B) Dens in Dente removal. (C) Calcium hydroxide.

Regenerative endodontic therapy procedure 2nd visit:

1) Anaesthesia with no vasoconstrictor.
2) Tooth cleaning, field isolation and disinfection with CHX.
3) Irrigation with 17% EDTA (20 ml.) and sterile physiological saline (5 ml.).
4) Dry with sterile paper points.
5) Induce bleeding with mechanical irritation.
6) Allow the canal to fill with blood. Wait 15 min. for clot formation.
7) Place a sterile collagen matrix on top of the clot.
8) Place a hydraulic silicate cement (Biodentine, Septodont, France) on top of the collagen matrix, 2 mm. underneath CEJ.
9) Seal with adhesive restoration.

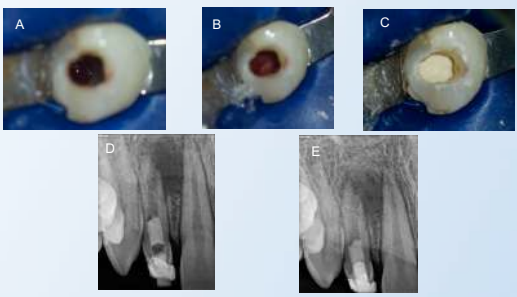

Fig. 3. (A) Apical bleeding. (B) Sterile collagen. (C and D) Biodentine. (E) Restoration.

Follow-up: clinical and radiographic follow-up visits were carried out up to 1 year. It was observed absence of signs and symptoms. There was root maturation. A CBCT was performed 1 year after to assess the lesion's healing and root formation.

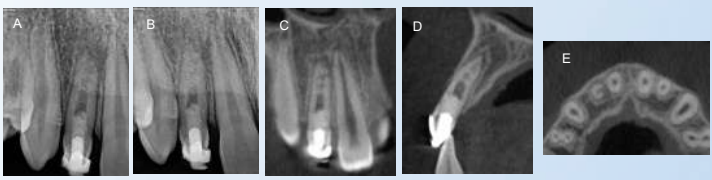

Fig. 4. (A) Follow-up 6 month. (B) Follow-up 1 year.(C) CBCT coronal. (D) CBCT sagittal. (E) CBCT axial.

Discussion

REP using a non-antibiotic disinfectant approach appears capable of providing satisfactory outcomes for a non-vital immature permanent tooth (3). The complex anatomy of a Dens in Dente immature tooth did not affect the outcome in the resolution of this case.The regenerative endodontic procedure was performed in accordance with the respective European Society of Endodontology Position Statement (4). There are three treatment outcomes of regenerative endodontics; (a) resolution of clinical signs and symptoms; (b) further root maturation; and (c) return of neurogenesis (5). In this case a and b were obtained.

Conclusion and Clinical Relevance

Based on the results of the present case report, regenerative endodontic procedure can be a potential treatment option for the treatment of periapical lesions in immature permanent teeth. The use of evidence-based standardized treatment procedures is paramount to increase their reproducibility and possibility of success.

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CP04

Revised Endodontic Treatment of a Perforated S-shaped Root Canal

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Aim

To analyse possible risk factors that may occur during root canal treatment of the doubled-curved canal.

Introduction

The mechanical preparation of the root canal is influenced by the root canal anatomy, such as: angle, radius and location of the canal curvature[1,2]. Preparation of curved canals may alter the original canal anatomy and can affect the outcome of endodontic treatment[3]. The canal might have an iatrogenic alteration, such as ledge or perforation that prevents instrumentation to the apical constriction[3,4].

Case Presentation

In 2016, a 33-year-old female the Patient reported to the GDP for dental treatment. An orthopantomography was taken and the treatment was begun. The GDP performed the primary RCT of the upper, left canine. The control radiograph showed canal underfilling (Fig. 2), so the doctor decided to retreat the canal by himself. Then, the canal perforation was performed which was revealed by the next control radiograph and the patient was referred to the specialist.

Discussion

Among factors influencing the prognosis of the root canal therapy, to avoid procedural erros precise analysis of the periapical radiograph and specific instruments and methods have to be implemented. Thus, it is essential to differentiate canal division with other canal blockages, search for original path of curved canals, perform coronal flaring or pre-brend instrument to negotiate abrupt canal curvatures. There are also new ideas supporting canal preparation, i.e. an arithmetic crown-down dynamic tactile instrumentation technique, that can be helpful in such cases.

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CP05

UNIVERSITY OF LIVERPOOL

Is External Cervical Resorption an Established Manifestation of Systemic Sclerosis? A Case Report

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Aim

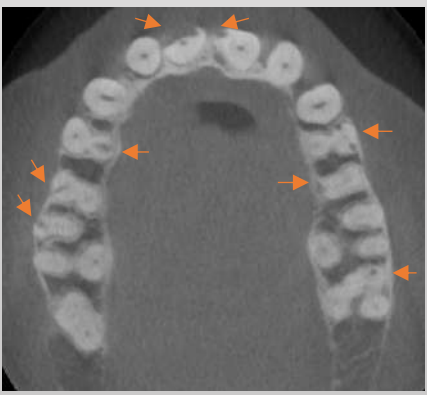
Systemic sclerosis is a multisystem autoimmune disorder characterised by hardening and fibrosis of the skin. Only a small number of case reports have established a relationship between systemic sclerosis and ECR. The aim of this case report is to document the case of a patient with multiple external cervical resorption lesions, who was referred to our unit.

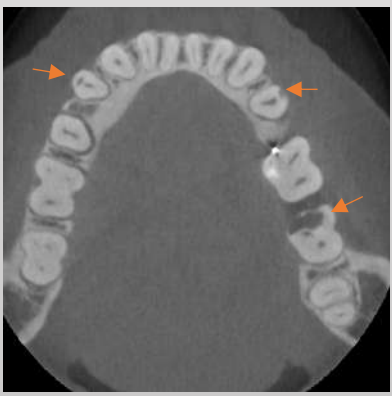
Introduction

ECR is a dynamic process characterised by the action of multinucleated odontoclastic cells on periodontal, pulpal and dental hard tissues. Scleroderma, or systemic sclerosis, is characterised by fibrosis and hardening of the skin, as a result of deposition of extracellular matrix components in various tissues. The association between systemic sclerosis and ECR is not well established, with only a few cases reported in the literature.

Case Presentation

A 54-year-old female patient, with a 10-year history of systemic sclerosis diagnosed by her rheumatologist, was referred to our unit regarding extensive ECR. A total of 14 maxillary and mandibular teeth with ECR were detected by clinical examination and cone-beam computed tomography (CBCT).





Axial CBCT images show ECR lesions associated with maxillary and mandibular teeth. The patient opted to monitor all lesions, with the possible need for extraction later.

Discussion and Conclusion

It may be logical that the pathogenesis of systemic sclerosis may affect odontoclastic action. The reduction in vascular supply, in accordance with the compression of the fibrotic skin over blood vessels, may impair vascularization, and favour osteoclastogenesis and resorption. Dental practitioners should be aware of a potential relationship between connective disorders and ECR, although further evidence is required to strengthen this association.

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Recurrent inflammatory changes after decompression treatment procedures of big periapical lesions. A case report.

CP06

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Aim

Is to present the healing pattern and the recurrent inflammatory changes in the treatment of big periapical lesions. A step by step procedure of conventional antiseptic RCT, decompression technique with the use of peripheral venous cannula and the following apicoectomy is shown on radiographic documentation. The objective of this case report is also to highlight the importance of long term control of the healing process in terms of possible recurrent changes and the need of multi optional strategy in the treatment of the odontogenic cyst.

Introduction

Non-surgical and surgical treatments of big periapical lesions are always challenging with no clear prognosis. The origin of radicular inflammatory cysts arises from epithelial resiclues (cell rests of Malassez) in the periodontal ligament as a consequence of inflammation following pulp necrosis (1). Apart from conventional endodontic therapy, various approach like enucleation, decompression or marsupialisation can be proceeded as well as root end microsurgery. The treatment of choice is dependent on the size and localization of the lesion, the bone integrity of the cystic wall and its proximity to vital structures. Decompression is indicated in close proximity of sensitive anatomical structures, which may lead to their damage during surgical procedure. Lining epithelium of the cyst remains in place and is responsible for a recurrent cyst formation.

Case Presentation

A 20-year old patient was referred by the GP dentist for a treatment of persisting inflammatory lesions after primary endodontic treatment of the teeth 22, 23 and 24. The episodes of exacerbation and antibiotic therapy occurred in the past. At the moment of examination: no provoked or spontaneous pain, a face asymmetry with a slight displacement of the left nose wing to the right side, the left inferior nasal concha elevation. In the oral cavity an exorbitance in the left infranasal area. RVG (Fig. 1 a) and CBCT examination (Fig. 1 d) revealed an extensive 21x18x12mm low-density area around the apex, spreading the roots of 22 and 23 apart, elating the floor of nasal cavity and the anterior wall of the maxillary sinus. Root canals of 22, 23 i 24 were homogeneously filled with a slight extrusion over the apex of 22. The tooth 21 reacted within normal limits under thermal and electric pulp testing. Due to the size of the lesion the discussed decision was for a surgical approach with a use of decompression method.
Under the infiltration anesthesia with one carpule of 4% articaine with 1:100,000 epinephrine (Citocartin 100; Molteni Stomat,Florence, Italy) one catheter was introduced to the lumen of the cyst into the alveolar arch in between the teeth 22 and 23 and the other one in between teeth 23 and 24, respectively (I.V. Catheter, Romed-Holland, Van Oostveen Medical B. V., Wilnis, Netherland) (Fig.1 e). The serous-purulent exudate occurred. The correctness of the decompression tubes' positioning was controlled on a radiograph with the GP cones in their lights (Fig. 1 b). Introduction of two catheters enabled the effective rinsing of the cystic cavity. Decompression tubes were sutured to the mucosa with a single knot seam (6:0 Optilene, B. Braun, Melsungen, Germany). The irrigation of a cystic cavity with 5 ml of a saline solution was ordered once every 24 hours. The syringe and the needle with a blunt tip of 0.6 mm in diameter were recommended. Control visits were appointed once a month, unless the accidental loss of the decompression tubes occurs. During every check-up visit the patency of the tubes was assessed and the cystic cavity was rinsed with 0.2% Chlohexidin solution (Corsodyl,Glaxosmithkline Consumer Healthcare, Warsaw, Poland) until clear washings without the purulent exudate.

In a control radiograph after 6 months the healing and the bone trabecularization was observed (Fig. 1 c). In 6 months time, the CBCT scans (Fig. 1 g) revealed bold anterior wall of the maxillary sinus, an extensive diminishing of the lesion with the restoration of the bony floor of the nasal cavity and palatal lamina. A good healing, lack of purulent exudate and clean washings from the cyst were the reasons for the removal of the decompression tubes (Fig. 1 h, i). The wounds after the tubes were left for a spontaneous healing. The irrigation of the oral cavity with 0,2% chlorhexidin (Corsodyl,Glaxosmithkline Consumer Healthcare, Warsaw, Poland) two times a day was ordered. After 3 months of observation another RVG (Fig. 1 f) revealed a complete healing of the periapical lesion.

Next follow-up visit was appointed within 3 months. A dental x-ray showed recurrent radiolucent area over the apex of the tooth 22 (Fig. 1 j, k). The decision was to wait next 3 months. Unfortunately, next control RVG showed the magnification of the radiolucent changes (Fig. 1 l). Due to the recurrence of the inflammatory changes the decision about surgery was made and the apicectomy of the tooth 22 with the excavation of the lesion, retrograde preparation and filling with MTA cement were done (Fig. 1 m). RVG dental x-ray was taken on a control visit in 6 months. The lesion diminished in size. (Fig. 1n). CBCT taken 9 months after surgery shows complete healing with uniform radio-dense area around the apex (Fig.1 o)

Discussion

Unfortunately over the period of half a year, despite decrease of a lesion in size, the surgical approach was necessary. Probably the reason for the inflammation recurrence is the cyst follicle left in a bone, which can't be removed during the decompression (2,3). Because of that, after the decompression it is essential to control the patient status clinically and radiologically. In case of the recurrence the surgical treatment is inevitable.

Conclusion & Clinical Relevance

Decompression technique with the use of peripheral venous cannula is an easy and efficient procedure in clinical conditions. Nevertheless, regardless of the treatment method, the cysts require a follow-up over a period of time because of the risk of the lesion recurrence. Root end microsurgery is a complementary treatment, which always needs to be considered.

Figure 1: A healing pattern of the lesion on the radiographic documentation throughout the treatment.

a, Periapical x-ray. Radiolucent lesion above the roots.
b: Gutta percha cone placed in the tube.
c: 6 months x-ray control - bone trabecularization.
d: Preoperative cbct scan – lesion spreading the roots of teeth 22 and 23 apart, elating the floor of nasal cavity and the anterior wall of the maxillary sinus.
e: Sutured intravenous catheters visible on the mucosa.
f: 9 months x-ray control - complete healing of the periapical lesion.
g: 6 months control - healing visible on a CBCT scan..
h, i: Cannula removal.
j, k: Recurrent lesion 3 months after cannula removal.
l: Magnification of the radiolucency 6 months after cannula removal.
m: Postoperative radiograph with adequate resection and root-end filling.
n: 6 months x-ray control - the lesion diminished in size.
o: Control cbct 9 months after surgery - complete healing of the bone.

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IN VIVO DYNAMIC EVALUATION OF THE OPERATIVE TORQUE DURING ROOT CANAL SHAPING WITH MARTENSITIC AND AUSTENITIC INSTRUMENTS: A CASE REPORT

CP07

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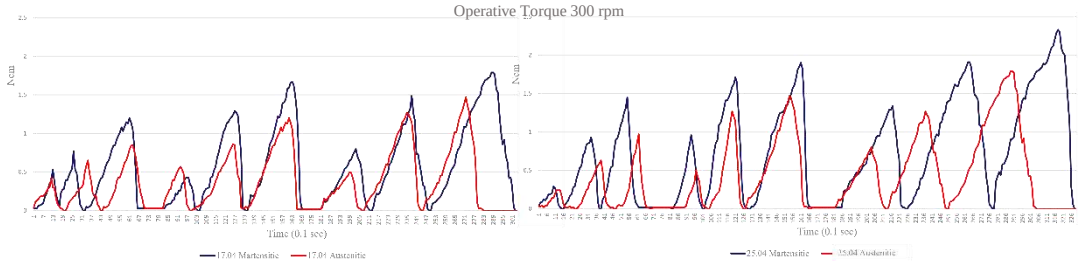
Introduction and Aim

As stated by several literature reviews, in vitro static and dynamic evaluation of mechanical performances of NiTi instruments is poorly clinically relevant (1). To date, the actual dynamic contribute of different crystallographic phases to mechanical stress generation during clinical shaping procedures is still debated due to the several factors involved (2). For this reason, the aim of this case report was to discuss and analyze the in vivo torsional loads developed during the mini-invasive instrumentation of root canals with martensitic and austenitic instruments

Cases Presentation

A 55-year-old female was referred to the Policlinico Umberto I's Endodontics Unite requiring RCT of the upper left second premolar because of periapical radiolucency arising from the necrosis due to the prosthodontics preparation. Considering the bridge integrity, the absence of marginal leakages and no evident pathologies of proximal teeth, in accordance with the patient, it was decided to perform a conservative access cavity trough the crown, performing the RCT without removing the fixed rehabilitation. Once the two canal orifices were located, the shaping procedures were differentiated according to the crystallographic phase of the selected NiTi rotary instruments. The buccal canal was instrumented using a martensitic instrument sequence (X7 EdgeEndo 17.04 and 25.04), while the palatal canal was instrumented using an austenitic sequence (X7 EdgeEndo 17.04 and 25.04). The instruments were rotated at 300 rpm with a torque limit set to 2.5 Ncm. The operative torque was measured thanks to the dedicated endodontic motor able to record the torque values each 0.1 seconds. Shaping procedures of both canal were performed through a pecking motion characterized by 2 mm of inward motion and 1 mm of outward motion, repeated for 3 strokes after which the instruments were completely removed and the canals were irrigated with NaOCl at 5%. After the final rinse the canals were obturated with the single cone technique and hydraulic sealer.



Discussion

The data showed in the above graphs clearly represent how the austenitic instruments lead to a lower development of torsional stress during shaping procedures. The maximum torsional values of each strokes are greater in the case of the martensitic instruments. This is probably due to the enhanced cutting efficiency guaranteed by the austenite, which decrease the resistant friction of the dentinal walls, leading to lower torsional stress development. In addition to the increase in the dynamic performances, the austenite guarantees more torsional stiffness, reducing the risk of torsional failure.

Clinical relevance

Since the lack of clinical data regarding the different mechanical performances of martensitic and austenitic instruments during conservative RCTs, this case report provides interesting information regarding this crucial topic. In case of not severe curvature, austenitic instruments could be preferred to martensitic ones due to their enhanced cutting efficiency and lower torsional stresses development.

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CP08

CONSERVATIVE MANAGEMENT OF A YOUNG DENTAL PULP – a clinical case

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AIM

Discuss vital pulp techniques for management of symptomatic carious exposed pulps and successful outcome in a young permanent tooth with clinical signs and symptoms of irreversible pulpitis.

INTRODUCTION

Therapeutic strategies focused on the pulp preservation, are important when managing young vital teeth with deep caries and exposed pulps. The purpose of caries management within Vital Pulp Therapy (VPT) is to remove microbial irritation and promote pulpal repairing by placing biomaterial and well-adapted permanent restoration for long-term preservation of a vital, symptom-free and functional tooth. Despite current literature based on low-quality evidence and lack of prospective and comparative trials investigating potential prognostic factors, the improved knowledge of pulp biology, the development of newer biocompatible materials and the advances in pulp tissue handling techniques are making the preservation of vital pulp more predictable.

Fig.1 Vital pulp protocol sequence.

CASE PRESENTATION

Female patient, 12 years old, was referred to endodontic specialist, in private hospital practice, with main complaint of spontaneous, radiating and sleep disturbance pain in the right lower jaw. Detailed pain history, radiographic findings, percussion and cold testing revealed tooth 46 with pulpal diagnosis of irreversible pulpitis and periapical diagnosis of symptomatic apical periodontitis, according to the American Association of Endodontics (AAE, 2013). Considering prognostic factors, the treatment plan was VPT by partial pulpotomy technique, capped with mineral trioxide aggregate (MTA) and restoration with a resin bonded composite over a layer of light-cured glass ionomer. One visit treatment. Two years follow-up with successful outcome. Positive response to cold testing and not tender to percussion. Periapical radiography with signs of healing and improvement in the periapical index (PAI) score. Hard tissue bridge formed under the biomaterial agent.

Fig.2. Inicial x-ray.

Fig.3. Inicial orthopantomography.

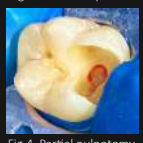

Fig.4. Partial pulpotomy.

Fig.5. Light-curing glass ionomer over MTA.

Fig.6. Final x-ray.

Fig.7. Two years recall.

DISCUSSION

Pain subjectivity and clinical pattern of the complaint does not indicate the tissue's ability to regenerate. The introduction of mineral trioxide aggregate (MTA) has opened a new frontier in vital pulp treatments and changed the perception that pulp capping in carious exposed teeth is unpredictable and therefore contraindicated.

CONCLUSION

VPT is a successful treatment for exposed pulps in young permanent teeth with irreversible pulpitis. The advances in pulp biology and treatment protocols will encourage the pulp survival and preservation, improving dental health in young patients requiring minimal invasive endodontics.

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MULTIDISCIPLINARY MANAGEMENT OF ENDODONTIC-PERIODONTAL LESION

CP09

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The Aga Khan University & Hospital

Aim: To discuss the management of Endo-Perio lesion in non-periodontitis patients with grade 3 defect: A 5-year follow up.

Introduction: The management of the Endo-Perio lesion is a dilemma for many clinicians. Conventional endodontic therapy alone has a very low success rate (27 % to 37%) in the management of Endo-Perio lesion. Literature suggests that guided tissue regeneration following endodontic therapy could increase the success rate of the Endo-perio lesion.

Case Presentation: A 33-years old female was referred for the management of recurrent abscess draining from upper left lateral incisor (UL2). Based on the clinical and radiographic findings, our diagnosis was "Grade 3 defect in UL2 in non-periodontitis patient". We performed guided tissue regeneration (GTR) around UL2 with Bone graft (allograft) to support the missing walls. Orthodontic wiring done before GTR and provided splinting through the healing period. Modified papilla preservation technique was used to gain access of the surgical site and extended flap was designed to gain the defect involving > 1/3 of the root. Flap was stabilized by double internal mattress suture.

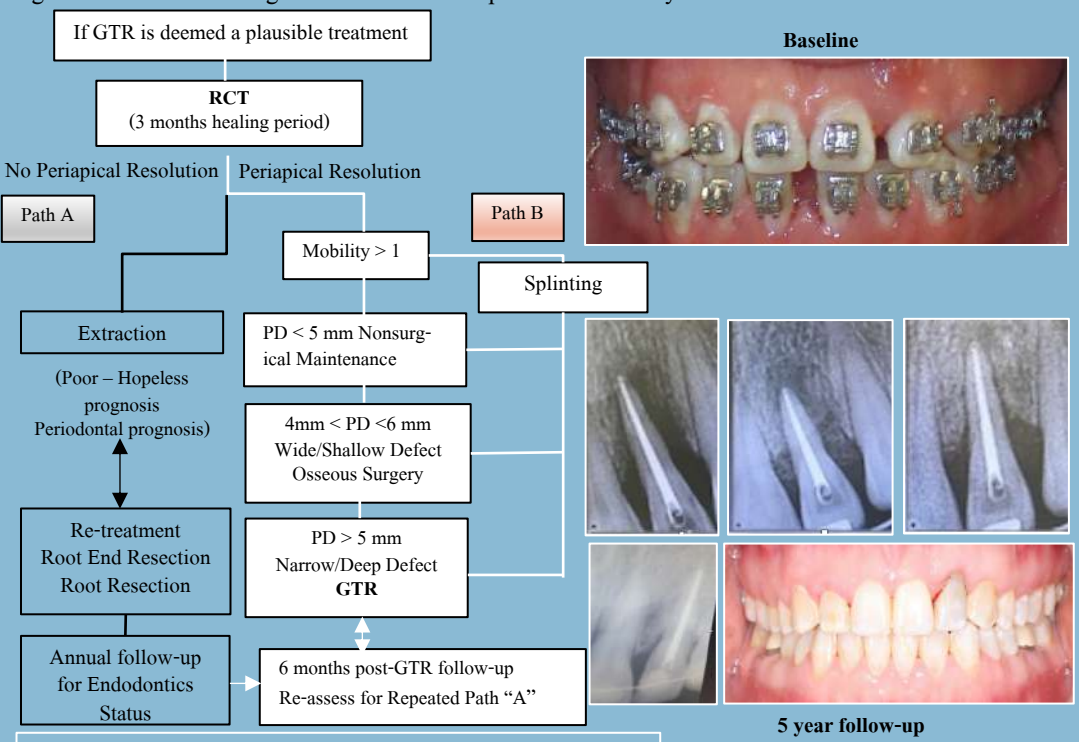

Fig: The treatment protocol followed (highlighted in white)

Discussion: Thorough assessment and planning is key in the successful management of the combined lesion. For this purpose, we used "Treatment algorithm for periodontic-endodontic combined lesions". Due to technique sensitivity of GTR procedure, clinician usually opt for extraction of the combined endo-perio lesion. However, case selection based on the Decision-Making Model for GTR procedure could improve the outcome. In our case, factors such as pocket depth (> 4mm), angle of the defect(≤ 25°), site with three walled infra bony defect and the splinting of the tooth before the GTR procedures resulted in bony fill and reduction in mobility. After 5 years, gingival health is stable with slight crestal bone loss and gingival recession. Site is stable with probing depth less than 4 mm and no bleeding on probing. Supportive periodontal therapy was provided for stability.

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CP10

A Multilocular Radiolucency Presenting at the Apex of a Tooth: Lessons to be Learned

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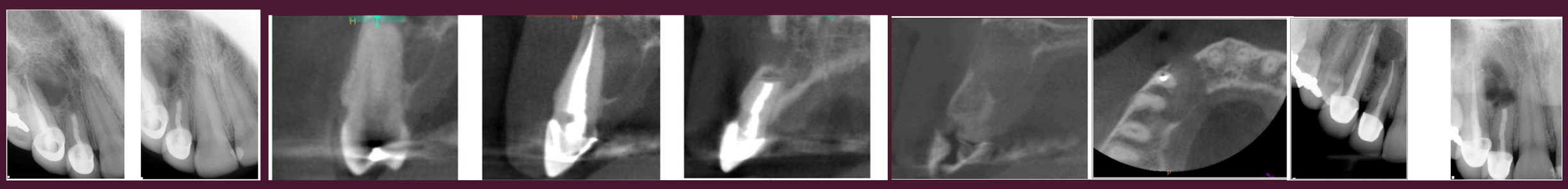
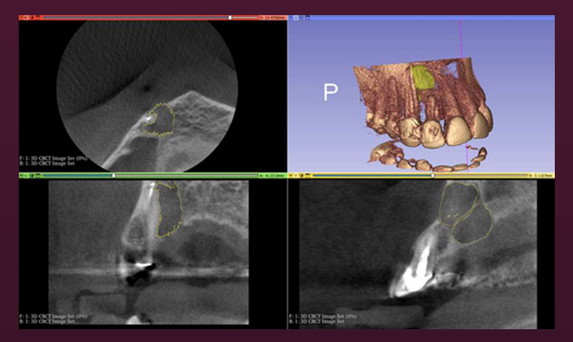
Aim: The purpose of this clinical poster is to highlights the importance of interdisciplinary consultation and work as a team of the endodontist, radiologist, oral surgeon and histopathologist, to be able to give the best treatment to our patients. An accurate diagnosis and treatment plan can increase the chances for a timely and effective treatment and better outcomes of our patients. Traditionally, a periapical lesion that is treated by non-surgical endodontic therapy is not biopsied. As a result, no histological diagnosis is available prior to endodontic treatment. While this approach is effective in the vast majority of cases, some cases are more complex and may be deceptive, resulting in failed treatment. One such case is presented in this case report.

Case presentation: In May 2011, a 34 year old female patient was referred from a community health center for the evaluation and retreatment of teeth 13 and 12, both of which had undergone endodontic therapy in 2009. Upon presentation in 2011, she was "symptomatic to palpation over teeth 13/12 area, probing <3mm, no teeth mobility or sensitivity to percussion, PFM margins were intact, no response to cold test. In February 2012, an apicoectomy was performed on tooth 12. The lesion was excavated, the tissue was removed and the area was filled with MTA. The biopsy report was received with a diagnosis of a radicular cyst. In April 2015, the patient was diagnosed with a "failing endodontic treatment." Tooth 13 was retreated. In October 2015, the patient presented again. On intra-oral examination, the apical region of 13 was slightly tender to palpation. The radiology consult showed that the epicenter of the lesion was between two teeth rather than at the apex, that endodontic therapy and retreatment, as well as an apicoectomy on 12 had failed to resolve the lesion, which all called into question the diagnosis of a radicular or lateral radicular cyst. After reviewing the case from the beginning, on the periapical image taken on 12/09/11, the lesion is clearly multilocular, rather than unilocular, with well-corticated locules. The multilocular appearance persists on the periapical image of 02/15/12. The appearance was more consistent with an odontogenic keratocyst and an ameloblastoma, rather than a radicular cyst. Upon consultation of an oral pathologist, a histopathologic diagnosis of a glandular odontogenic cyst was established. The patient was referred to an oral surgeon for definitive treatment, following which the second pathologist provided a diagnosis of a glandular odontogenic cyst. The patient did not return for follow-up.



Discussions: Since multilocular radiolucent lesions are rare, the question arises of what endodontists should do when confronted with a multilocular lesion at the apex of a tooth. Recommendations in literature regarding histopathological examination of tissue collected from endodontic surgery are controversial, with authors suggesting it to be not beneficial and expensive for patients and careful clinical diagnosis would differentiate endodontic and non-endodontic lesions, while, other studies recommend histopathological examination for the exact diagnosis especially in large periapical lesions or cases of failure of endodontic treatments needing endodontic surgery. Many clinicians do not submit tissue in cases where they have 'no doubt' on their diagnosis or the tissue recovered is considered 'limited'. The case underscores the importance for all practitioners to be familiar, at least in a general way, with the radiographic features of lesions. Finally, from a practice perspective, the case points to the value of establishing and maintaining a mutually trustworthy and respectful relationship with fellow practitioners, in this case, endodontist, radiologist, oral surgeon and histopathologist.



A 3D reconstruction from the CBCT data was used to help in the visualization of the radiolucent lesion, to better understand in 3D its extend and size.

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Conclusion and clinical relevance: 1. Clinical and radiographic examinations are of high importance for the everyday treatment of our patients, with new technologies supporting and helping us succeed.

2. Endodontists may face difficulty in diagnosis and treatment planning when lesions present as periapical radiolucency, considered all practitioners should be familiar, at least in a general way, with the radiographic features of lesions.

3. Interdisciplinary consultation and collaboration as a team of the endodontist, radiologist, oral surgeon and histopathologist is very important to be able to make a correct diagnose, treatment plan and to give the best treatment to our patients.

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Management of external root resorption via Revascularization procedures

CP13

CP1

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Aim

To present the use of revitalization procedures in two cases diagnosed with pulp necrosis, apical periodontitis and external inflammatory root resorption (EIRR).

Introduction

Revitalization procedures are gradually becoming popular in endodontic field as they have been widely used for the treatment of teeth with pulp necrosis and incomplete root formation.

Case Presentation

Case 1: 22 y.o, #12 Pulp Necrosis & Chronic Apical Abscess (1a, 1b)
Case 2: 22 y.o, #36 Previously Treated & Symptomatic Apical Periodontitis (2a, 2b)
Both cases presented with signs of external inflammatory root resorption

Methodology

Case 1.

- Light mechanical preparation with hand instruments
- Irrigation with NaOCL 1,5%
- Intracanal Dressing: Double Antibiotic paste for 2 weeks (Amoxicillin & Metronidazole) – Healing of fistula (1c)
- Blood clot formation + MTA barrier
- Post operative radiograph (1d)
- Recall examination: At 6, 18 & 28 months (1e, 1f, 1g)

Case 2.

- Coronal Restoration disassembly
- Chemomechanical preparation: Edge Endo X7
- Intracanal dressing: $Ca(OH)_2$ for 2 weeks
- Distal root canal:
  Blood clot formation + MTA barrier (2c,d)
- Size of apical foramen in distal root canal (1,4cm)
- Mesial root canals: lateral condensation (2e)
- Post operative radiograph (2f)
- Recall examination: At 6 & 9 months (2g,h)
- Permanent Coronal Restoration (2i)

Discussion

In both cases, resolution and rapid healing of periapical lesion could be attributed to the regenerative procedure implemented. Additionally, in case 1, increase in root length and wall thickness is accomplished.

Conclusion & Clinical Relevance

Regenerative endodontic procedures seemingly have great potential in cases of teeth presenting with EIRR. The type of stimuli causing pulp necrosis and the root formation stage may comprise important prognostic factors regarding the healing pattern of the involved tissues. Appropriate restoration is also essential to ensure longevity of the treated teeth.

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CP14

CLINICAL ADVANTAGES OF NEW MINIMALLY INVASIVE RECIPROCATING INSTRUMENTS

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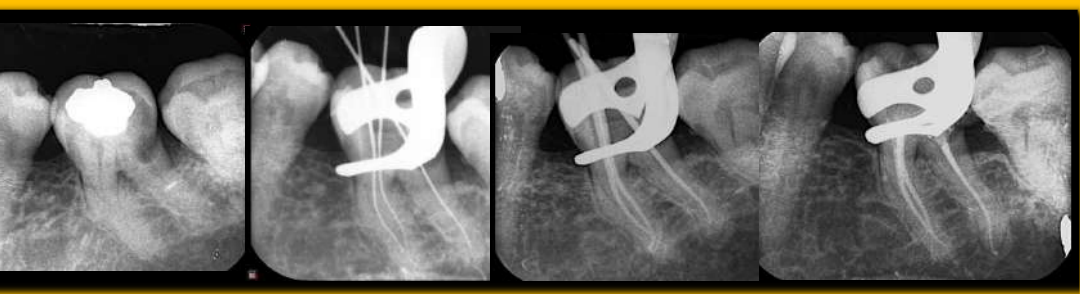
Aim. To evaluate the advantages of new small tapered reciprocating NiTi instruments (Direct-R Mini, Direct Endo , Paris, France), which were developed to provide a minimally invasive instrumentation technique .

Introduction. Traditionally single-file reciprocation technique has been performed used files of variable greater tapers which are, however, less flexible, less resistant to fatigue than less tapered instruments (i.E. .04 tapered), and require more skills to reach apex without iatrogenic errors in severely curved canals. Indeed, in such cases a smaller taper could make progression easier and less stressful, allows more flexibility and less elastic return (improving maintenance of original trajectories) and better resistance to flexural stress and fatigue failure. These favorable properties could also be enhanced by heat-treatments, which have now widely adopted in the manufacturing of reciprocating NiTi single files. Following these concepts, new .04 single-file reciprocating instruments have been recently developed (Direct-R MI GOLD (R 25 size) , Direct endo , Paris, France) aiming at providing a less invasive and less stressful instrumentation, while maintaining the benefits of the commonly used reciprocating motors and motions (30°-150°).

Case 1. In the present upper molar case complex curvatures were easily, safely and efficiently treated by using a new heat-treated minimally invasive (.04 taper) DIRECT-R MI GOLD (R25 size) reciprocating file. Following a manual glidepath up to size 10, a R25 reciprocating single-file shaped all canals, respecting original trajectories without any iatrogenic error, then easily and rapidly obturated using a single-cone (.04) cold hydraulic condensation technique with bioceramic sealer.

Case 2 : In this lower molar case, Direct-R MI GOLD (R 25 size) was used for shaping root canal system without prior rotary/reciprocating glidepath instruments.



Case 3. The proprietary heat treatment also allows prebending of the files, making shaping (when still) much easier in posterior area without sacrifying tooth structure when compared with other file systems. In this case severe curved mandibular molar shaped with Direct-R MI GOLD (R 25 size) and obturated with single-cone (.04) cold hydraulic condensation technique with bioceramic sealer similar to case1 and case 2.

Discussion: Direct-R MI GOLD files were able to perform canal shaping in a simple and rapid way, without needing any rotary/reciprocating glidepath instruments. Direct-R mini design, sizes and tapers provide increase flexibility and fatigue resistance for easier and safe instrumentation.

Conclusion & Clinical Relevance: Direct-R MI Gold files are effective and safe instruments for root canal shaping in different anatomically various canals.

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FACULTY OF MEDICINE AND HEALTH SCIENCES

HELSINKI SHEDDING NORTHERN LIGHTS ON ENDODONTICS 6-9 SEP. 2023 ese

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SURGICAL EXTRUSION OF A TRAUMATIZED INCISOR WITH A COMPLICATED CROWN-ROOT FRACTURE: A CASE REPORT

Aim

To describe the management of a traumatized upper central incisor with a complicated crown-root fracture by means of surgical extrusion including 180° root rotation.

Introduction

A complicated crown-root fracture is often considered as hopeless because of subgingival fracture extension, especially if little crown substance is left. Clinicians should consider surgical extrusion as a viable treatment option in these cases [1,2].

Case presentation

An 18-year-old female attended dental practice Icarus in Antwerp, Belgium, because of an ice-skating accident. Clinical (Fig. 1) and radiographic (periapical radiograph and CBCT, Fig. 2-3) examination led to the diagnosis of a crown-root fracture of tooth #11, with very little remaining crown substance and subgingival margins all over.

A risk-benefit analysis was made and the following treatment options were proposed: surgical crown lengthening, orthodontic or surgical extrusion, extraction and replacement by an implant-supported crown or by a partial denture. The patient consented to a surgical extrusion.

During the emergency treatment, the coronal tooth fragment was removed and temporary root canal treatment with calcium hydroxide was done (Fig. 4-5). As a provisional replacement, the patient's transparent orthodontic retainer was filled with composite (Filtek Supreme, 3M ESPE, USA) (Fig. 6).

One week later tooth #11 was extracted using the Benex vertical extraction system (Benex; Helmut Zepf Medizintechnik GmbH, Germany) (Fig. 7). The root was rotated 180°, repositioned coronally within the socket, and stabilized with a suture (Seralene 5-0, Serag-Wiessner GmbH, Germany) for 10 days. Five weeks later root canal preparation was terminated with Reciproc R40 (VDW Dental, Germany), and the canal obturated with gutta percha and bioceramic sealer (EndoSequence BC sealer HiFlow, BUSA Dental Instrumentation, USA) using warm vertical condensation. A glass fiber post (Snowpost, Abrasive Technology LTD, UK) was cemented with resin cement (Panavia V, Kuraray Noritake Dental, Japan) and a composite (Filtek Supreme, 3M ESPE, USA) crown build-up was made (Fig. 9-11). Treatment was performed with the aid of rubber dam and operating microscope (PICO, Carl Zeiss, Germany). 18 weeks later a provisional crown was fabricated to temporize the treatment. After one year, tooth #11 was asymptomatic and no mobility or ankylosis could be detected. At this time, a definitive crown was placed and further follow-up was scheduled (Fig. 12-13).

Discussion

Surgical extrusion can be considered a suitable treatment option in case of complicated crown-root fractures. In the present case, the fracture line on the buccal side was localized subgingivally, while the fracture on the palatal side was infraosseous (Fig. 3). A 180° root rotation reversed this unfavourable situation because of the inverse relationship of the buccal and palatal vertical bone level, thereby limiting the required extrusion, which benefits the crown-root ratio[3]. The Benex vertical extraction system (Benex; Helmut Zepf Medizintechnik GmbH, Germany) was used to minimize damage to the periodontal ligament in order to decrease the risk of ankylosis or root resorption[3,4]. The clinician can expect a good prognosis with respect to function and aesthetics, and a minimal risk of adverse events[2].

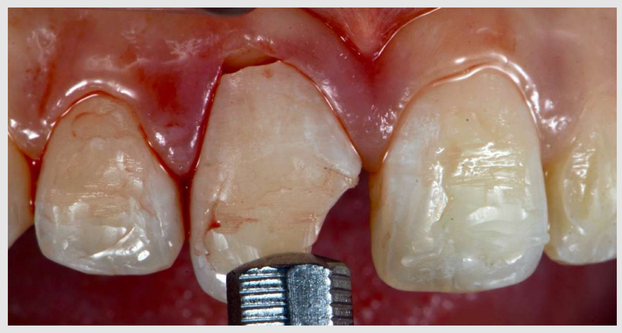

Fig. 1: Labial view of traumatized tooth 11 with crown-root fracture

Fig. 2: Preoperative periapical radograph

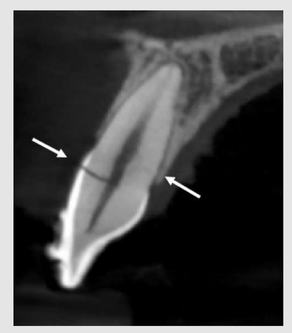

Fig. 3: Preoperative CBCT: sagittal view

Fig. 4: Labial view after removal of the coronal fragment

Fig. 5: Periapical radiograph after temporary root canal treatment

Fig. 6: Labial view of the immediate provisional replacement

Fig. 7: Surgical extrusion: root extraction using the Benex and replantation in a more coronal position after 180° rotation. Stabilization with sutures.

Fig. 8: Labial view 4 weeks after extrusion

Fig. 9: Endodontic and restorative treatment

Fig. 10: Restoration after rubber dam removal

Fig. 11: Periapical radiograph of endodontic and restorative treatment

Fig. 12: Labial view of definitive crown

Fig. 13: 1 year follow-up: periapical radiograph

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Conclusion and Clinical Relevance

Complicated crown-root fractures might look hopeless, especially when very little coronal tooth substance is remaining. Surgical extrusion and subsequent adhesive build-up of the crown may offer a viable treatment option, as demonstrated in the present case.

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INTRACORONARY BLEACHING OF A RETREATED TOOTH: A CASE REPORT

CP16

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Aim

The aim of this case report was to evaluatethe success of intacoronary bleaching of a retreated tooth with hydrogen peroxide using the walking bleach technique.

Introduction

One of the most critical aspects of an aesthetically pleasing smile is tooth color. When a single tooth presents discoloratian, the adverse effect may be more pronounced than when a generalized dentition discoloration persists because it is clear that the color of one tooth differs from that of the rest of the teeth. Local causes of the intrinsic tooth discolorotian are pulp necrosis, intrapulpal bleeding, pulp tissue residues after endodontic therapy, root canal filling materials, coronary restorations and aging. Intracoronary bleaching is a widely used and minimally invasive alternative treatment to solve aesthetic non-vital or endodontically treated tooth discoloration.

Case Presentation

A 42-year-old female patient was admitted to the endodontic clinic with the complaint of non-aesthetic and discolored appearance in her upper central incisor. An unsuccessful root canal treatment was detected in the initial radiograph of the involved tooth, and intracoronary bleaching was planned together with retreatment. After the root canal filling was removed, one week calcium hydroxide medication was applied. In the second appointment, root canal retreatment was performed with the cold lateral compaction method using a resin-based sealer. A 2 mm glass ionomer cement was placed between the bleaching gel and the root canal filling, and then bleaching was performed with hydrogen peroxide gel. Coronary restoration was performed with composite resin after adequate whitening was achieved.(Figure 1)

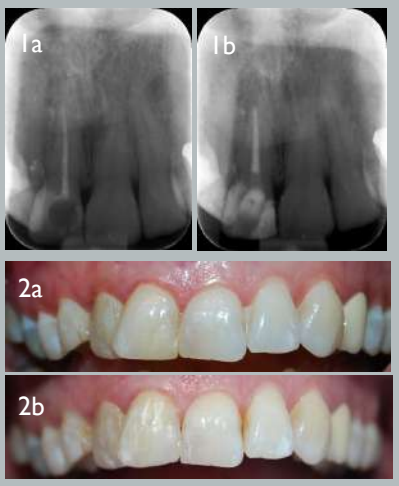

Figure 1: Pre and postoperative radiographs of the case (1a, 1b) Pre and postoperative photograph of the case (2a, 2b)

Discussion

Whitening that tooth not only influences the patient's satisfaction with her appearance but also positively affects her self-perception and supports psychological well-being. Additionally,in the present case report a base of 2 mm glass ionomer cement was placed over the root canal filling to provide a mechanical barrier between the obturated root canal and bleaching gel, which is in agreement with Amato et al. (2006), but is in disagreement with Friedman et al. (1988), as they did not use an intermediate barrier prior to the bleaching material.

Conclusion & Clinical Relevance

Intracoronary bleaching is a minimally invasive, alternative treatment that addresses aesthetic concerns related to non-vital teeth discoloration.

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CP17

Orthodontic extrusion of subgingival carious teeth

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Aim

In this case, the teeth with subgingival caries were restored using orthodontic extrusion.

Introduction

The restoration of extensively carious teeth has been challenging, especially when the caries extend below the gingival margin. Preservation of the biologic width and crown ferrule are critical for maintaining the long term success and periodontal health.

Case Presentation

A 66-year-old female patient presented with complaint of cavity of the upper anterior teeth.(Fig a,d) The patient had received endodontic treatment on #11, 12 teeth and crown restoration on #11 tooth. At the clinical examination, upper right central incisor presented a distal root caries and upper right lateral incisor presented a loss of mesial wall owing to caries extend below the gingival margin. To start, old crown removal of #11 tooth was performed. lingual buttons were bonded to the #11, 12 teeth, resin-wire splint was placed to the adjacent teeth, and extrusive force was provided by elastic thread.(Fig b) After 6 weeks of treatment, around 4mm of extrusion had been achieved.(Fig e) After then, crown lengthening procedure with osteotomy was performed to correct the discrepancy of the gingival margin due to coronal migration of the soft tissues. Subsequently, residual caries were removed. A fiber post(Snowpost, Abrasive) was cemented with adhesive(Singlebond Universal, 3M ESPE) and resin cement(RelyX Ultimate, 3M ESPE) and core(LuxaCore Dual, DMG) was built up. Finally, Porcelain fused to zirconia crowns were cemented.(Fig c,f) After 1 year follow up, The tooth presented satisfactory functional and esthetic outcomes. In addition, the periodontal tissues remained healthy.

Discussion

This case included extensive decay of multiple teeth, and each tooth had discrepancy of gingival margin. It is difficult to predict the amount of movement of teeth and soft tissues. So it is necessary to reposition the gingiva after extrusion. Thus, osteotomy with orthodotic extrusion was accompanied in this case considering the location of gingival margin.

Conclusion & Clinical Relevance

When managing multiple teeth with different level of gingival margin, orthodontic extrusion accompanied by crown lengthening procedure is good treatment option.

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CP18

Management of Large Periapical Lesion: Two Case Reports using Decompression

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Aim

The aim of this report was to describe the management of two cases of large periapical lesions using decompression with or without subsequent apical surgery.

Introduction

It has been proven that nonsurgical endodontic treatment can promote healing of large lesions (Çalışkan 2004). However, If signs and symptoms persist or procedural difficulties arise during root canal treatment, surgical intervention should be considered (Carrotte, 2005). Decompression has been introduced as an alternative treatment to manage large periapical cysts , as it preserves the vitality of adjacent teeth and minimizes damage to adjacent structures, such as nerve, sinus and nasal cavity (Anavi *et al.,* 2011).

Case Reports: Case 1

A 26-year-old male complained of pain and a swollen gum in the upper right anterior region. Oral examination revealed a fluctuant swelling above UR1 and UR2 (Figure 1A), which both exhibited mobility greater than grade I. Pulpal sensibility tests were positive for UR2. Periapical and occlusal radiographs revealed a 17mm x 17mm radiolucent lesion in close proximity to the nasal cavity , causing distal displacement of the root of UR2 (Figure 1B, C, D). Decompression was performed and a vestibular incision was made with limited curettage on the cystic lining for biopsy. A sterile venous line was custom fitted and stabilized with 4-0 silk sutures (Figure 1E). The patient was instructed to irrigate the lesion with a syringe at least twice a day. The biopsy report confirmed the lesion is compatible with radicular cyst. Fourteen weeks after decompression, radiographic examination revealed reposition of the root of UR2 and the tube was removed (Figure 1F, G). Apical surgery of the UR1 was performed four months after decompression (Figure 1H). At the six-month recall appointment after surgery (Figure 1I), the UR2 was responsive to pulpal sensibility test. The patient was asymptomatic and radiographs revealed complete resolution of the periapical radiolucency at the 22-month recall (Figure 1J, K).

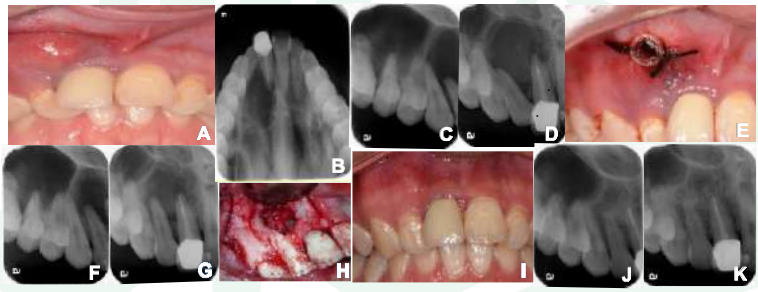

Figure 1. (A) Localized swelling above UR1 and UR2. (B) The maxillary occlusal radiograph. (C, D) The preoperative radiograph showed a radiolucent lesion involving the apices of UR1 and UR2. (E) A custom-fitted tube was sutured. (F, G) The periapical radiograph at the 3.5-month recall. (H) Flap reflection and lesion enucleation. (I) Soft tissues healed well at a six-month review. (J, K) The periapical radiograph at the 22-month recall.

Case Reports: Case 2

A 53-year-old woman presented with complaints of fullness in the maxillary right region. Oral examination revealed a vestibular swelling and a bony elevation in the buccal region extending from the UR1 to UR3 pontic (Figure 2A). Periapical radiographs revealed a periradicular radiolucent lesion measuring 24mm x 17mm, resulting in the deviation of the median palatine suture (Figure 2B, C). Computed tomographic imaging confirmed an expansile, well-defined lesion on right maxilla (Figure 2D, E). Decompression was performed using the same procedures as in case 1. A custom fitted tube was inserted (Figure 2F) and the patient was given the same instructions as in case 1. The biopsy report revealed a radicular cyst. Three months after surgery, there was a reduction in the size and the tube was trimmed (Figure 2G). The tube was naturally expelled four months after surgery. Recall periapical radiographs taken at 10 (Figure 2H, I), 16 (Figure 2J, K) and 31 (Figure 2L, M) months showed gradual reduction in size except for a periapical radiolucent lesion of UR2 and a widened periodontal ligament space around UR1. As the patient was asymptomatic, she deferred further apical surgery of the UR2.

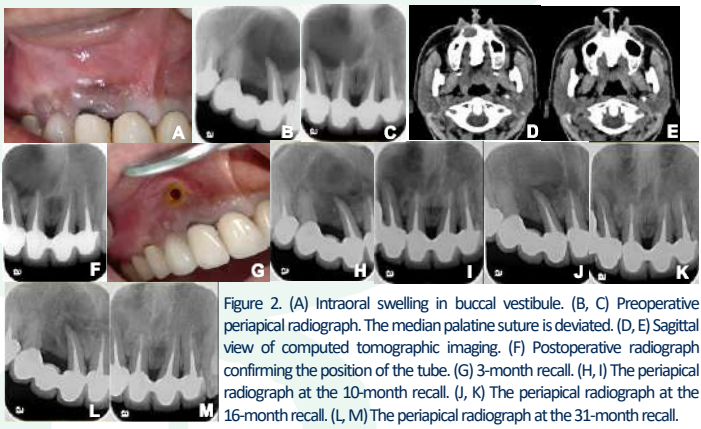

Figure 2. (A) Intraoral swelling in buccal vestibule. (B, C) Preoperative periapical radiograph. The median palatine suture is deviated. (D, E) Sagittal view of computed tomographic imaging. (F) Postoperative radiograph confirming the position of the tube. (G) 3-month recall. (H, I) The periapical radiograph at the 10-month recall. (J, K) The periapical radiograph at the 16-month recall. (L, M) The periapical radiograph at the 31-month recall.

Discussion

In Case 1, due to the difficulty of removing the fibre post and the significant size of the lesion affecting nearby teeth and structures, decompression represented a viable alternative option to surgical retreatment, as it preserve the vitality of adjacent teeth. In Case 2, considering the complexity of the prosthesis replacement and the extensive size of the lesion involving multiple teeth, decompression served as a conservative approach to relieve symptoms without damaging the adjacent structures. However, the patient's cooperation and comfort are crucial aspects to take into account when employing decompression as a treatment.

Conclusion & Clinical Relevance

Decompression is a relatively less invasive technique that can potentially serve as the primary treatment for large periradicular lesions that involve multiple teeth and adjacent structures. Additionally, it allows for biopsy to be performed to address concerns regarding the lesion's diagnosis.

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Revitalizing Mature Necrotic Molar: Advanced PRF, Cold Atmospheric Plasma, and Sweeps Laser Cavitation Technique in a 3-Year Controlled Case Report.

CP19

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Aim: To assess the effectiveness of a combination of advanced techniques, including laser cavitation (Sweeps), cold atmospheric plasma (CAP), and platelet-rich fibrin (PRF), in revitalizing a necrotic mature molar.

Introduction: Currently, there is a significant interest in minimizing the risk of tooth vitality loss through regenerative treatment protocols or restoring lost tooth vitality[1]. While revitalization protocols for immature teeth are comparatively well-established, there is scarce to no information regarding revitalization of mature teeth, particularly molars. The complexity of these root canal anatomies presents challenges in achieving complete disinfection[2]. Therefore, the focus of this case report was on the application of an advanced disinfection protocol using laser cavitation and cold atmospheric plasma to establish the groundwork for successful revitalization using a combined platelet-rich fibrin technique (I-PRF+A-PRF) as the scaffold.

Case presentation: The 18-year-old female patient presented with complaints and was diagnosed with pulpal necrosis associated with symptomatic apical periodontitis due to a deep cavity. After obtaining informed consent and discussing treatment alternatives, a decision was made to proceed with revitalization in two appointments respecting the actual guidelines[3,4]. After local anaesthesia without epinephrine, an access cavity was prepared under rubber dam isolation. Electronic and radiographic working length was determined. Root canals were prepared to size 40/.04 (BioRace NiTi) and manual irrigation was performed with 17% EDTA. Final irrigation was performed using Sweeps, with 2x5mL of 3% NaOCL for 90sec (Fig.1,a). Triple Antibiotic Paste (Ciprofloxacin, Metronidazole, Cefuroxime) was used as an intracanal medicament[5]. Ten days later, root canals were further prepared to size 50/.02 and irrigated with 17% EDTA. Final irrigation was performed as mentioned above, followed by 10 mL sterile saline solution. Canals were dried with a microsuction device, and CAP (Neoplas Tools) was applied for 90 seconds (Fig.1,b). Periapical bleeding was provoked using a size 20 Reamer (Fig.1,c). I-PRF and A-PRF was prepared using a blood sample from the patient. I-PRF was applied, followed by placement of A-PRF plugs (Fig.1,d). The PRF membrane in the pulp chamber (Fig.1,e) was covered with a hydraulic calcium silicate (Biodentine, Fig.1,f) and composite (Tetric). The patient remained symptom-free with no tooth discoloration (Fig.1,g) and exhibited successful apical healing at 12, 24 and 57-month follow-up radiographic assessments (Fig.2,D-F).

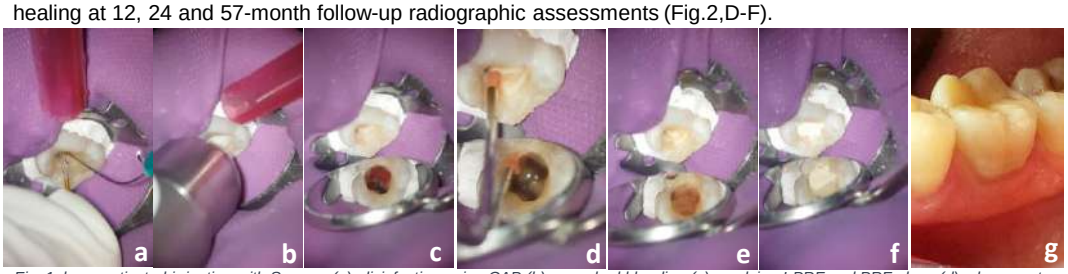

Fig. 1: laser activated irrigation with Sweeps (a), disinfection using CAP (b), provoked bleeding (c), applying I-PRF and PRF plugs (d), placement of PRF membrane into pulp chamber (e), and tricalcium silicate (Biodentine) covering the PRF membrane (f), all aimed at enhancing treatment outcomes. After three years, the clinical appearance remained unremarkable without any tooth discoloration (g).

Fig. 2: Pre and postoperative x-ray images (A and C). Determination of working length (B). Recall follow-up images at 12 months (D), 24 months (E), 57 month(F). A resolution of the periapical lesion and sclerosis of the root canals (C-F) indicating a successful revitalization.

Discussion: The combined technique of cap and sweeps demonstrated effective root canal cleaning, enabling successful revitalization with I-PRF and A-PRF. Although vitality assessment through cold testing or electric pulp test was not possible within 3 years, radiographic evidence showed root canal sclerosis and resolution of apical periodontitis, suggesting a potential indicator of successful revitalization.

Conclusion&Clinical relevance: Considering that this is a single-case study with a 3-year follow-up, the results are promising for the potential of revitalizing mature teeth in the future. Not only from a statistical perspective, but also in terms of the potential benefit to a broader population, the possibility of revitalizing mature teeth in specific cases should be recognized. Researchers and clinicians should be encouraged to further refine clinical protocols for revitalization of mature teeth.

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CP20

UNIVERSITÄT BONN

SHEDDING NORTHERN LIGHTS ON ENDODONTICS HELSINKI 6-9 SEP. 2023 ese

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A two-visit pulpotomy approach to manage un-controllable bleeding in a traumatically injured tooth with immature root formation

CP1

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Aim

The present case demonstrates a possible alternative to more invasive treatment options like e.g. pulpectomy and apexification in a crown-root fractured immature tooth when bleeding cannot be stopped during intended (partial) pulpotomy at the first visit.

Introduction

Complicated crown or crown-root fractures are common traumatic injuries of permanent anterior teeth. Pulp capping or partial pulpotomy is the treatment of choice[1-3], especially in teeth with incomplete root growth. However, early initiation of the treatment is of utmost importance for success of this approach. In cases of treatment delay and subsequent pulpitis, pulpal bleeding is mostly a limiting factor for this treatment. Then, if hemostasis cannot be achieved within several minutes, removal of additional pulp tissue is recommended until bleeding is controlled. However, if bleeding still persists, further removal finally might result in pulpectomy. Root formation then remains incomplete at the present state or at least poorly predictable. To avoid this, a compromise treatment might be considered (Fig. 1). We hereby present a case, where pulpotomy was attempted in spite of uncontrollable bleeding during first treatment.

Case Presentation

A seven-year-old boy presented two weeks after dental injury for further treatment of his upper central incisors at the Department of Periodontology, Operative and Preventive Dentistry, Center for Dental and Oral Medicine, University of Bonn.

Tooth #11 showed a complicated crown-root fracture (Fig. 2 & 3) and signs of a vital but severely inflamed pulp with beginning pulpal hypertrophy. After local anaesthesia and rubber-dam application, firstly partial, then full pulpotomy was intended but a massive, uncontrollable bleeding still made proper placement of a capping material impossible.

Calcium hydroxide was therefore applied onto the continuing pulpal bleeding as good as possible and the access cavity was temporarily sealed using increments of Cavit™ and a glas-ionomer-cement (Ketac™-Fil) (Fig. 4).

Four weeks later, the access cavity was reopened with the objective to remove the blood clot and fulfil further pulpotomy with expectation of a now controllable bleeding. After removal of the temporary filling and rinsing with 1% sodium hypochlorite (NaOCl), a fragile hard tissue barrier was observed with minimal and focal bleeding, that could easily be stopped using NaOCl and sterile paper points. The hard-tissue barrier was left in place, covered with calcium hydroxide (Calxyl®), a light curing glas-ionomer-cement (VitreBond™), and a composite build-up was placed (Fig. 5). Only the coronal part of the defect was restored.

After 12 months, the tooth reacted to electric pulp testing and a control radiograph showed continuing root formation in length and width (Fig. 6 & 7).

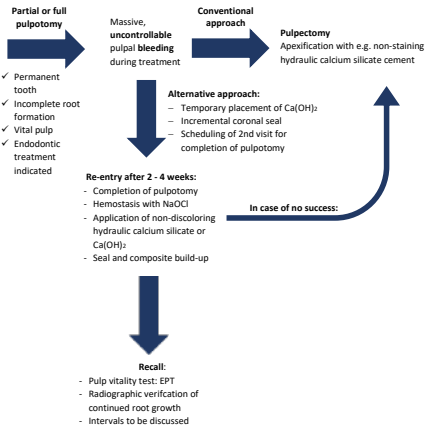

Figure 1: Overview of decision process and possible treatment options

Discussion

Preserving the vitality of the pulp is of utmost importance in traumatically damaged permanent teeth with incomplete root formation. The length and width of the root walls is essential for the stability and long-term prognosis of a tooth.

In the present case, uncontrollable bleeding due to pulpal inflammation made proper execution of partial pulpotomy in a single visit impossible (especially placement of a capping material). Pulpectomy could however be avoided by temporary placement of calcium hydroxide material and scheduling a second visit in which pulpotomy should be fulfilled. Interestingly, at the second visit, no further pulpotomy was necessary due to a newly formed hard tissue barrier.

The treatment goal was achieved as the pulp could be kept vital and root formation continued. However, strictly aseptic working and a sufficient temporary seal appear mandatory for this treatment option when pulpal bleeding cannot be controlled.

Conclusion & Clinical Relevance

A two-visit pulpotomy might be an alternative to pulpectomy in teeth with immature root formation and uncontrollable pulpal bleeding.

Figure 2: Intraoral view after emergency treatment alio loco. #11 with complicated crown-root fracture. #21 has been replanted and splinted two weeks ago.

Figure 3: Radiograph depicting tooth #11 before endodontic treatment

Figure 4: Two weeks after initial pulpotomy (4 weeks after traumatic injury)

Figure 5: Completed pulpotomy

Figure 6: 1 year after pulpotomy. Tooth #11 shows continued root formation (arrow)

Figure 7: Clinical view 1 year after treatment

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CP21

Treatment of Complicated Crown Fracture : A CVEK Pulpotomy Report

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Aim: To present that partial pulpotomy is one of the vital treatment options in a permanent mature tooth with complicated crown fracture (CCF).

Introduction: Pulp exposure caused by CCF in permanent teeth is usually treated with Cvek pulpotomy, which involves removing 1-3 ml of coronal pulp adjacent to the pulp exposure. Cvek pulpotomy is a popular treatment method as it involves the preservation of cell-rich coronal pulp tissue that facilitates healing.

Case Presentation: A 14-year-old female patient with no systemic diseases applied to the department of endodontics due to a fracture of her tooth as a result of a trauma. In the extraoral examination, abrasions were detected on the patient's face. As a result of intraoral and radiographic examinations, a CCF including the pulp was detected in tooth #22 of. An uncomplicated crown fracture was diagnosed in tooth # 32. The mobile part of the crown was extracted and kept in distilled water to prevent it from drying.



For tooth #22, a Cvek pulpotomy using MTA was performed by removing 2 mm of the exposed coronal pulp with a sterile steel round bur. The exposure sites were gently rinsed with sterile saline to remove any debris and to control bleeding. The exposed pulp was directly capped with a 2–3 mm thick MTA layer. Conventional glass ionomer cement was used as the temporary restoration material.

Since the fracture line was 2 mm below the gingiva, a gingivectomy was performed. The composite resin restoration was applied to tooth # 32. The patient was given another appointment for permanent restoration. Until the appointment date, the patient kept the tooth fragment in distilled water. In the second appointment, after isolation with teflon tape, the tooth fragment was bonded using dual-cured resin cement. At the 6-month follow-up, tooth #22 was asymptomatic and remaintained its vitality.


Discussion: In cases of CCF, various treatment methods such as direct pulp capping, pulpoectomy, and root canal treatment can be considered depending on factors such as the age of the patient and the condition of the pulp.

Conclusion: Cvek pulpotomy using MTA can be considered as a successful treatment choice for complicated crown fractures in mature teeth.Complicated crown fractures in mature teeth can be successfully treated with a cvek pulpotomy using MTA.

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CP22

HEALING OF THE EXTRAORAL SINUS TRACT WITH NON-SURGICAL ENDODONTIC TREATMENT

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Aim

To present the non-surgical endodontic treatment of the extraoral sinus tract originating from the mandibular right first molar.

Case Presentation

An 18-year-old male patient who admitted to the plastic surgery clinic with the complaint of swelling and extraoral purulent drainage was referred to our endodontic clinic. Extraoral examination revealed a sinus tract on the right side of the neck. In the intraoral examination, a deformed and near-pulp composite restoration was detected in the right mandibular first molar, and periapical radiolucency was observed in this tooth in radiographic examination. While the tooth was not sensitive to percussion and palpation tests, a negative response was obtained to the electric pulp test. After the clinical and radiographic examination, the right mandibular first molar was diagnosed with chronical apical abscess and it was determined to treat this tooth with non-surgical endodontic treatment.

The root canals were enlarged and calcium hydroxide was placed as an intracanal medicament.

After4 weeks, the sinus tract was recovered and the root canals were obturated.

The 6-month follow-up revealed radiographic, clinical, and dermatological healing. The patient is being followed for complete periapical healing.

Introduction

The sinus tract is mainly a common manifestation of pulp necrosis. In the extraoral form, the sinus tract can open to any part of the face or neck (1-2). Extraoral sinus tracts are associated with mandibular teeth with a prevalence of 80-87% and usually require conventional endodontic treatment to heal (3).

Preoperative Panoramic Radiograph

Initial Radiograph | Final Radiograph | 6-month Follow-up

Preoperative Image | Postoperative Image | 6-month Follow-up

Discussion

Treatment of the extraoral sinus tract originating from the tooth is root canal treatment if the tooth can be restored. As a result of the correct diagnosis and treatment provided by the elimination of the main factor, it was observed that the sinus tract was closed within 4 weeks. Also, the hyperpigmentation in this area disappeared over time.

Conclusion & Clinical Relevance

When patients do not exhibit endodontic symptoms, they may not associate extraoral sinus tracts with teeth and may seek care from a general practitioner rather than a dentist. Interaction between physicians and dentists is critical to avoid unnecessary surgical procedures and antibiotic treatments.

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Decoronation of a previously avulsed incisor with replacement resorption and infra-positioning

CP23

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The aim of this clinical poster is to present the management of a previously avulsed central incisor with severe replacement resorption and infra-positioning.

Introduction: Traumatic dental injuries in children and young adolescents present a serious challenge for the clinician. Tooth avulsion comprises 1-16% of all traumatic injuries of permanent dentition. Suboptimal early management of an avulsed tooth might lead to serious consequences. Ankylosis and replacement resorption is one of the negative sequela after avulsion that do not only lead to tooth loss but also interfere with the growth of adjacent bone.

Fig 1. Preoperative clinical situation

Case Presentation

A 10-year-old girl with non-contributory medical history was referred from the Department of Pediatric Dentistry to the post-graduate clinic of the Endodontic Department for decoronation of tooth #21. The patient had undergone a severe traumatic dentoalveolar injury 20 months ago, in which avulsion of teeth #21,#22,#63 and #24 and lateral luxation of #11 took place. Teeth #22 and #24 could not be retrieved whereas #21 and #63 were kept in milk for 2 days. Then, root canal treatment of #21 was performed extraorally with the MTA plug technique for obturation and afterwards it was repositioned.

When the patient was referred to our clinic, clinical examination revealed infrapositioning and ankylosis of #21. Severe replacement resorption was also evident in the periapical radiograph. Decoronation technique was performed. Under local anesthesia, a full mucoperiosteal flap was elevated and the crown was removed with diamond burs 2 mm below the marginal bone. Obturating materials were removed with Hedstroem and ultrasonic files and the root canal was flooded with blood. The flap was sutured using horizontal matrix technique to achieve primary closure. A temporary fixed appliance was placed after the initial healing of the soft tissues in order to restore the patient's esthetic, speech and masticatory functions by the Department of Pediatric Dentistry. Follow up examination 12 months later showed vertical preservation of the alveolar ridge. However, tooth #23 seems to erupt more mesially, in the gap that occurred as a result of multiple tooth loss. Future treatment plan consists of orthodontic therapy along with dental implants for the patient's proper rehabilitation.

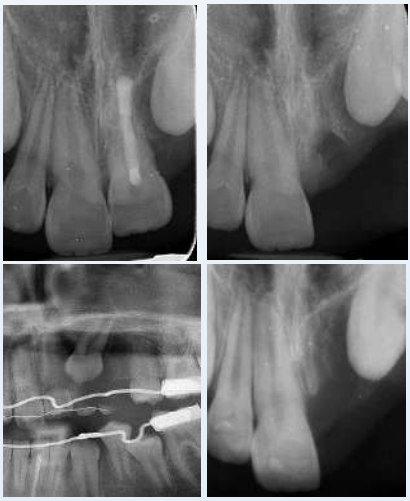

Fig 2. Preoperative radiograph **(a)**, Postoperative **(b)**, 4 months panoramic **(c)** , 12 months follow-up **(d)**

Fig 3. Surgical steps of decoronation of tooth 21

Discussion

In such challenging cases where the clinician has to face the consequences of severe traumatic injuries, a multidisciplinary collaboration along with a cooperative and understanding patient are of paramount importance.

In this case decoronation was the treatment of choice, in order to enable alveoral bone to grow vertically and to preserve it in the bucco-palatal dimension, instead of surgical extraction which would have resulted in further bone loss.

Fig 4. 12-month follow-up

Conclusion & Clinical Relevance

- Guidelines of dental trauma management should be furtherly taught to general population in order to prevent such adverse effects
- Decoronation, when indicated, is a suitable procedure to minimize the loss of alveolar bone and facilitate the future prosthetic rehabilitation of the patient
- Timing of decoronation is of paramount importance for successful alveolar ridge preservation.

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CP24

PERIAPICAL HEALING FOLLOWING SEPARATED INSTRUMENT RETRIEVAL IN LOWER FIRST MOLAR

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Aim

To present a clinical case of successful treatment outcome after separated file removal from lower first molar with severe periapical lesion.

Introduction

Instrument separation is an unpredictable mishap which can occur during endodontic treatment, often being a result of complex root canal anatomy or procedural errors. The influence of this complication on periapical tissues depends on several factors such as diagnosis before treatment or the phase of instrumentation during which the separation occurred.

Case presentation

A 24-year-old female patient was referred to the Department of Restorative Odontology and Endodontics, School of Dental Medicine, due to instrument separation in her lower right first molar. A pre-operative radiograph, confirming a 3 mm long separated instrument in the middle third of the mesial root, also revealed a distinct radiolucency at the apical aspect of the same root (Fig. 1).

Fig. 1. Pre-operative radiograph

Patient was without discomfort at palpation or sensitivity to percussion and had no complaints. After obtaining a straight-line access cavity preparation, coronal curvature of the mesio-buccal root was softened using Gates-Glidden burs. Dental microscope magnification (40x) added additional visibility and enabled precise dentin removal around the coronal aspect of the fragment. The space, formed in that way, enabled adequate transfer of vibrations from endodontic ultrasonic tip to the lateral side of separated instrument. This led to the detachment and successful removal of the separated instrument from the canal, which was confirmed with additional periapical radiograph (Fig. 2).

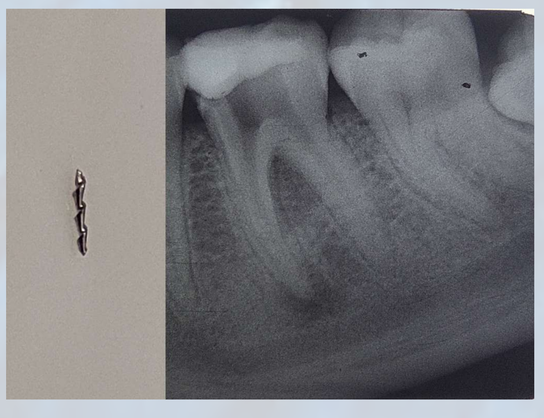

Fig. 2. Radiograph after fragment removal

Afterwards, canals were instrumented using reciprocating file system and irrigated with 1% sodium hypochlorite and 10% citric acid solutions. Following medication with calcium hydroxide for two weeks, canals were obturated using single cone gutta-percha technique and epoxy resin-based endodontic sealer. Quality of obturation was checked by post-obturation radiograph (Fig. 3).

Fig. 3 Post-obturation radiograph

A follow-up X-ray, taken one year later, revealed complete periapical healing (Fig. 4). Control clinical examination confirmed that the patient was without symptoms.

Fig. 4 Control radiograph after a year

Discussion

Thorough cleaning and disinfection of root canal system is a prerequisite for periapical lesion healing in a case of infected canal space. Instrument fractured inside root canal interferes with the effects of instrumentation and irrigation even in cases of effective bypassing, thus complete fragment removal is the most desirable solution.

Conclusion & Clinical Relevance

Conservative techniques that allow effective removal of a separated instrument while minimizing the risk of further canal damage should be the first option in treatment planning of these complications. Although these procedures, in most cases, require specialized equipment and significant clinical experience, they minimize the loss of tooth structure and patient's discomfort.

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CP25

Management of a rare case of dens invaginatus in a maxillary canine combined with a history of dental trauma

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Aim To present a rare case of a maxillary canine affected with dens invaginatus and pulp necrosis combined with a previous dental trauma that led to irreversible pulp damage of the adjacent lateral incisor.

Introduction The prevalence of permanent teeth affected with dens invaginatus is reported to range between 0.3% and 10%. However, the occurrence of dens invaginatus in canines is generally uncommon. Few cases have been described so far and most of these teeth have been extracted instead of their maintenance focusing on endodontic management approach.

Case Presentation A 14-year-old patient with a history of dental trauma one year before at the left maxillary region referred with pain and swelling at the apical area of the left maxillary canine. Palpation was painful and #tooth 13 was tender to percussion. Pulp sensibility tests (cold, EPT) revealed no response of tooth #13 whereas tooth #12 showed a delayed response to EPT and no response to cold test. Initially it was decided the endodontic treatment of the maxillary canine and to repeat pulp sensibility tests on tooth #12 at the next appointment. The referring paediatric dentist had already observed the existence of dens invaginatus in the canine though a panoramic and periapical radiograph (Fig. 1,2) and had previously referred the patient for CBCT examination Fig. 3a, b). After CBCT evaluation, it was decided the complete removal of the invagination through a conservative access cavity preparation (Fig. 4). All the procedures were performed under operating microscope and obturation was done with apical plug technique using MTA (Fig. 5). At the second appointment, besides the completion of endodontic treatment of the canine, endodontic management of the lateral incisor took also place. 18-month follow-up radiograph showed complete healing of the periapical tissues of both teeth (Fig. 6).

Figure 1

Figure 2

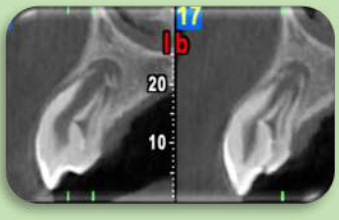

Figure 3a

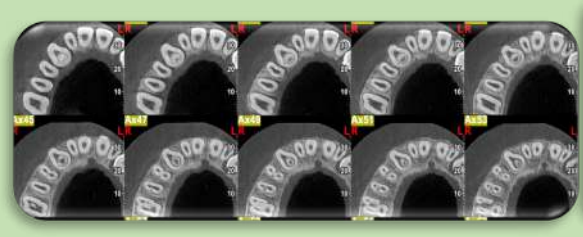

Figure 3b

Figure 4

Figure 5

Figure 6

Discussion Precise and accurate diagnosis plays the most important role for a successful outcome. In such cases with high degree of difficulty, preoperative CBCT examination is required for decision making and appropriate endodontic case management.

Conclusion The present case points out the importance of taking a thorough dental history and performing careful clinical and radiographic evaluation and subsequent treatment planning especially when addressing combined pathologies and dental malformations.

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CP26

Management of a lateral root perforation in a single session: A case report

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Aim
To discuss the management of a root perforation in a single session by using novel bioceramic biomaterials with shorter setting time.

Introduction
Root perforations are unfortunate complications, that result in the communication of the root canal and the periodontal space. The use of novel root repair materials with shorter setting times, setting in acidic environments and that are easier to manipulate, may simplify root repair protocols above the standard 2 visit-procedure with calcium hydroxide follow by MTA.

Case Presentation
A 40-year-old woman was referred due to pain when chewing on element 37. Tooth 37 was root canal treated 1 month prior the referral. The radiographic exam showed previous RCT with an overextended endodontic filler through a perforation located at the mid third of the mesial surface of the mesial root of tooth 37, incomplete filling of the mesial root and apical radiolucency of the mesial root. During treatment, previous Thermafil filling material was removed with a micro forceps. The perforation was sealed with bioactive bio-ceramic (NeoMTA Plus).
Shaping sequence
Glidepath 0.10 K files; Rotaries: Hyflex EDM 05.10; 03.15; 05.20; and Hyflex CM 04.25 and 04.30.
Irrigation: NaOCL; Saline; EDTA; Saline; CHX and Saline. 2 cycles of PUI with Endo 1 Woodpecker activation, 2mm from working length. Sealing was performed with BC sealer - Wellroot ST 04.30 GP points 0.5mm from WL.


Pre-op x-ray


Immediate post-op


2 year follow-up

Discussion
The 2 year follow-up x-ray revealed periapical tissue healing at the apex of the mesial root of 37 as well as in the area of the perforation. There was no pain on percussion, palpation or mobility of the tooth. Our findings further confirm the success reported on similar studies, although further RCT with longer follow-ups are needed.

Conclusion & Clinical Relevance
Novel BC sealers show promising results, when used for repairing lateral root perforations in 1 visit.

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CP27

After alveolar bone fracture – how long should we wait for tooth pulp sensibility to return?

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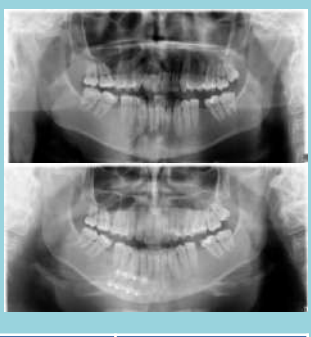
Aim

Alveolar bone fracture can cause trauma in teeth near fracture line. If the pulp is infected root canal treatment (RCT) should be initiated without delay to prevent fracture line infection. On the other hand, vital teeth may temporarily lose sensibility, and false negative testing may lead to unnecessary RCT. Teeth with negative response may be followed up to one year[1,2], after that, prognosis is poor[3]. This case represents markedly delayed return of sensibility.

Case Presentation

Healthy 18-year-old man suffered double mandibular fractures (right parasymphysis and left ramus). The parasymphysis fracture line crossed d.43 apex and ligament (type1)[4] and d.42 ligament (type2)[4]; d.42 was also luxated. Two fixation plates were used to stabilize the parasymphysis fracture line, covering the region dd.42-44. The teeth in the fracture line were followed at 3, 4, 12 and 17 months. Electrical and cold test were used. No signs of infection were detected in the periapical radiographs. Despite fracture line apically and luxation d.42 sensibility returned at 4 months and d.43 only after 17 months.



TEETH	3 MONTHS Cold spray (+/-) Electrical test radiograph	4 MONTHS Cold spray (+/-) Electrical test radiograph	12 MONTHS Cold spray (+/-) Electrical test radiograph	17 MONTHS Cold spray (+/-) Electrical test
d.41	+ 3/18	+ 3/18	+ 2/18	+ 2/18
d. 42	- No response	+ 9/18	+ 2/18	+ 3/18
d. 43	- No response	- No response	- No response	+ 5-8/18
dd.41-43				

Discussion

Negative response to sensibility tests after trauma is a normal consequence if the innervation of the teeth is affected. Up to 92% of teeth in the bone fracture line with initial negative testing may recover sensibility within one year[3]. The present case indicates that in the absence of other indications, teeth in the bone fracture line and with negative sensibility testing may be followed beyond one year.

Conclusion & Clinical Relevance

After alveolar bone fracture, teeth in the fracture line should not receive RCT as prophylactic measure, instead they may be followed if there are no signs of infection. Tooth sensibility can return also after one year.

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CP28

Endodontic complications ten years after premolar transplantation due to traumatic tooth loss after avulsion

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Aim

To discuss the ten-year clinical outcome and treatment options of a complex dental traumatic injury including avulsion, replacement resorption (ankylosis), premolar transplantation and initial as well as late endodontic complications.

Introduction

In case of a post-traumatic ankylosis during early adolescence, a premolar-transplantation can be a feasible treatment option. The transplants can stay vital, but may also cause instant or delayed endodontic complications.

Case Presentation

An eleven-year-old patient avulsed his two central incisors after slipping on icy ground on the way to school. Initially retransplanted, both teeth suffered post-traumatic ankylosis. In close cooperation with an orthodontist, transplantation of the lower premolars was performed seven months after the initial traumatic injury.

avulsion 11,21

$Ca(OH)_2$+resorption

transplanted 35/45

root canal treatment premolar 21

orthodontic treatment with fixed braces to adjust occlusion and gingival profile

The premolar transplanted for 21 caused clinical (perc+,sens-) and radiographic (beginning lateral root resorption) problems after one month. Root canal treatment was initiated, the necrotic pulp tissue removed, and after repeated exchanges of the intracanal calcium hydroxide medicament for one year, an apical MTA plug was placed, followed by a fiber-post for stabilization.

The premolar transplanted for 11 did not cause problems initially and showed continuous root development and obliteration of the pulp chamber as clear signs of a functional dental pulp. During the next years, the patient had no complaints on both transplants, the clinical and radiographic recalls did not show pathological findings.

initial situation after removed fixed braces

first re-shaping premolars to cental incisors

apikal lesion premolar 11

root canal treatment premolar 11

5 month - regressive lesion premolar 11

vestibular view of the optimized aesthetic build-ups using direct resin-based composites

occlusal view of the optimized aesthetic build-ups using direct resin-based composites

After ten years, the patient suddenly developed pain on the transplant regio 11 under occlusal contact and a swelling on the vestibular side. Radiographic diagnostics showed an apical lesion and an obliterated root canal system. Using a dental microscope, an access cavity to the root canal system was prepared and the length determined with an electronic apex locater. After mechanical and chemical disinfection, the root canal was filled with bioceramic sealer and guttapercha. The clinical complaints stopped after application of intracanal medicament, the apical lesion was resolved radiographically five months after the endodontic treatment. To support the positive outcome for the patient, aesthetics was optimized, again using direct resin-based composite build-ups.

Discussion

Autogenous tooth transplantation is a valid option to support soft tissues and to prevent bone atrophy in children and young adolescents after tooth loss due to severe traumatic injuries like avulsion. [1]. Premolar-transplantation can result in success rates of more than 90% [2]. As the patient of the current case is now grown-up, extraction and implantation should be mentioned as a potential alternative treatment.

Conclusion & Clinical Relevance

After traumatic dental injuries, interdisciplinary cooperation of specialists in orthodontics, oral surgery and endodontology can help finding patient-based long-term solutions. Auto-transplantation of teeth as an option suggested by international guidelines should be considered within the respective time-frame [3]. Possible complications should regularly be monitored and treated if necessary to enable long-term clinical success.

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Acknowledgements

Dr. Anne Bauersachs: initial replantation of the central incisors; Prof. Dr Rolf Koch: orthodontic treatment and advice; Dr. Pohl: autogenous transplantation; Dr. Kathrin Rumi, PD Dr. Christine Berthold and Dr. Barbara Holzschuh: endodontic treatment central incisors/ transplant regio 21, planning autogenous transplantation.
Eva Maier was supported by the Interdisciplinary Center for Clinical Research (IZKF) at the University Hospital of the FAU Erlangen-Nuremberg (Junior Project J103).

CP29

Computer assisted digital endodontic planning in managing a combined external and internal root resorption: A case report

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Aim:

To describe the use of computer-assisted digital endodontic planning (CADEP) to diagnose, plan, and monitor the progress/healing of a resorptive lesion affecting an anterior tooth.

Introduction:

Root resorption is either a physiological or a pathological process that results in the loss of root structure. The endodontic treatment in these cases aims to destroy the clastic cells through the removal of the inflamed pulp or the external pathological tissues. However, clinicians can be faced with difficult diagnostic and treatment decisions with respect to tooth resorption. This is mainly due to the challenge associated with monitoring the healing and repair.

CADEP has become an important diagnostic and therapeutic tool in modern endodontics. It also provides a unique opportunity for clinicians to objectively assess healing. In this case report, we describe the use of this technology to determine the proper planning and healing of a root resorption case.

Materials and Methods:

A 17-year-old male patient was referred for the management of his maxillary lateral incisor, which had been diagnosed with pulp necrosis and chronic apical abscess with extensive root resorption. Conventional nonsurgical endodontic therapy combined with long-term calcium hydroxide, followed by placing mineral trioxide aggregate (MTA) as an apical plug and obturation with flowable gutta-percha. After 1 year, conventional radiography and CBCT scans were inconclusive in determining the rate of lesion progression/healing. Therefore, a 3D rendering software (3Dslicer) was used to measure the volume of the tooth and the resorptive lesion before and after treatment. The results indicated that the lesion was progressive and caused further root resorption. Therefore, endodontic microsurgery was performed to completely remove the pathological tissues. This surgery was also planned by reconstructing the lesion and craniofacial structures, printing and performing the surgery on the construct first. One year after surgery, there was clear evidence of lesion reduction.

Discussion:

CADEP is a potential tool to determine lesion progression/healing through comparative and objective volumetric assessment of the lesion before and after treatment. Furthermore, a 3D reconstruction of the structure prior to the surgery helped reduce the errors that could occur during the surgery.

Conclusion:

This case provides evidence that CADEP could be a potential tool for the endodontic management of teeth with complex root resorption.

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Figure 1. Preopreative CBCT. A periapical lesion can be noticed, and caused buccal bone perforation. Moreover, an extensive irrigular apical root resorption can be noticed

Figure 2. Periapical radiographs of maxillary left lateral incisor. The pre-op PA shows a lesion with GP tracing. By 6 months, when there were sign of lesion healing, filling was done using MTA and GP. On 1 year follow-up the singus track appeared again with uncertaininty on the lesion size progression

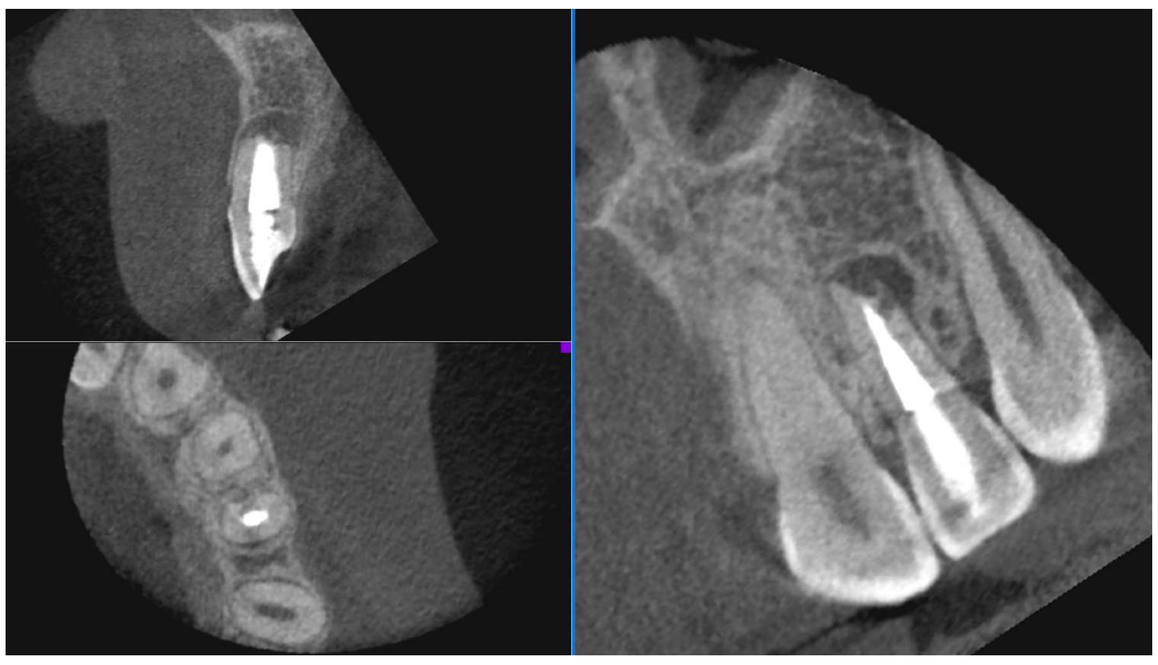

Figure 3. Two years follow up (one year after the surgery) CBCT show significant decrease in the lesion size

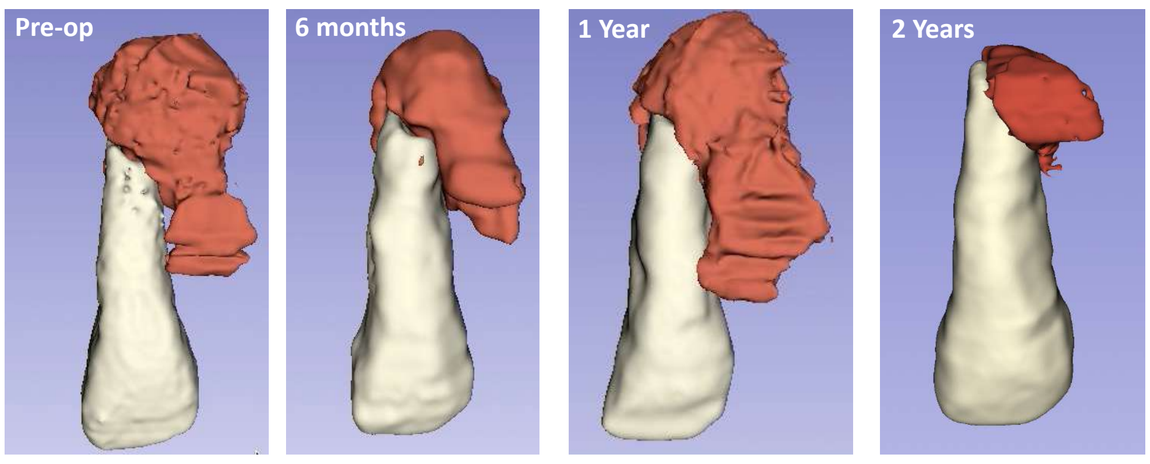

Figure 4. Series of 3D reconstructions of the tooth and the lesion throught the procedure.

Lesion Progression Direction

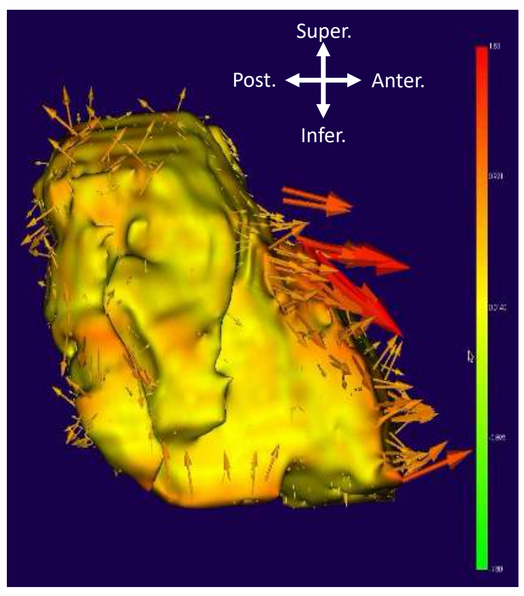

Figure 5. Overlapping and 3D construction of the lesion showing the direction and magnitute of the lesion progression.

Lesion Volume

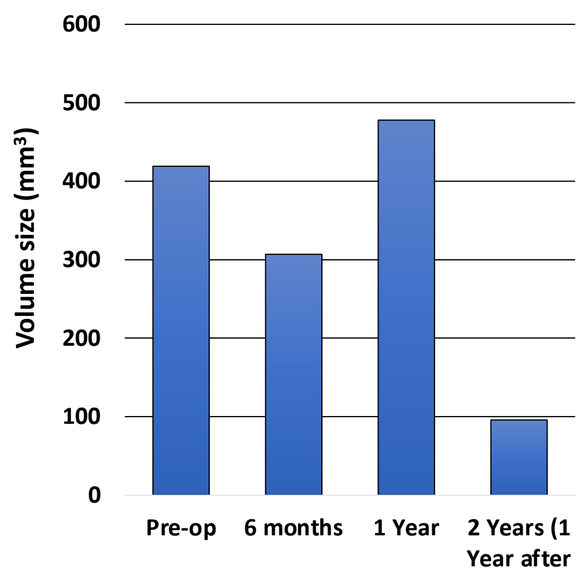

Figure 6. Bar graph comparing the volumetric size of the lesin over the treatment period

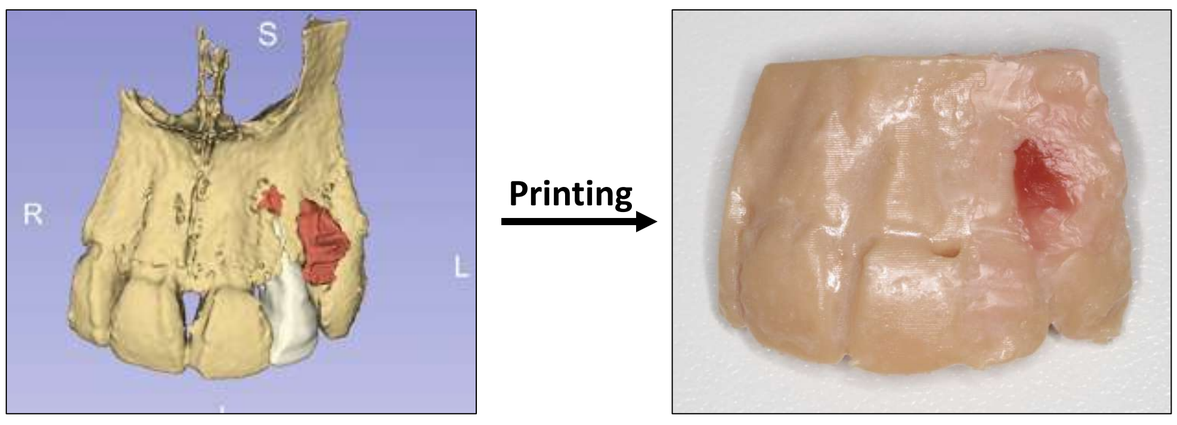

Figure 6. 3D construction of the craniofacial structure combined with the affected tooth and the lesion. Following by printing the construct for planning and training before consucting the procedure.

CP30

ENDOLIGHT
DR GREGORY FEJOZ

European Society of Endodontology

Use of a dynamic navigation system (DNS) for the management of complex root canal morphologies in a minimally invasive approach : a case report

Gregory Fejoz, PhD

Aim - The aim of this case report is to describe the root canal treatments of a 56-year-old patient who present a complex root canal anatomy on her 4 upper incisors using a dynamic navigation system.

Introduction – Managing pulp canal obliteration or complex anatomy remains a challenge in a freehand technique. Being accurate and minimally invasive is unpredictable[1]. DNS allows the practitioner to follow a planified access drill path. It combines infrared camera and markers to enable real-time visualization of the position and angulation of the endodontic drills (Fig. 1). It has been demonstrated that it's more accurate, preservative and faster than the freehand technique[1].

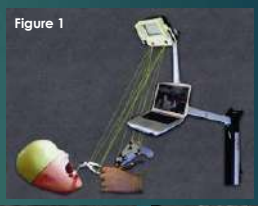
Figure 1

Case Presentation – 56-year-old patient, ASA1, referred by his general dentist for the root canal treatment of the 4 upper incisors, after a failed location attempt on each tooth (Fig 2-3). They are subject to a prosthetic rehabilitation from 23 to 13, with temporary crowns.


Figure 2


Figure 3

Navident (ClaroNav) workflow begins with the placement of a frontal marker on the patient's head followed by the tracing step, with the calibration of the tracer and the acquisition of the structures chosen as oral markers. Access drill path is planified for each tooth on the software, the length is measured (between 13 and 15.5mm) and burs or endodontic drills are chosen accordingly.

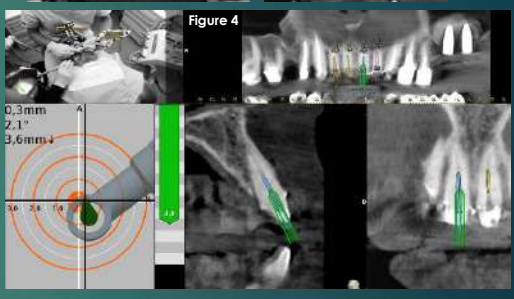

Figure 4

Once this step is completed, local anesthesia (articaïne 1/200 000) is performed and multiple teeth isolation was undertaken using a rubber dam, cut between 23 and 13. Sealing is ensured by Structur (Voco) and the surface of the rubber dam and the teeth were disinfected by swabbing for 60 seconds with 2.5% sodium hypochlorite.

Coronal access is achieved with a sterile diamond bur, with the head of the handpiece held by both hands. The goal is to keep the bur in the center of the target (Fig 4). Root drilling is performed with a long tungsten sterile bur. Location of the canal is confirmed using a size 10 K-file and the operation is repeated on each incisors (Fig 5).

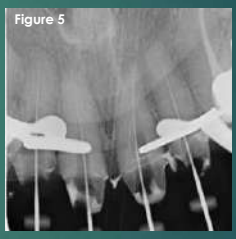
Figure 5


Figure 6

Working lengths are determined using an electronic apex locator (EndoPilot, Komet) and canal preparation is performed in a crown down approach using 6% heat-treated reciprocity files (Procodile Q, Komet) according to the latest international recommendations: renewed irrigation with sodium hypochlorite 2.5% with a side-vented 30-gauge needle, scouting with a size 10 K-file to prevent apical dentinal plug and radiographic control of the gutta-percha cones (Fig 6). Final irrigation with EDTA 17% (1mL per canal, for 30 seconds) followed by passive sonic activation of sodium hypochlorite at 2.5% (Eddy, VdW, 5mL per canal, for 20 seconds).

The canals are dried with sterile paper points before being filled with gutta-percha and zinc-eugenol oxide cement (Sealite, Pierre Roland) using a warm compaction technique (Gutta-Smart, Dentsply). A final radiograph is taken (Fig 7) and the patient is referred to the general dentist for prothestic restorations.


Figure 7

Discussion - In this case, DNS helps to perform the root canal treatment on the 4 teeth, by allowing reproducibility in locating the obliterated canals and a minimal tissue loss. It also helped to work against the previous and incorrect axis, with the possibility, at any moment during the process, to modify the access drill path.

Conclusion and Clinical Relevance – Dynamically navigated access preparation techniques for root canal location are more accurate[1] and preservative than a freehand technique[2]. This method makes perfectly sense in the modern minimally invasive approach.

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REGENERATIVE ENDODONTIC TREATMENT OF IMMATURE NECROTIC PERMANENT TEETH WITH PERIAPICAL LESION: REPORT OF TWO CASES

CP32

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Aim: To present two cases of successful Regenerative Endodontic Treatment (RET) using different materials (ProRoot MTA and Biodentine) for immature permanent teeth with periapical lesion.

Introduction: The RET has been considered a viable treatment option for immature teeth with necrotic pulp and periapical periodontitis which can induce the root root formation [1,2].

Case presentation

Case 1: A twelve-year-old boy came with a dens evaginatus of mandible second premolar. Clinical examination revealed a vestibular sinus, the tooth was negative with vitality tests (cold test with Endo frost and EPT). The CBCT showed a periapical lesion with open apex (*Fig 1c*). Diagnosis: pulp necrosis, asymptomatic apical periodontitis. The RET was indicated. The clinical procedure was followed ESE's protocol in which ProRoot MTA was used.[3]

Case 2: A twelve-year-old girl suffered from a severe pain of mandible second premolar. Clinical examination found that the tuberculated cusp had been trimmed, painful response with palpation and percussion tests, negative with vitality tests. The tooth was open apex with periapical lesion on CBCT (*Fig 2c*). Diagnosis: pulp necrosis, symptomatic apical periodontitis. The RET was chosen with ESE's protocol while Biodentine was used instead of MTA. [3]

Follow up: Both patients were recalled every three months with clinical evaluation and radiographic examination. At one-year follow up, both teeth was asymptomatic and negative with cold test. CBCT showed that the periapical lesions were resolved, the root length and canal wall thickness were increased and the apex of both teeth was completely closed. (*Fig 1e and Fig 2e)*

Fig 1a

Fig 1b

Fig 2a

Fig 2b

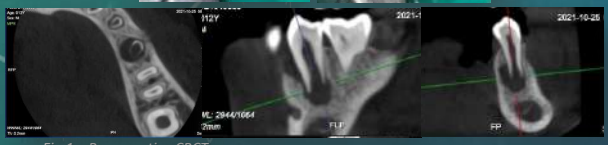

Fig 1c: Preoperative CBCT

Fig 2c: Preoperative CBCT

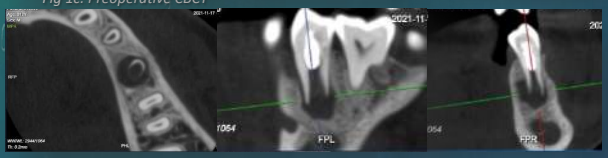

Fig 1d: Postoperative CBCT

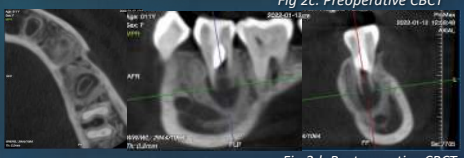

Fig 2d: Postoperative CBCT

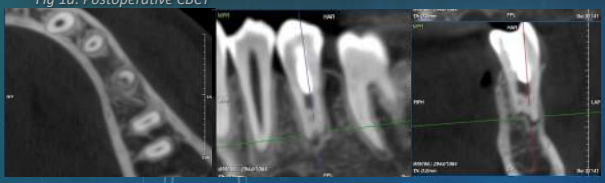

Fig 1e: One- year recall CBCT

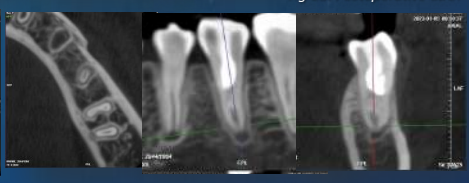

Fig 2e: One- year recall CBCT

Discussion: Both ProRoot MTA and Biodentine created a favourable clinical and radiographic outcome for RET in immature necrotic permanent teeth with periapical lesion. After one year, the lesions were healed, the root were formed including the increase of root length, dentin thickness and the closure of the apex.

Conclusion & Clinical Relevance: RET using ProRoot MTA or Biodentine is an effective procedure for immature necrotic permanent tooth with periapical lesion.

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Chronic apical abscess with extraoral sinus tract, treatment of a 12 years old patient: a case report

CP33

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Clinic of Dental and Oral Pathology, Faculty of Odontology, Lithuanian University of Health Sciences

Aim

To describe the treatment of a chronic apical abscess with extraoral sinus tract which appeared as cutaneous abscess.

Introduction

In rare instances, the sinus tract of dental origin arises on the skin of the patient's face. Due to the asymptomatic nature of chronic apical abscess this clinical condition might be misdiagnosed as local cutaneous infection, abscess, furuncle and other skin pathologies that are more common among teenagers. The surgical treatment or medication only is usually ineffective in those cases as the cause of infection remains untouched and the skin nodule tends to reappear. It is evident that extraoral sinus tract opened due to chronic periapical abscess should heal spontaneously once the source of the infection is eliminated by effective endodontic treatment of causative tooth.

Fig. 1 Periapical radiograph of tooth 36

Fig. 2. Extraoral sinus tract apparent as cutaneous abscess

Case Presentation

A 12 years old female patient presented for treatment with a main complaint of a painless skin nodule in the left submandibular area. Severe caries of tooth 36 was discovered during the examination by general practitioner. The tooth was asymptomatic and pulp sensitivity test was negative. The initial treatment was started, then the patient was referred to an endodontist for evaluation and treatment of the tooth 36. The temporary filling and periapical radiolucency were detected evaluating the periapical x-ray (Fig. 1). During the first apointment, the root canals were shaped, disinfected, filled with calcium hydroxide paste, endodontic cavity was isolated with temporary filling. At the time of the next appointment the skin nodule was infiltrated and superficial accumulation of pus was observed (Fig. 2). A surgical incision of cutaneous abscess was performed for a better drainage. Two weeks later the resolution of extraoral sinus was evident (Fig. 3). The canals of mesial root were obturated with TotalFill BC sealer (FKG Dentaire Sàrl, Switzerland) and gutta-percha, calcium silicate based cement (Biodentine (Septodont, USA)) was used for obturation of an apical part of the distal root. Then the crown of the tooth was restored with permanent filling. During a follow-up after six months the tooth 36 was asymptomatic, the extraoral sinus tract was absent and healing process of periapical tissues was evident in periapical radiograph (Fig. 4 and Fig. 5).

Discussion

A cutaneous abscess in the facial area can be an expression of undiagnosed chronic apical abscess. Some authors claim extraoral sinus tract might arise more frequently in paediatric patients due to teeth being partially errupted and/or relatively deeper seated within the developing alveolar process and closer to the external cortex (1, 2). It can be speculated that extraoral sinus tract of dental origin could be difficult to differentiate from dermatological pathology especially in young patients as infections in the facial area are more prevalent among teenagers. Nevertheless, currently there is no clinical evidence to fully support this statement as case reports regarding chronic apical abscess with sinus tract present patients of diverse age (1 - 5).

Fig. 3. Two weeks after surgical incision

Fig. 4. Six months follow-up

Fig. 5. Six months follow-up

Conclusion & Clinical Relevance

A chronic apical abscess may cause the development of an extraoral sinus tract that can be misdiagnosed as a cutaneous pathology. After establishing the diagnosis of chronic apical abscess with extraoral sinus tract endodontic treatment should be the treatment of choice if the tooth is restorable. Thus, a thorough dental examination in cases of nonhealing cutaneous pathology is recommended to avoid misdiagnosing and mistreatment paying attention to young patients.

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CP34

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DIAGNOSIS, TREATMENT AND FOLLOW-UP OF AN EXTRAORAL SINUS TRACT OF ENDODONTIC ORIGIN: A CASE REPORT

Aim

To describe the management of an extraoral fistula associated with an upper right second premolar in a 22-year-old patient.

Introduction

A sinus tract is a communication between an enclosed area of long-lasting infection, which permits the drainage of inflammatory material to a surface or body cavity via an epithelial-lined tract, following the path of the least resistance. Sinus tracts from endodontic origin are mostly found along the alveolar process. When they have a facial manifestation, they present a demanding challenge to the clinician and are, unfortunately, commonly overlooked, misdiagnosed and/or mistreated[1-5].

Case Presentation

A healthy 22-year-old female was referred to the endodontic department of the Ghent University Hospital for diagnosis and treatment of an extraoral sinus tract presenting in her right cheek. The referring dermatologist, after failing to eliminate the fistula with numerous systemic and local remedies, suspected a dental origin. Upon presentation, the patient did not mention any complaints apart from her obvious aesthetic problem (Fig. 7). Clinical examination revealed an extensively carious 15, non-responsive to sensibility tests and tender to percussion. Radiographic examination showed a well-defined periapical lesion around element 15, the area where the tracing of the fistula with a gutta-percha point precisely lead to (Fig. 2). The diagnosis of pulpal necrosis with a chronical apical abscess for tooth 15 was established. The patient consented to a root canal treatment, which was caried out in two appointments. In the first appointment after caries excavation, a pre-endo build-up was completed with composite (Filtek Supreme, 3M ESPE, USA) and cleaning and shaping was performed using hand and mechanical files (Reciproc, VDW, Munich, Germany). After copious irrigation and sonic activation (EDDY, VDW, Munich, Germany) the root canal was dried and calcium hydroxide was placed as an interappointment dressing. At the second appointment 4 weeks later, the root canal was obturated with gutta percha and AH plus sealer (Dentsply, De-Trey Konstanz, Germany) using warm vertical compaction. The access cavity was restored with composite and an indirect restoration was recommended. All treatment stages were performed with rubber dam and operating microscope (PICO, Carl Zeiss, Germany). At the 6-month follow-up, the tooth was asymptomatic, the extraoral sinus tract had healed and the periapical lesion had greatly reduced in size.

Discussion

A sinus tract can be mucosal or cutaneous, depending on factors such as the morphology of the affected jaw, the length and anatomy of the involved root, as well as the proximity of the apex to the external bony cortex. Extraoral sinus tracts are cutaneous abnormalities that due to their nature hide their odontogenic aetiology. The patient does not always report symptoms and as the sinus presents away from the source of infection, it makes diagnosis a true challenge for the clinician. Differential diagnoses of these lesions include salivary gland, thyroglossal and branchial fistula, actinomycosis, tuberculosis, infected pimple, nodule, ulcer or even malignant melanoma[5]. Misdiagnosis of these lesions can lead the patient into a series of unnecessary treatments, such as antibiotics or surgical excision, that will have little or no effect[2].

Fig. 1: Preoperative periapical radograph

Fig. 2: Preoperative fistelography

Fig. 3: Pre-endo build-up and placement of $Ca(OH)_2$

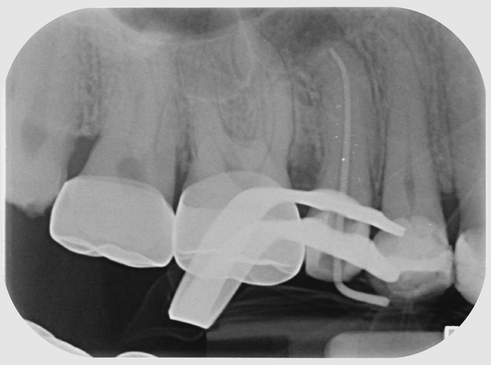

Fig. 4: Master cone radiograph

Fig. 5: Postoperative radiograph

Fig. 6: Periapical radiograph at 6 months follow-up

Fig. 7: Preoperative extraoral photographs

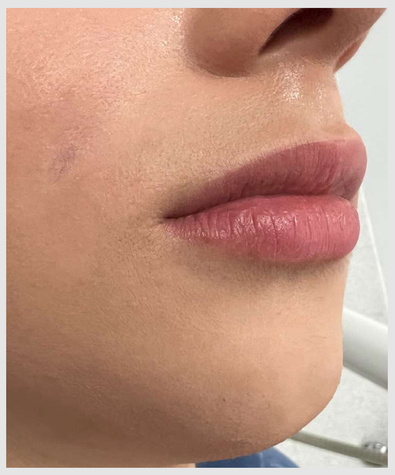

Fig. 8: Extraoral photograph at 6 months follow-up

Conclusion and Clinical Relevance

Dental and medical professionals should always consider an endodontic origin in case of a cutaneous sinus tract of the face and neck. Elimination of the endodontic infection predictably results in complete resolution of the skin lesion.

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CP35

CLINICAL MANAGEMENT OF AN EXTERNAL ROOT RESORPTION IN MANDIBULAR PREMOLAR

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Aim: To illustrate a clinical case of successful treatment of external root resorption in mandibular premolar.

Introduction: Root resorption is a pathological condition that may be an endodontic challenge if not diagnosed and treated correctly. The recent advances in the imaging technologies and material science have enabled the clinician to visualize the structural changes accurately and repair them with materials providing favorable seal ability.

Case Presentation A 68-year-old female patient was referred from a general dentist for management of a cervical lesion in mandibular right first premolar. Patient came to our department with a slight discomfort in that region, asking for a composite restoration. Clinical examination revealed a cervical lesion buccally (Fig 1). The toot responded negatively to percussion test and had a slightly delayed response to electrical pulp test. Cone beam computed tomography (CBCT) was done using field of view 5 × 5 and axial, sagittal, and horizontal sections were obtained that aided in the diagnosis of an external cervical resorption (Fig 2, 3). The lesion was positioned slightly subcrestal, the circumferential spread was > 90° but ≤ 180° and it was in communication with the pulp. After administration of local anesthesia, the gingiva was thermocauterised and the granulation tissue was excavated from the defect. After access cavity preparation, straight line access was achieved and the canal was instrumented with a full rotation rotary file system. Before obturation, a hand file was placed into the canal as a space keeper to enable defect restoration with glass ionomer cement with improved mechanical properties. Obturation was completed with a one syringe calcium silicate-based sealer using single cone technique. The quality of the obturation was assessed radiographically (Fig 4). Control examination after three months showed that patient was symptom free with glass ionomer with improved properties in place (Fig 5).

Figure 1.

Figure 2.

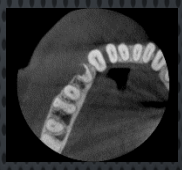

Figure 3.

Figure 4.

Figure 5.

Discussion: 3D imaging by CBCT has helped in assessment of the resorptive defects by predicting the treatment complexity and expected outcome based on the location and extension of the defect. The choice to use glass ionomer cement with improved mechanical properties in the present case was based on the material's biocompatibility, adhesion, and beneficial physical properties.

Conclusion & Clinical Relevance- Different factors, including location and the size of the resorption influence the success rate while managing cervical resorptions. Careful clinical technique and materials that provide an effective seal of the lesion contribute to higher therapy success rate and functional significance of the tooth.

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CP36

Prevention of osteoradionecrosis in head and neck cancer patients by root banking

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Aim:
To present root banking as a clinical technique for avoiding extractions in Head and neck cancer (HNC) patients who are at risk of developing osteoradionecrosis (ORN).

Introduction:
HNC patients undergone radiation therapy (RT) are at a higher risk of developing caries, tooth destruction, apical periodontitis, and ORN.
ORN is a serious complication in which the bone tissue becomes necrotic due to the reduced blood supply and impaired healing. The incidence is ranging between 2 to 22 % of HNC patients.
It requires surgical intervention and/or hyperbaric oxygen therapy, with a high cost and poor prognosis. In these patients, extractions should be avoided as they present a risk factor for ORN.

Case Presentation:
A 59-year-old man was diagnosed with oropharyngeal carcinoma (T2N2M0), HPV negative. He was treated with surgery, chemotherapy, and radiation therapy (60Gy) with IMRT in 2019.
In 2020, he presented at the University Medical Centre Ljubljana for the dental management of post-radiation caries. He reported multiple painful teeth, carious destruction, and fracturing of teeth.

Treatment:
After a thorough clinical and radiographic examination, the treatment plan was formulated. Due to the risk of ORN, extraction was not a suitable option for the patient.
Decoronation was done on teeth 27, 28, 37, 41, 42, 47, and 48. Root banking was performed on the remaining roots of the teeth.
The roots were instrumented, and CaOH medicament was placed. SDF application was done to arrest caries progression, and GIC filling was done to restore the roots.

Follow-up:
The patient was symptom-free and reported no ORN after the procedure. The patient was advised to maintain good oral hygiene and attend regular follow-up visits to monitor the progress of the treatment.

Conclusion and clinical relevance:
Root banking is a viable option for HNC patients who have undergone RT and are at risk of developing ORN due to extractions. This technique can help preserve the remaining teeth and avoid further complications. Early intervention and regular follow-up visits can help achieve successful outcomes in these patients.

Root banking technique is a reliable technique for avoiding root extractions. Apical extrusion should be minimized by:
- crown-down approach,
- precise control of working length
- copious irrigation,
- rotary instrumentation, and
- avoiding apical patency.

Caries can be prevented by applying silver diamine fluoride (SDF), followed by placement of a glass ionomer cement (GIC) temporary restoration. In case of symptoms or the need for retreatment, a calcium hydroxide (CaOH) medicament is placed within the root canal.

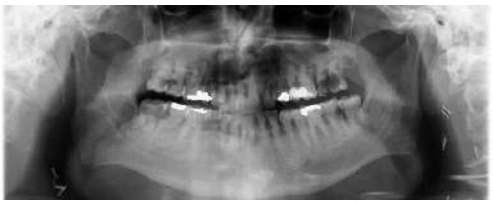

Figure 1. Panoramic 13th Jan 2022. Multiple postradiation caries lesions in cervical regions

Figure 2. Intraoral scans, showing occlusal (a,b), frontal (c,d), and detailed view (e,f) of carious destruction of tooth 28 and decoronation of teeth 27, 41, and 42.

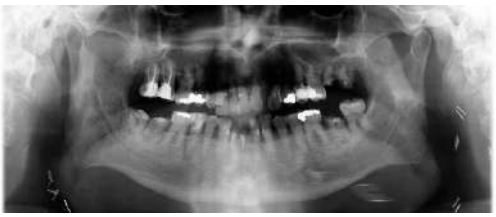

Figure 3. Panoramic 23rd March 2023. Multiple decoronations (27, 28, 37, 41, 42, 47,and 48). Root banking was performed (41,42).

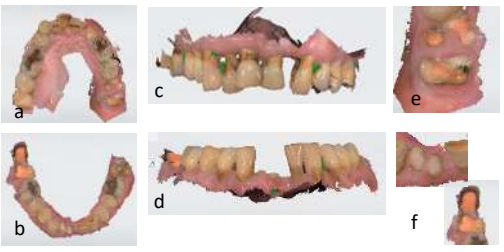

Figure 4. Intraoral scans, showing occlusal (a,b), frontal (c,d), and detailed view (e,f) of root banking (27, 28, 37, 41, 42, 47, and 48)

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Unique Anatomy in A Mandibular Second Premolar with Five Canals and Radicular Grooves: A Case Report

CP37

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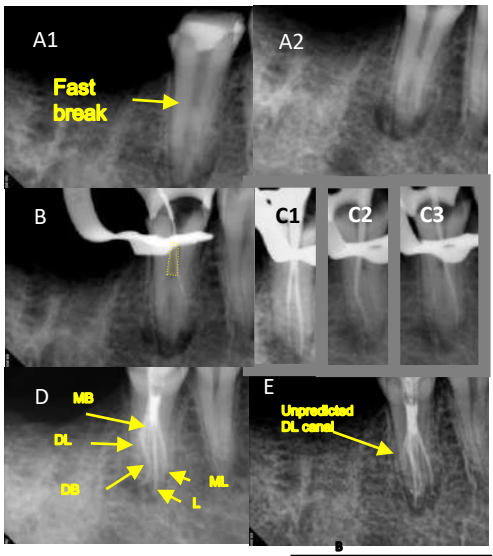
Aim

To introduce clinical strategies and techniques designed to provide successful treatment for a mandibular second premolar with multiple canals and radicular grooves.

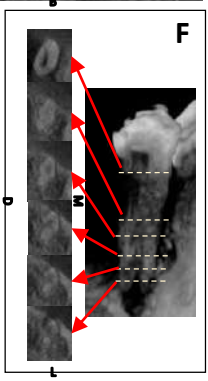
Introduction

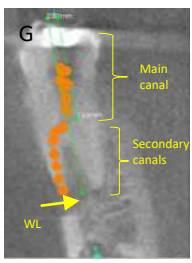
It is difficult to predict the outcomes of non-surgical root canal treatment (NSRCT) for mandibular second premolars with multiple root canals. In these teeth, the complicated anatomy with fin(s), or a C-shape, and possible secondary canal(s) varies unpredictably. Moreover, the prevalence of mandibular second premolars with multiple canals is extremely infrequent[1]. Therefore, the clinical management of NSRCT in such cases has not been sufficiently reported.



Case Presentation

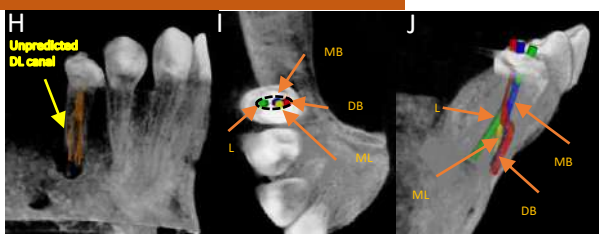
A male patient was diagnosed with previously initiated therapy and asymptomatic apical periodontitis in tooth #45 (Fig. A1-2). On CBCT evaluation, one main canal, irregular grooves and four calcified secondary canals (mesiobuccal [MB], mesiolingual [ML], distobuccal [DB], lingual [L]) were detected via the CBCT scan (Fig. F). Considering the complicated anatomy of the root canal system, an optimized clinical strategy was developed for the treatment. First, premeasuring the working lengths of a main canal and the secondary canals (Fig. G). Second, interim placement of an intracanal dressing of calcium hydroxide, and final irrigation using BioPure® MTAD®. Third, using the tactile examination technique of #6 C+ files with precurved tips[2]. Forth, augmentation of the flow dynamics during irrigation, using the EndoActivator®. During the tactile examination, the orifices of the secondary canals were not visible despite using the dental microscope because the orifices were located beneath the wall of the main canal (Fig. B, *note yellow trapezoid*). The glide pathways of the canals were achieved by the alternative use of #6 C+ files and S1 ProTaper Gold®. The working lengths were measured as 24 mm in all canals. The canals were instrumented up to 25/.04 files in the MB and ML canals, and 35/.04 files in the DB and L canals. Three radiographs verifying the placement of the master cones were taken because of too small access (Fig. C1-3). The single cone obturation technique was employed in the secondary canals and then the main canal was obturated in the warm vertical compaction technique. EndoSequence BC Sealer™ was used. DL canal was not noticed until the obturation was completed (Fig. D and E).





Discussion

Based on the CBCT interpretation, the advanced protocols of NSRCT were planned: First, augmentation of chemo-mechanical cleaning, but minimizing the loss of dentin. Second, the tactile examination to locate and negotiate the orifices of the secondary canals. Lastly, the optimized plan and technique for obturation of the complex canal systems. After the completion of NSRCT, the CBCT was reused to review the completed procedures (Fig. H, I, and J). Access opening should be an "*Oval-shape outline*" to find all canals and complete the treatment (Fig. I)



Conclusion & Clinical Relevance

The incidence of multiple canals in mandibular second premolars with irregular radicular grooves is rare, and the configuration of the canals can be exceptionally complex and unpredictable. Therefore, it is critical to establish a precise and proper clinical strategy for treating such cases.

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CP38

SUCCESSFUL REPAIR OF ROOT PERFORATION AND ENDODONTIC RETREATMENT OF MANDIBULAR MOLAR

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Aim

To report a clinical case of successful conservative therapy of first mandibular molar with root perforation and previous canal filling.

Introduction

During operative procedures, treatment outcome can be compromised by root perforations which can be a significant cause of endodontic treatment failures. Root canal perforations can occur throughout endodontic instrumentation, as well as during preparations for intracanal posts where even massive destructions can occur.

Case presentation

A 47-year-old female patient was referred to our department for endodontic retreatment of mandibular right first molar due to decementation of a cast post and a porcelain fused to metal crown. Patient was without sensitivity to percussion or palpation but post space exploration revealed bleeding from the distal canal. Radiographic imaging showed perforation of the distal and thinness of the mesial wall in the distal root (Fig. 1.). Previous root canal filling was removed using Gates–Glidden burs and reciprocating file system. After instrumentation and irrigation, calcium hydroxide paste was placed as an intracanal medicament. During the next visit, in order to strengthen the weakened mesial wall, a glass ionomer restorative material with enhanced mechanical properties was compacted against dentinal walls of distal canal around a gutta-percha point that was inserted in the canal as a space keeper (Fig. 2.). Perforation defect was sealed using premixed, one-component, calcium-silicate based endodontic sealer. Sealer was dispensed through application tip directly from its original syringe packing into the perforation defect and then into the original canal. Obturation was completed by gutta-percha points applied in original canals with monocone technique. Post-obturation X-ray was taken to check the quality of obturation (Fig. 3.) and patient was referred for final restoration with a cast post and a porcelain fused to metal crown. Three years later, control clinical and radiographic examination showed favorable outcome, absence of any symptoms and satisfactory healing of the periapical lesion (Fig. 4.).

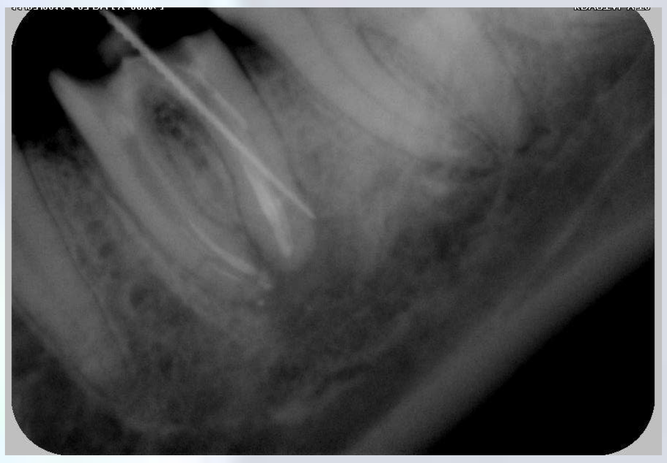

Fig. 1. Localization of the root perforation

Fig. 2. Glass ionomer material placement

Fig. 3. Post-obturation radiograph

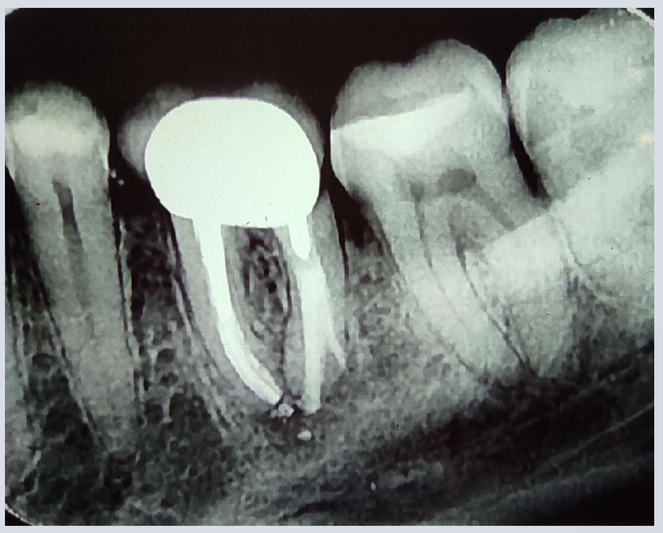

Fig. 4 Control radiograph after three years

Discussion

Root perforations represent an unfavorable condition that may cause impairment of adjacent periodontal tissues, propagation of microorganisms and consequent alveolar bone resorption. The longer the period that has passed since its occurrence and the larger the size of the perforation, the lower the chances for a favorable outcome of the therapy.

Conclusion & Clinical Relevance

Desirable treatment outcome is possible even in cases of large, neglected root perforations with persistent infection and destruction of surrounding tissues. This can be achieved with appropriate planning, careful clinical technique and simple, standard armamentarium. Premixed, one-component, calcium-silicate based endodontic sealers can be reliably used for perforation sealing in clinical cases where their direct application from the original syringe is technically easily feasible.

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CP39

CP16

Clinical Approach to External Replacement Resorption in the Second Lower Premolar: A Case Report

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Aim: To discuss how a patient with external replacement tooth resorption can present unique characteristics that require treatment to be case dependent, based on aspects related to the patient and the affected tooth.

Introduction: External replacement resorption typically occurs following an injury to the periodontal ligament (PDL) and/or external root surface (i.e. the cementum). The tooth then loses the protection provided by the PDL which allows clastic cells from the adjacent bone to resorb the cementum and dentin. This will be followed by osteoblasts forming bone in the area of resorption. This process is usually progressive, eventually leading to resorption of the entire root and loss of the tooth. However, it might also be transient in some cases.

Case Presentation :

A 23-year-old female patient was referred by the dentist for endodontic treatment of the second right lower premolar due to the presence of incidentally discovered cervically located external root resorption.

History: The patient was systemically healthy and was not taking any medication. The orthodontic treatment was started 7 years ago and it lasted for 3 years. The second right lower premolar was orthodontically extruded.

Clinical examination: The crown was intact (Fig. 1), the tooth was responding to cold and electric pulp testing. The tooth was asymptomatic and no signs of reduced mobility or unusual percussion sound were present. Periapical radiography showed mottled radiolucency with cloudy appearance and irregular margins in the region of the cemento-enamel junction at distal side in marginal bone level (Fig. 2). CBCT examination confirmed replacement of the tooth substance with bone tissue appearance (Fig. 3). There were no signs of dental pulp involvement.

The management of external replacement resorption included regular annual follow-ups of the tooth with clinical examinations and periapical radiographs to determine the dynamics of resorption (Fig. 2). We explained and discuss the possible treatment options to the patient. Regarding the fact that it was 4 years since completed orthodontic treatment and the resorption was replaced by bone tissue, we decided for regular follow-ups.
At the follow-up examination after 4 years (Fig. 1), the tooth was vital, asymptomatic, the CBCT examination showed no progression of the resorption (Fig. 4).

Discussion: It is important to emphasize that external replacement resorption is not related to the dental pulp, so root canal treatment will not prevent or arrest this type of resorption. Following baseline clinical and radiographic assessment (with CBCT), a decision must be made regarding appropriate time intervals for review.

Conclusion & Clinical Relevance: External replacement resorption is a pathology that can be treated often inadequately and even result in tooth loss. In certain clinical cases, external replacement resorption does not require any treatment, but before making such a diagnosis, the teeth should be regularly examined.

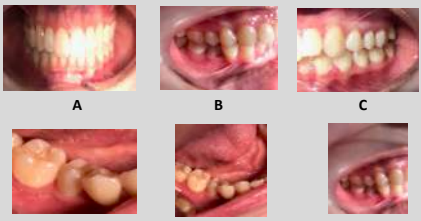

Fig. 1 (A, B, C, D, E, F): Clinical examination at the first visit: A-frontal view; B-right occlusion; C-left occlusion; D-intraoral examination of the second right lower premolar at the first visit; E and F-intraoral examination of the second right lower premolar after 4 years of follow up.

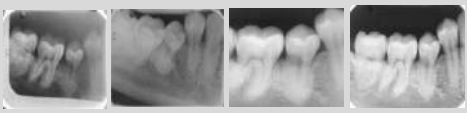

Fig. 2 (A, B, C, D): Periapical radiography assesment of the second right lower premolar. A-initial rafiography; B-after 1 year; C-after 2 years; D-after 4 years.

Fig. 3 (A, B, C): Initial CBCT examination of the second right lower premolar. A-sagittal view; B-coronal view; C-axial view.

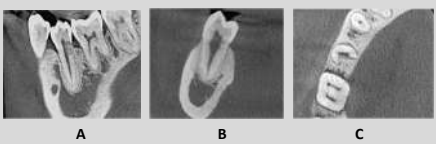

Fig. 4 (A, B, C): CBCT examination of the second right lower premolar after 4 years of follow up. A-sagittal view; B-coronal view; C-axial view.

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CP40

Surgical Management of Lateral Canals in Middle Roots: Two Cases

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AIM

The aim of this report is to present two cases of lateral canals, one in middle root of maxillary right central incisor and one in middle root of mandibular right first molar. They both failed to root canal treatment and healed after surgical management.

INTRODUCTION

Lateral canals are accessory canals located in the coronal or middle third of the root, usually extending horizontally from the main canal. It is estimated that 30~40% of all teeth have lateral or accessory canals, mostly found in the apical third of the root[1,2]. Intracanal infection may cause a lateral periodontal lesion via lateral canal. It is difficult to achieve disinfection of lateral canals because of the complex anatomy[3,4]. If the non-surgical endodontic treatment failed, the surgical endodontics may be the next treatment option.

CASES PRESENTATION

Case 1

A 27 y/o female was found a lateral radicular lesion appeared from maxillary right central incisor and a lateral canal was revealed on CBCT (cone-beam computer tomography) scan. Gingival abscess dismissed once but re-appeared after obturation. In the apical surgery, the opening of lateral canal was found on the middle root surface. The debridement and retrograde filling were performed to the opening of apex and lateral canal. The lateral lesion healed uneventfully in the following 14 months.

Figure1. (A) Preoperative periapical radiograph. A lateral lesion of tooth #8 was traced with GP. (B,C) Sagittal plane, CBCT scan of tooth #8. The white arrow points to a lateral canal. (D) Axial plane of middle root, CBCT scan.

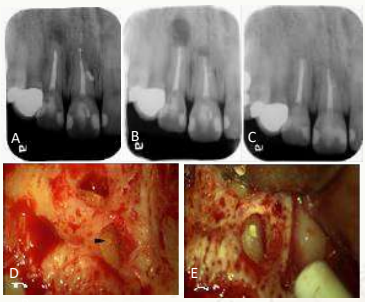

Figure 2. (A) Root canal obturation of tooth #8. Sealer extrusion from lateral canal. (B) Post-operative radiograph. (C) 14-month follow up after surgery. The lateral lesion healed uneventfully. (D) Apical surgery. The black arrow points to a lateral canal opening on the mesio-buccal root surface of tooth #8. (E) MTA retrograde filling in the opening of apex and lateral canal.

Case 2

A 39 y/o female suffered from gingival abscess of mandibular right first molar for 4 months and had root canal treatment 15 years ago. A lateral lesion on mesial root was revealed on periapical radiograph and CBCT scan. Lateral canal, cemental tear, vertical root fracture and non-odontogenic lesion were suspected. Due to approach limitation, the exact etiology could not be confirmed even after apicoectomy and retrograde fillings. Five months later, gingival abscess appeared again and a lateral foramen on distal surface of middle level was saw on mesial root of mandibular right first molar during the second surgical approach. The lateral lesion healed uneventfully after further root resection to remove the lateral canal of mesial root.

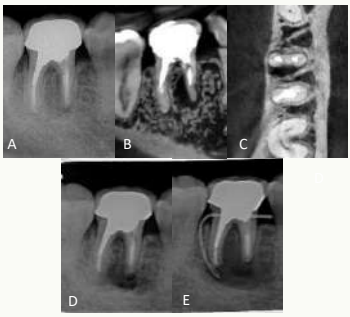

Figure 3. (A) Periapical radiograph. Radiolucency on furcal area of tooth #30. (B) Coronal plane, CBCT scan. Lateral radiolucency on mesial root of tooth #30. (C) Axial plane of middle root, CBCT scan. (D)Post-operative radiograph. Periradicular surgery with apicoectomy and MTA retrograde filling. (E) 5-month follow up. Gingival abscess appeared again and periradicular radiolucency enlarged.

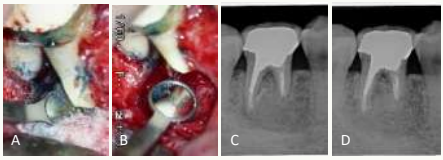

Figure 4. (A,B) Periradicular re-surgery of tooth #30. Complete loss of buccal cortical bone and access of lateral foramen on distal middle surface of mesial root. Located a lateral canal of mesial root during root resection procedure. (C) Post-operative radiograph. Root section to remove the lateral canal. Retrograde preparation and filled with MTA. Periradicular bony defect was filled with bone graft. (D) 20-month follow up radiograph. The lateral lesion healed uneventfully.

DISCUSSION

De Deus found that 17% of the teeth presented accessory canals in the apical third of the root, about 9% in the middle third, and less than 2% in the coronal third[1]. Gu reported an incidence of lateral canals in mandibular molars was 6.7% in the middle of mesial roots and 8.9% in the middle of distal root[5]. The complicated morphology of lateral canals poses great challenges to their debridement during root canal treatment. Bacteria might remain in the well filled canals of radiographically successful cases.

CONCLUSION & CLINICAL RELEVANCE

While using surgical approaches, the infected lateral canal can be treated with retrograde preparation or resecting away the lateral canal.

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CP41

Conservative Management of Dens Invaginatus Type II with a Large Periapical Lesion : A Case Report

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Aim

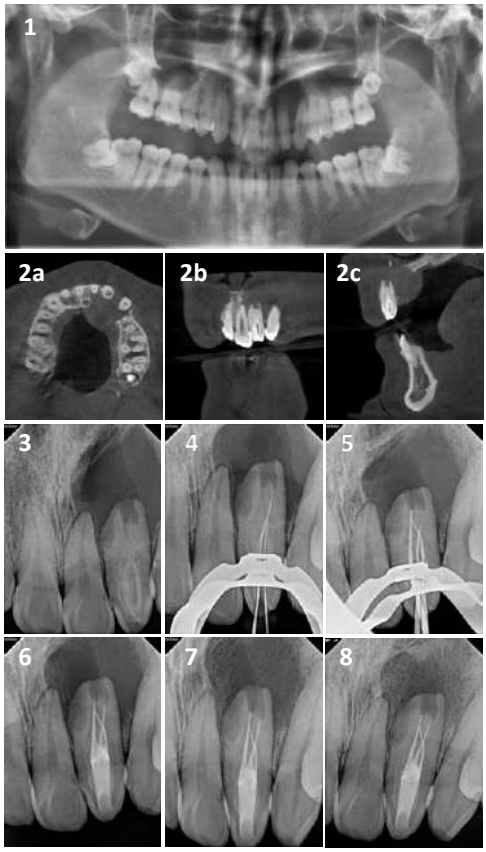
To report the non-surgical endodontic treatment case of a maxillary lateral incisor showing dens invaginatus type II with a large periapical lesion.

Introduction

Dens invaginatus is a developmental anomaly resulting from epithelial invagination into the dental papilla and maxillary lateral incisors are the most common affected teeth.

Case Presentation

A 22-year-old male patient the dental clinic of the Eunpyeong St. Mary's hospital of the Catholic University for endodontic treatment of the left maxillary lateral incisor. The intraoral clinical examination revealed a peg-shaped maxillary left lateral incisor with no discoloration. The tooth was asymptomatic, but did not respond to cold test and electric vitality test, confirming pulp necrosis. The adjacent teeth had normal pulpal conditions. Radiographs and Cone Beam Computed Tomography (CBCT) scan showed the presence of Oehlers type II invagination and revealed a large periapical radiolucency related to tooth #21-23 (Fig.1-3). The treatment plan was to perform an root canal treatment of #22. A rubber dam was applied and root canal of orifices were detected under the dental operating microscope. Access preparation revealed two orifices that were explored with a #15 K-file through the labial and palatal sides, the working length was determined with a radiological technique (Fig.4). Radiographs revealed an additional mesial canal, two more mesial canals were negotiated after that. The root canals were prepared to a master apical file size #30 with .04 ProFile Ni-Ti rotary instruments (Dentsply Maillefer, Switzerland) under copious irrigation with 5.25% NaOCl. Following preparation, the root canals were irrigated with 17% EDTA was used for chelation. Following drying with sterile paper points, the root canals were obturated with Endoseal (Maruchi, Japan) and gutta-percha by the single cone technique (Fig.5,6). At 5-month (Fig.7) and 9-month (Fig.8) follow-up, the patient had no discomfort and radiographic examination showed increase in radioopacity of periapical radiolucency and formation of trabecular pattern of the bone.



Discussion

Oehlers classified dens invaginatus into 3 types based on the vertical extension of the invagination. In Type II, such as this case, the invagination extends through the root and ends in a blind sac without communication with the periodontium that complicates the performance of conventional endodontic treatment when the pulp of the main canal is necrotized. By using CBCT as an auxiliary tool, clinicians can develop appropriate treatment plans with the knowledge of such anatomical variations of the invaginated tooth to achieve successful treatment outcomes.

Conclusion & Clinical Relevance

In this case, the radioopacity of periapical lesion of a tooth affected dens invaginatus was increased without any surgical treatment at the 9-month check-up, but further follow-up is required.

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CP42

The Traumatic Consequences of Failure to Provide Intervention: A Clinical Case Report

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AIM: Traumatic dental injuries pose a variety of complex issues, due to their somewhat unpredictable pathological sequelae, long term treatment and follow up burden, along with patients' social considerations, this case demonstrates the array of potential pulpal and periodontal ligament sequelae when injuries are left untreated.

Tooth	UR3	UR2	UR1	UL1	UL2	UL3
Colour	Normal	Grey-ish	Yellowing	Yellowing	Normal	Normal
Mobility	0	0	1	1	0	0
Tender to Percussion	N	Y	N	N	N	N
Endo Frost	+ve	-ve	-ve	Delayed	-ve	Delayed

Figure 1. Trauma follow-up assessment table findings

CASE PRESENTATION: A 16-year-old was referred to the restorative department due to an incidental finding on a radiograph that indicated extensive root resorption present on both upper central incisors. Two years previously, both upper centrals were avulsed, and the upper laterals were laterally luxated, other than immediate re-positioning, no further treatment or follow up was provided. The patient complained of pain from the upper left and right lateral incisor intermittently and that the front teeth felt as though they were 'floating' when she was eating.

Periapical radiographs supplemented by a CBCT displayed a range of pulpal and PDL responses to trauma which differed in severity across the majority of upper anterior teeth.

The CBCT revealed advanced combined internal & external resorption of the upper central incisors, ERR of the laterals, sclerosis of the upper left canine and a cystic lesion on the upper right lateral. Arrangements have been made for implant planning.

INITIAL PERIAPICAL RADIOGRAPHS – JAN 2021

Figure 2. PA UR2 showing mesial external cervical root resorption, a wide patent canal and periapical pathology

Figure 3. PA UL1/UR1 showing irregular root canal spaces, inflammatory root resorption and normal PDL with intact lamina dura

Figure 4. PA UL2/3 showing distal caries UL2 and PDL widening with a faint canal, UL3 pulp canal obliteration with normal PDL

FOLLOW-UP PERIAPICAL RADIOGRAPHS – JAN 2022

Figure 5. PA UR2 showing no change in size of resorption defect, a well obturated root canal with periapical pathology that appears larger and more well defined

Figure 6. PA UL1/UR1 showing minimal changes from the original radiograph, resorption slightly more radiolucent and well defined

Figure 7. No changes from previous radiograph, UL2 caries still present

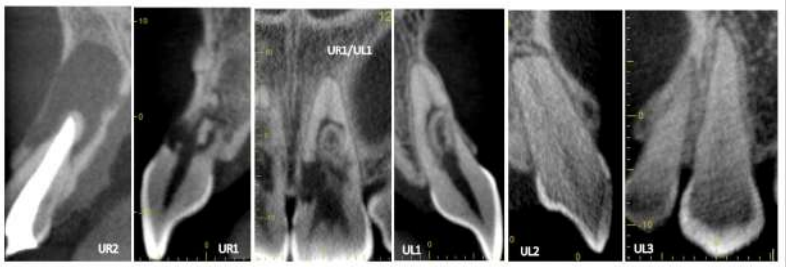

Figure 8. Selected images from CBCT

DISCUSSION: This case demonstrates a unique presentation of multiple different unfavourable responses of the pulpal and periradicular tissues to trauma in the same patient. Multiple factors have been proposed that may influence the outcomes and tissue response to trauma, however the literature states that though the traumatic scenarios may be different, the mechanical and biological factors involved in the mechanisms of trauma determine the type and severity of resulting injury sustained by the tissues. This is consistent with the case presented above, as many other proposed 'variables' potentially affecting outcomes such as age, gender, health status, length of time to and type of emergency treatment provided, along with the oral environment have been controlled in this case.

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CP43

Multiple external root resorptions in a patient with Myotonic Dystrophy: a new manifestation?

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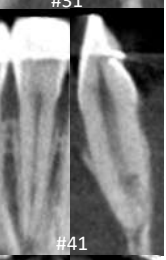
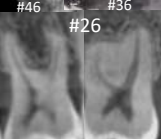




Aim

Describing a rare case with multiple external root resorptions in a patient diagnosed with Myotonic Dystrophy (MD).

Introduction

MD is a hereditary neuromuscular multisystem disease caused by a gene mutation. Symptoms include muscle weakness, myotonia, fatigue, cardiac abnormalities, and respiratory complications (1). MD may cause alterations in craniofacial growth, resulting in a higher frequency of dental issues such as open bite and crossbite, a higher risk of developing caries, plaque, gingivitis, and experiencing TMD pathology (2,3).

Case Presentation

A 29-year-old male with MD was referred due to a random finding of root resorption in lower premolars. The patient underwent orthodontic treatment 12 years before the current examination, during which the first premolars were extracted.

Clinical examination revealed an anterior open bite, all teeth responded positively to cold testing (TFE) with no percussion or palpation tenderness, and periodontal probing up to 5mm.

Radiograph examination (PA) revealed varying degrees of resorption among eight teeth. Tooth number 22 was suspected of complex root morphology. To further assess the extent of the affected teeth, a CBCT scan was conducted (4). The CBCT scan revealed 16 affected teeth showing different degrees of root resorption, along with two teeth displaying Dens Invaginatus combined with root resorption. Moreover, thin cortical bone, a high hard palate, and an enlarged incisive canal were observed.

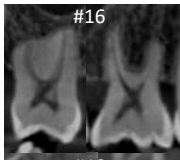
Discussion

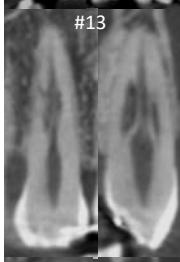
CBCT may serve as a more accurate diagnostic tool for detecting root pathologies.

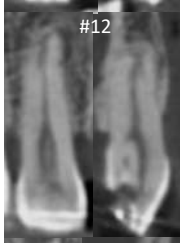
Multiple external root resorption among MD patients has yet to be reported. This case emphasizes the need to dentally monitor these patients to detect potential pathologies as early as possible; enabling timely intervention for an improved prognosis.

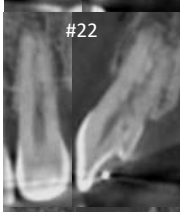
Conclusion & Clinical Relevance

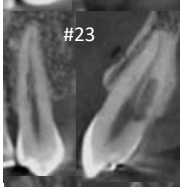
Dental professionals should be mindful of the potential dental complications linked to MD and implement appropriate measures when providing care for affected individuals. To ensure timely treatment and monitor MD patients' dental status, scheduling frequent follow-ups is crucial.

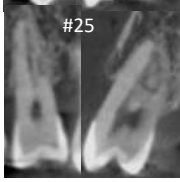












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DIRECT R GOLD AND O.R.E TECHNIQUE – MANAGEMENT OF A CHALLENGING CASES

CP44

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AIM

The aim of the present poster is to present and clinically evaluate a new NiTi File using the Only Rotary Endodontic Technique.

Pre Operative X ray

INTRODUCTION

The introduction of NiTi Rotary instruments completely revolutionized the root canal treatment (RCT), increasing cleaning effectiveness and predictability. Despite in the last years the Only Rotary Endodontic technique has incresead its popularity, in most of cases general practioners and endodontist specialist still prefer using manual stainless steel (SS) files. If this behavior was justified at the beginning of the NiTi Era, nowdays the improvement in design, cutting efficiency and manufacturing (Heat treatment with softer alloys) could eliminate the needs for SS Files even in challenging cases. This poster aims at presenting a not common anatomy performed using only one rotary NiTi instruments.

CASE DESCRIPTION

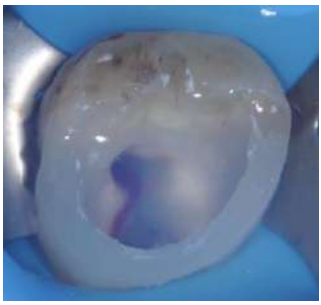
A male 60 years old was referred for a swelling in the lower right jaw. To the intra oral examination and, after a periapical x ray of the area, the diagnosis was of endodontic abscess. The RCT of the two lower right teeth (4.5 and 4.8) was then performed without anesthesia. Rubber dam was placed, pulp chamber opened, and the abscess was drained from the distal canal of the 4.8. Both RCTs were performed in a single appointment as follow:

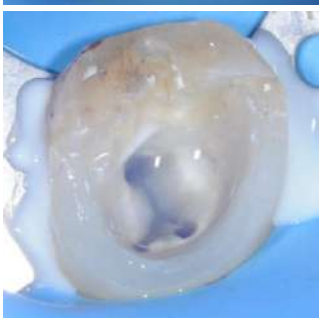
1) Mechanical scouting using Direct R Gold 25.06 in CCW continous motion at 300 rpm and 2.0 Ncm

2) The Shaping of all the canals was completed using Direct R Gold 25.06 (CW 60° - CCW 170°)

3) Sodiun Hypoclorite 5% with ultrasonic activation using EndoUltra

4) The mesial canals of 4.8 and the canal of 4.5 were filled using a carrier-based technique, while the distal canal of the 4.8 using Continous Wave Condensation technique





Immediate Post Operative X ray

DISCUSSION

The showed case with the proposed technique allowed the Direct R Gold to reach working length with no deformation or fracture. The use of NiTi Rotary file especially with high cutting efficiency is capable to complete RCT reducing the difficulties.

CLINICAL RELEVANCE

The proposed technique with the use of this new file, the Direct R Gold, seems promising to exploit the peculiar properties of this new instrument, highlighting the boundless possibilities of the NiTi Rotary files.

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Root canal treatment and surgical treatment of lower calcified incisor with large lesion after trauma: a multidisciplinary approach

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CP45

Introduction: Dental trauma can impact on the hard dental tissues and damage the pulp, periodontium, and surrounding alveolar bone.

Aim: To present the management of a lower calcified incisor with large lesion after trauma that occurred 30 years prior.

Case Presentation

A 42-year old woman was referred for evaluation and treatment of the mandibular incisors that presented a large periapical lesion at initial radiographic examination (Fig. 1). According to the patient's dental history, she had experienced trauma at her lower incisors at the age of 12. After clinical examination, all the lower incisors were asymptomatic. Tooth #41 responded negatively at sensitivity tests while the rest had a normal response. The periapical radiograph revealed involvement of the apex of tooth #41 in the periapical lesion (Fig. 2). A diagnosis of asymptomatic apical periodontitis of #41 was established. s-FOV CBCT was asked to assess the true size of the lesion and locate the calcified root canal (Fig. 3,4) According to the CBCT, a dehiscence of the cortical plate was noticed as well as calcification of the root canal and apical resorption. A root canal treatment of tooth #41 was performed, followed by surgical excision. Upon access, calcification was evident. A Munce Discovery bur #1/2 was used to try and locate the canal, however a small perforation of the buccal canal wall occurred with a #10 C-pilot file at 11 mm (Fig. 5). Eventually, patency of the root canal was achieved with #6,8,10 C-pilot files (Fig. 6) and root canal was manipulated with 17/.04-45/.04 SmartTrack rotary files & copious irrigation with NaOCl 2.5% & EDTA 17%. Obturation was performed with the single cone technique & calcium silicate sealer (Fig. 7). A week later, due to the size of the lesion, microsurgery was performed on tooth #41 in collaboration with the Dpt. of OMFS. After the initial flap elevation, the dehiscence of the cortical plate was easily located (Fig. 8). An osteotomy was performed & the lesion was removed in toto (Fig. 9-11). After apicoectomy (Fig. 12,13), root-end preparation was performed with a 3mm surgical ultrasonic tip (Fig. 14) and retro-filling was performed with MTA Angelus (Fig. 15,16). Suturing of the flap was performed with PGA 4/0 sutures (Fig. 17,18). Histologic analysis showed the lesion was a perirradicular cyst. Recall examinations were performed at 6 months (Fig. 19) & 9 months (Fig. 20) post-op. Almost complete healing of the lesion can be observed.


Fig. 1


Fig. 2

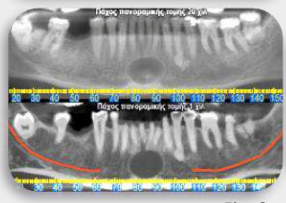
Fig. 3

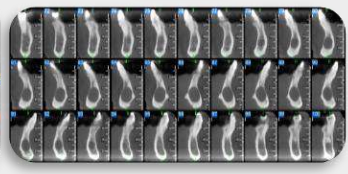
Fig. 4


Fig. 5


Fig. 6


Fig. 7


Fig. 8


Fig. 9


Fig. 10

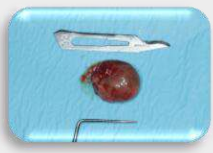
Fig. 11


Fig. 12


Fig. 13


Fig. 14


Fig. 15


Fig. 16


Fig. 17


Fig. 18


Fig. 19


Fig. 20

Discussion: Thorough clinical and radiographic examination as well as the use of an operating microscope are of the outmost importance to the management of teeth with complications due to trauma.

Conclusion & Clinical Relevance: Collaboration between different specialties can lead to the most favourable outcome in complicated cases.

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CP46

A case indicating the importance of an accurate pain history and diagnosis to differentiate between odontogenic and non-odontogenic pain

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Aim

The present case underlines the importance of a careful pain history and differential diagnosis of possible non-odontogenic pain origins prior to initiation of endodontic treatment of a tooth.

Introduction

Due to the diagnostic complexity of dental and orofacial pain, clinicians at times are led to endodontic treatments, which, retrospectively appear unhelpful. A good knowledge of odontogenic and non-odontogenic origins of orofacial pain is necessary to make a proper diagnosis and prevent patients from unnecessary treatments.

Case Presentation

A 67-year-old female patient suffered from unclear, partly burning, poorly localized, persistent pain in her right cheek region radiating into her right eye. The patient assumed, that the pain would originate from her upper right teeth and, thus, visited her dentist.

There, in a first visit, tooth #11 was extracted due to loosening and at a second visit, root canal treatment (RCT) was initiated on teeth #14 and #16 due to the persisting pain. However, these treatments did not lead to an improvement or change of the symptoms. After consultation with an ENT specialist including MRI imaging, the patient was referred about two months later for further treatment to the Department of Periodontology, Operative and Preventive Dentistry (DPOPD), Center for Dental and Oral Medicine, University of Bonn.

Here, a dental pain history was obtained and clinical and radiological examinations of the teeth were performed. All teeth except #14 and #16 reacted normal to sensitivity (cold), percussion, and palpation tests, respectively. Mobility of the teeth and probing depths were within physiological limits. No swelling, signs of gingival inflammation, or sinus tract were detected. The pain that the patient reported could not be reproduced. Radiographic examination showed physiological periapical conditions (Fig. 1). Thus, non-odontogenic pain was presumed and the patient was referred to pain specialists at the Department of Anesthesiology, Intensive Care and Pain Medicine (DAICPM) at the University Hospital Bonn, where atypical facial pain (AFP) was diagnosed.

Root canal therapy (RCT) of teeth #14 and #16 was successfully completed in the following month using hand and rotary files, 1% NaOCl solution, an epoxy-amine resin-based sealer, and gutta-percha in vertical compaction technique (Fig. 2-5).

At the recall, 6 months after obturation, the periapical regions appeared clinically and radiographically normal (Fig. 6). However, RCT did not change the patient´s pain complaints. Later on, improvement of her symptoms was achieved by medical treatment administered by pain specialists at the DAICPM. The diagnosed AFP was treated with amitriptyline. To date, still under medical treatment, the patient reports significant improvement of her symptoms.

Discussion

In the present case, a patient received endodontic treatment in two posterior teeth due to unclear persistent pain in her right face. Dental treatment did not improve symptoms and after referral to pain specialists, AFP was diagnosed. Detailed information about the exact symptoms of the patient at initiation of RCT are unknown. Potentially, with proper differential diagnosis, RCT of the teeth could have been avoided. However, correct diagnosis of dental and orofacial pain can be a complex and challenging task.

Conclusion & Clinical Relevance

In order to prevent incorrect treatment or overtreatment in cases of orofacial pain, it is important to know about possible odontogenic and non-odontogenic origins of orofacial pain and to obtain an accurate pain history and to perform proper diagnostics. The role of the dentist is to diagnose and if necessary to treat disorders of the oral cavity and masticatory structures. If a non-odontogenic cause of pain is suspected, an interdisciplinary consultation should be carried out.

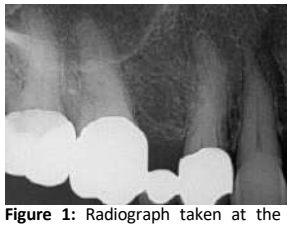

Figure 1: Radiograph taken at the patient's first visit at the DPOPD. RCT has been initiated on teeth #14 and #16 two months before by the patient's dentist (not visible due to cast metal restorations)

Figure 2: Teeth #14 and #16 immediately after removal of the temporary filling and rinsing with NaOCl at the patient's first visit

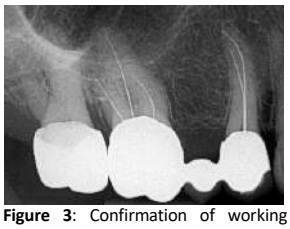

Figure 3: Confirmation of working length

Figure 4: Confirmation of master cone fit

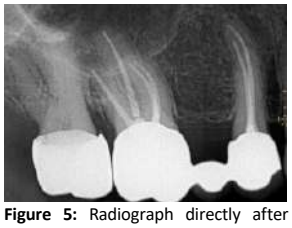

Figure 5: Radiograph directly after obturation

Figure 6: Radiograph at 6-month recall

Non-Surgical Root Canal Treatment of Dens Invaginatus Type II in a Maxillary Lateral Incisor

CP47

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Aim

The aim of this case is to describe the clinical management of a type II dens invaginatus in a maxillary lateral incisor.

Introduction

Dens invaginatus (DI) is one of the most prevalent developmental anomalies. The widespread classification of DI was described by Oehlers in 1957. In type II cases, the invagination extends into the root but remains within the anatomy of the root without communication with the periodontal ligament (PDL) (1).

Case Presentation

A 15-year-old girl was referred for treatment of maxillary left lateral incisor. Clinical examination revealed a peg shaped lateral incisor.
Radiographic examination revealed an apical radiolucency and a complex root anatomy (Fig1). The tooth was diagnosed with pulp necrosis with asymptomatic chronic apical periodontitis. Further examination with CBCT revealed DI type II (Fig 2,3).


Figure 1


Figure 2


Figure 3

The treatment plan was to perform non-surgical root canal treatment. After rubber dam isolation and gaining access into the invagination, an empty sac lined with pitted enamel was found without apparent communication to the pulp canal. Access to the root canal was established through this invagination using a dental microscope and long neck burs.

Mechanical preparation with hand files was complemented by irrigation with 1% sodium hypochlorite (NaOCl) , 17% EDTA and 5% iodine potassium iodide solution. Calcium hydroxide paste was applied between the visits.
After 4 weeks, the canal was obturated by gutta-percha and EndoSequence BC™ sealer (Brasseler, Savannah, USA) using warm vertical and continuous wave techniques (Fig 4).


Figure 4

Discussion

Standardization of treatment approach is not possible in complex cases and may not be applicable to different root canal anatomy. Therefore, anatomy-based planning based on CBCT is essential to plan the access preparation and treatment strategies.

Removing the invagination entirely may facilitate the treatment. However, the invagination in this case was maintained to avoid further weakening to the remaining tooth structure.
The very complex anatomy may require supplementary disinfection steps after chemo mechanical procedures, including activation of NaOCl by ultrasonic means and interappointment intracanal medication.

In order to obturate the canal and the invagination, a thermoplasticized technique can be used for better filling of the anatomic irregularities. The invagination may alternatively be filled with bioceramic materials. In this case both techniques were used in order to achieve obturation of the entire pulp space (2,3).

Conclusion & Clinical Relevance

Despite the complex anatomy of dens invaginatus, non-surgical root canal treatment can be performed successfully with judicious treatment planning and the proper selection of materials and techniques.

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CP48

MANAGEMENT OF A HORIZONTAL ROOT FRACTURE WITH BIOCERAMIC OBTURATION.

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AIM

The aim of this study is to investigate the possibility of treating a horizontal root fracture with bioceramic cements.

INTRODUCTION

The management of horizontal root fracture depends on the location of the fracture and mobility and the vitality of the tooth. Fractures in the apical third usually display no mobility and generally do not require any treatment. Root fracture at the cervical third often requires extraction. When the coronal fragment shows severe mobility, there is no other option but extraction.

Proper clinical and radiographic examination is required for correctly diagnosing root fracture. A clinician must check for mobility of the coronal fragment and the pulp vitality. Radiographically, a radiolucent line is seen separating the apical and coronal fragments

CASE PRESENTATION

In the present case a 50 years old woman came to the office, with pain during chewing and grade 2 mobility on the first upper premolar. Radiographically, a radiolucent line was seen separating the apical and coronal fragments. Vital pulp testing provided negative response. After explaining the treatment plan to the patient and obtaining his consent, endodontic treatment was initiated. The working length was correctly determined and canals were cleaned and shaped using Ni-Ti rotary files (EdgeTaper Platinum). Irrigation was performed with 0,5% sodium hypochlorite to avoid complications due to irrigant extrusion through the fracture. Since canals were dried (without significant presence of blood or exudate) it was decided to complete the treatment in a single visit and immediately restore and temporarely splint the tooth. Canal obturation was performed using a cold hydraulic technique using a guttapercha cone and a new bioceramic sealer (Direct Bioceramic Sealer). Splint was removed after two weeks. A 3 and 6 months follow up shows no signs of periapical lesion. Tooth is stable (no mobility), asymptomatic and regain optimal functionality.

DISCUSSION

The main aim of treating fractured elements is to keep the tooth steady and maintain its position in the dental arch whenever possible. The use of bioceramic cements can improve the long-term prognosis of horizontally fractured teeth thanks to the osteoinductive properties of the cements themselves and the possibility of obtaining a seal even in a humid environment.

CLINICAL RELEVANCE

This case shows how the treatment of a horizontal root fracture with a bioceramic cement has ensured stability of the element over time, the disappearance of symptoms and radiographic signs, and therefore can be a good option in the treatment of these cases.

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CP49

AN INNOVATIVE CLINICAL APPROACH TO MANAGEMENT OF COMPLEX CURVATURES

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MIMERACI

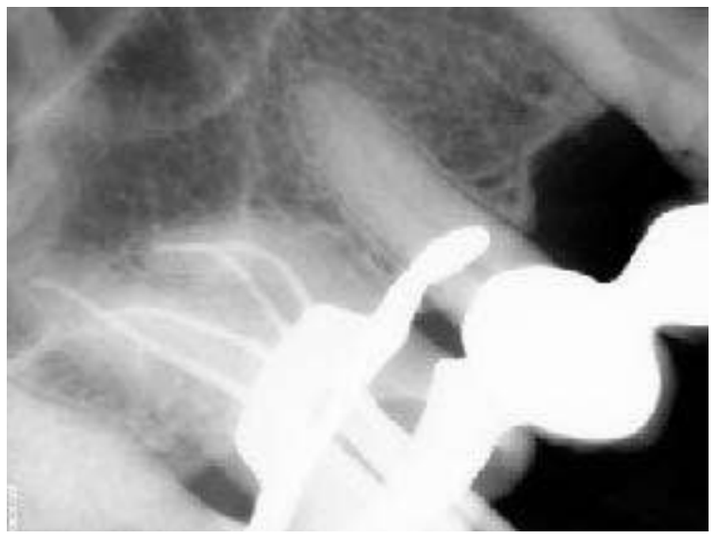
1. MI = Manual Insertion
2. ME =Minimally Engage
3. R = Remove from canal
4. AC = and Clean flutes
5. I = Irrigate root canal

Repeat steps 1-5 until WL is reached

AIM To present a new technique and new instruments for easier and safer management of complex curvature

METHODOLOGY In the last decade, new martensitic, heat-treated, nickel-titanium (NiTi) rotary instruments have been commercialized, to improve safety and efficacy of canal preparation in complex curvatures . The new Edge Taper Blaze Utopia instruments (Edge Endo Albuquerque, New Mexico) are produced using a proprietary heat treatment, that increases both flexibility and resistance to flexural stresses, while maintaining high torsional strength and cutting efficiency, with a tougher ,more resilient blade. In addition to these favorable characteristics, performance and safety can be increased using a dedicated clinical approach: the MIMERACI technique. MIMERACI acronym which stands for :MI = Manual insertion, ME = Minimal Engagement, R = Remove (instrument from canal) AC = And Clean flutes I = Irrigate. The rationale of the technique is to avoid to immediately progress into the canal, increasing the risk of overengagement and screwing-in effect, which may result in iatrogenic errors and/or intracanal deformation/breakage of the rotary files: ideally the NITI rotary instrument should progress slowly (maximum 1-2 mm advancement, or 1-2 sec) inside the canal, and immediately after short progression they must be removed from the canal, and flutes clean from debris while canal is irrigated. By doing so, the NITI rotary instrument is never overengaged and overstressed, also in severe curvatures. Moreover the limited amount of cutting produces less debris, and most of them are entrapped within flutes. Therefore they are more efficiently removed “outside“ the canal by cleaning flutes with a sponge, reducing the risk of canal blockage. An additional benefit is a more copious and frequent irrigation, The described steps are repeated till the instrument reaches the working length.

CLINICA RELEVANCE A correct combination of new highly-performing instrument and MIMERACI operative technique can allow safe, easy and predictable root canal shaping procedures , as shown by the cases presented in the poster.



TOOTH AUTOTRANSPLANTATION : Myths or Realities ?

CP50

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Aim

To present teeth autotransplantations as an uncommon surgical technique in the management of dental inclusion in children.

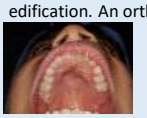
Introduction

Tooth transplantation is a surgical treatment of extracting a tooth (donor site) and transplanting it into recipient site within the same individual. This procedure has proven good success rates 96.6% when is well conducted. Nevertheless, it's not widely practiced. Particularly in front of young people, this therapeutic option can be treatment of choice.

Case Presentation

Case 1 :

A 7 years-old boy, addressed to our department for managing a radiolucent lesion associated to tooth 21. Reimplantation of the germ of 21 after enucleation of the cystic lesion was done immediately. Good evolution was notified with eruption of the 21 and root edification. An orthodontic treatment was preformed after 18 months.



Uprised upper lip, persistance of tooth 61 (geminated)

Mucosal incision and flap detachement

Reimplantation of the germe of tooth 21 after enucleation of cycstic lesion

CT-Scann images : Well limited radiolucent lesion of anterior maxilla, lesion was associated to tooth 21 wich was repressed.

Panoramic X-ray after 6 months

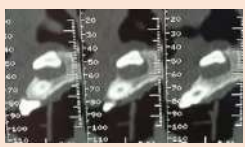
Endobucal view : Clinical evolution of tooth 21 and 22 (after respectively 12 months – 18 months – 2 years)

CBCT after one year : radicular evolution of the germe 21

Retroalveolar radiography : root edification, periodontal ligament well defined

Case 2 :

A 14 years-old boy, addressed to our department for managing a delayed eruption of tooth 11 with a mesiodens in its site. A radiolucent lesion associated to tooth 11 was noticed on the CT-scann. Reimplantation of tooth 11 after enucleation of the cystic lesion and extraction of the mesiodens was done immediately. Endodontic treatment was made after 15 days. Good evolution was notified after 3 years follow-up.



CT-Scann images : Well limited radiolucent lesion associated to tooth 11 wich was repressed under nasal cavity.

Retroalveolar radiography : Immediately after reimplantation and immobilization

Retroalveolar radiography : after 3 years follow-up

Discussion

Tooth autotransplantation could be a good alternative when a suitable donor tooth and recipient site ware available. Several factors affect the prognosis (Root edification – healing of periodontal ligament cells – extra-oral time – bone support on the recipient site…) Good prognosis depends on vitality of cells attached to the root surface, gently extraction and fast reimplantation are the key points for success.

Conclusion & Clinical Relevance

Autotransplantation is a good therapeutic solution to included teeth and presents a compromise in terms of aesthetics, price, and osteo-integration especially in the case of a pediatric patient for whom implant treatment or prosthetic dentistry are not possible.

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CP51

ALTERNATIVE TREATMENT PROCEDURES OF A PERMANENT TOOTH WITH INCOMPLETE ROOT DEVELOPMENT AND PERIAPICAL LESION

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European Society of Endodontology

Aim: To present a case of possible treatment for the teeth with incomplete root formation and periapical lesion.

Introduction: There are three main treatment options for immature, permanent teeth with infected root canal systems and open apices. These include calcium hydroxide apexification techniques, apical barrier techniques and regenerative endodontic procedures (1). This case report presents regenerative endodontic procedure failure and further management.

Case Presentation / Methodology: A sixteen-year-old male patient with a history of trauma was referred to our clinic. In clinical evaluations, extraoral examination showed no facial asymmetry or swelling. Upper left central incisor (#21) was asymptomatic and did not respond to sensibility tests. The radiographic examination revealed incomplete root formation with periapical lesion. A cone beam-computed tomographic (CBCT) image was taken to confirm the presence of open apex associated with periapical pathosis **(Fig. 1)**. A decision was made to try regenerative endodontic procedure.

A written informed consent was obtained. After buccal infiltration of non-vasoconstrictor containing anesthesia, the rubber dam was placed, and the temporary filling was removed. The working length was determined radiographically. Regenerative endodontic protocols are applied in accordance with *'European Society of Endodontology revitalization procedures'* on two visits. (2)

At second visit, Biodentine (Septodont, Saint-Maur-des-Fosses, France) was used as a coronal biocompatible barrier. The tooth was restored with composite resin at the same visit **(Fig. 2a)**.

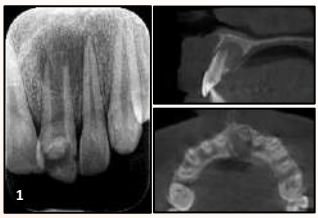

Fig 1: pre-op radiographs

Fig 2: (a) post-op, (b) 3 months, (c) 6 months, (d) 1 year follow-up

At one-year follow-up, radiographic examination revealed no signs of dentine wall thickening nor periapical lesion healing **(Fig. 2d)**, in intraoral examination there was a sinus tract related to the tooth **(Fig. 3)**. The regenerative procedure was considered unsuccessful, so a decision was made to do an alternative endodontic therapy.

The patient was anesthetized locally (2% lidocaine with 1:80.000 adrenaline) then rubber dam was placed, composite restoration and Biodentine plug were removed. Drainage was obtained through the root canal **(Fig. 4)**. $Ca(OH)_2$ was placed into the canal then the access cavity was sealed with temporary restoration. The upper left lateral incisor (#22) response negatively to electrical and thermal pulp tests with no periapical pathosis shown in radiograph. A single-visit root canal treatment was performed.

Three weeks later, $Ca(OH)_2$ was washed out by NaOCl irrigation, the canals were dried and approximately 4 mm of MTA (ProRoot MTA, Dentsply, Tulsa, OK) was placed at the apex. The root canal was filled using warm gutta-percha obturation technique. The tooth was restored with composite resin **(Fig. 5)**.

A surgical approach after endodontic treatment was planned. The operating field was anaesthetized with 2% lidocaine with adrenaline. A full-thickness mucoperiosteal buccal flap was raised. The granuloma or cyst was removed from the periapical area, curettage was done and MTA in apex was adjusted. The cavity was washed by saline solution. The flap was repositioned and sutured. **(Fig. 6)**.

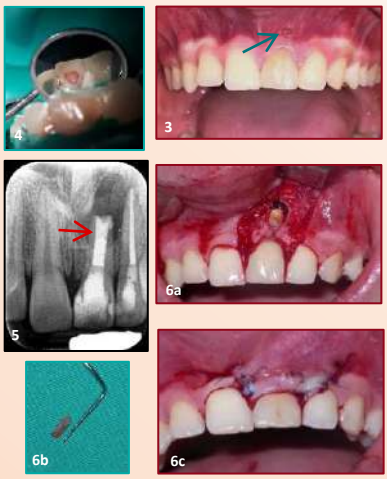

Fig 3: sinus tract related to tooth #21, **Fig 4:** drainage through the root canal
Fig 5: root canal obturation with MTA & warm gutta-percha,
Fig 6: endodontic surgery

Discussion: The main causes of revascularization/ revitalization therapy (RRT) failures are inadequate control of the infection and root resorption after the therapy (3). Infection prevents regeneration, repair, and stem cell functions. It is questionable that the current root canal disinfection protocol of revascularization/revitalization procedures that lacks mechanical debridement of biofilm on the canal walls is able to effectively eliminate most intracanal bacteria *in vivo* (4).

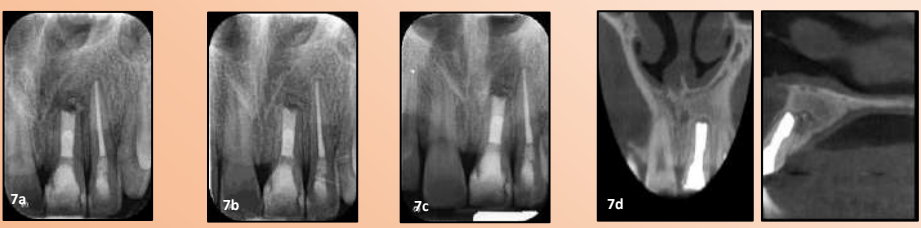

Fig 7: (a) 6 months, (b) 1 year, (c) 2 years follow-up, (d) 1 year CBCT

Conclusion & Clinical Relevance: To achieve successful results of the regenerative endodontic treatment procedure, case selection, and a long-term follow-up are considered to be very important. Whenever regenerative endodontic procedures fail, alternative treatment options should be considered like MTA plug placement and endodontic surgery.

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A second mandibular premolar with Dens Invaginatus and obliteration of the pulp chamber: a diagnostic and treatment challenge.

CP52

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Aim

Describing Dens Invaginatus (DI) as a complicator of diagnosis and treatment.

Introduction

DI in mandibular premolars has been reported scarcely. It's a potential pathway for microbe invasion. Obliteration and pulp necrosis are possible consequences. CBCT can be used as a diagnostic, operative, and guidance tool (1).

Case Presentation

A 21-year-old healthy patient was referred due to pain in the area of tooth number 45. The tooth did not respond to a cold test (TFE), was negative to percussion, and positive to palpation. The occlusal surface was restored with a composite restoration (Fig. 1). Periapical (PA) radiograph demonstrated periapical radiolucency, obliteration of the pulp chamber, and a radiolucent round area in the distal part of the crown (Fig. 2). CBCT scan was performed due to suspected complex morphology (Fig 3). DI type 1 (2) was observed. Diagnoses were: Pulp Necrosis, Symptomatic Apical Periodontitis.

Pre-operative access planning was based on frontal and axial CBCT scan measurements (Figs 4a, 4b).

The treatment was initiated by the elimination of the DI, followed by an X-ray in order to guide the drill in the proper direction related to the root canal (Figs 5a, 5b). The treatment consisted of two visits utilizing FKG XP Endo Finisher, Sodium Hypochlorite 3%, EDTA 17%, and Calcium Hydroxide medication for two weeks. Obturation by Gutta-percha and epoxy sealer (BJM) using the combination technique (Fig 6).

Discussion

In this specific case CBCT scan in comparison to guided endodontics, served as a low-cost planning guided tool. Elimination of the minor DI and access to the canal through the obliterated pulp chamber were successful.

Conclusion & Clinical Relevance

CBCT scans enable proper diagnosis, treatment planning, and operation guidance in cases with complex morphology.

Fig 1

Fig 2

Fig 3

Fig 4a

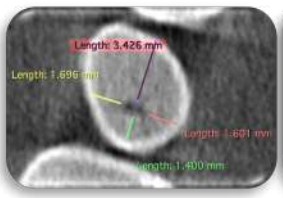

Fig 4b

Fig 5a

Fig 5b

Fig 6

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Separate apical root formation of traumatized immature permanent teeth under the persistent inflammation

CP53

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Aim

This report provides clinical evidence of the capability of the apical papilla(AP) of immature permanent teeth under an inflammatory environment.

Introduction

Mesenchymal tissue of the AP, which comes in contact with the inner layer of Hertwig's epithelial root sheath (HERS), is differentiated into odontoblasts, and then radicular dentin is formed. When it is damaged under trauma, infection, or iatrogenic factors, however, normal root formation may be disturbed.

Case Presentation

A 6-year-old girl had a laterally luxated injury on tooth 11. The tooth was repositioned and splinted at a local clinic (Fig 1A), and a one-visit apexification with a mineral trioxide aggregate (MTA) was performed (Fig 1B). However, a sinus tract formed, and periapical radiolucency was observed around the apical area 3 months after the treatment (Fig 1C).

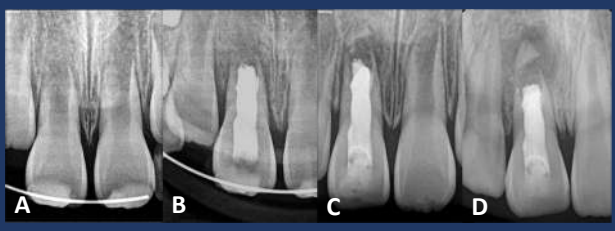

Fig 1

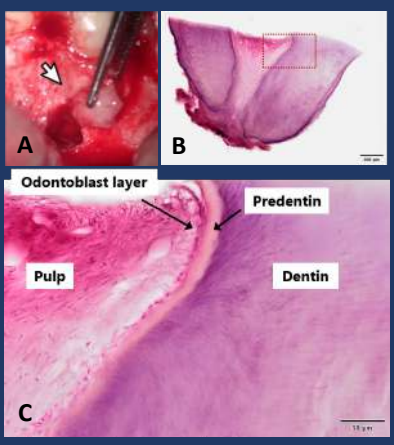

Fig 2

At 3 years after treatment, the patient was referred to our clinic. Tooth 11 showed tenderness upon percussion and revealed periapical radiolucency with a radiopaque material partly away from the main root in the radiograph (Fig 1D). Considering the difficulty of accessing the apical area by orthograde approach, endodontic microsurgery was planned. During the surgery, hard tissue was detected in the bone cavity and taken out (Fig 2A). Histological analysis of hard tissue showed a typical root tip with pulp tissue in the canal with the foramen (Fig 2B).

In the magnified image, a normal root structure was observed with the pulp tissue, odontoblast layer, predentin, and dentin with dentinal tubules (Fig 2C). Endodontic microsurgery was completed as usual, the tooth healed completely 1-year after the surgery (Fig 3A and B).

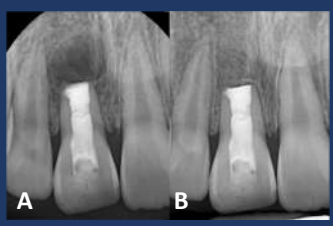

Fig 3

Discussion

Continuous root tip development occurred in the immature permanent tooth even under 3-year inflammatory conditions. This phenomenon may be elucidated by the unique features of the apical papilla (AP), which is less susceptible to pathological events and has a structure with its own vascular network and innervation.

Conclusion & Clinical relevance

The capability of AP is an important basis for performing the regenerative endodontic treatment in immature teeth having necrotic pulp and apical periodontitis. This case report is representative clinical evidence. Understanding the capability of AP could help with treatments, such as regenerative endodontic procedures and trauma management for immature permanent teeth.

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CP54

Surgical removal of separated endodontic instrument from peri-apex– case report

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Medical University of Lublin, Poland

Aim

Proper management of endodontic therapy in case of intracanal instrument separation during root canal treatment with its following displacement to the periapical region.

Introduction

Fractured instrument may influence the outcome of endodontic therapy. Possible treatment options like file removal, bypassing or leaving *in situ* depends on file localization and length, stage of the treatment and presence of periapical lesion. Therapy including surgical procedures remains an alternative option.

Case Presentation

A 58-years old female patient with a chief complaint of dull, aching pain and swelling in relation to her mandibular left central incisor was reffered to the Department of Conservative Dentistry with Endodontics for root canal treatment and fractured instrument removal. Radiographic examination showed separated instrument in tooth 31 and periapical radiolucency at tooth apex. Further investigation of tooth 31 revealed a presence of 2 canals inside one root (buccal with separated instrument and lingual nontreated). Two-visit endodontic treatment including by-passing fractured instrument, desinfection and obturation of two canals with warm vertical condensation was performed. At second appointment all pain symptoms disappeared and investigation and radiograph examination showed broken segment displacement into periapical tissue. (fig.1). Surgical treatment with instrument removal from periapex was performed after root canal treatment (fig. 2). One-year recall showed effectiveness of the root canal treatment: no complains and periapical lesion healing. Radiograph demonstrated complete healing of the periapical radiolucency with no clinical signs or symptoms (fig.3).

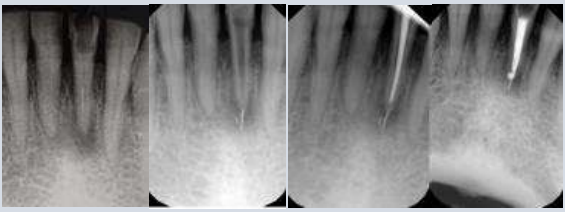

Fig. 1

Fig. 3

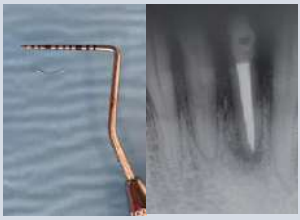

Fig. 2

Discussion

Untreated intracanal space left beyond separated endodontic file may result in a periapical lesion development or in case of the lesion presence – disturbances in healing. Appriopriate approach should be considered based on potential benefits of removal in comparition to risk of complication.

Canal patency, effective desinfection and compact, hermetic obturation result in peri-apex pathology healing. Foreign body from peri-apex can be removed in surgical approach soon after completing RCT.

Conclusion & Clinical Relevance

If management of separated instrument is performed properly, root canal treatment may result in successful endodontic therapy even with complex tooth morphology and difficult clinical approach. Conventional root canal treatment with its achievements: canal patency, effective desinfection and hermetic obturation restrains intracanal infection and promotes periapical healing. Surgery approach including foreign body removal may be considered after completion of RCT.

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CP55

The Prognosis of Horizontal Root Fractures in Teeth Following Dental Trauma

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Aim

The purpose of this case series is to assess and present favorable clinical and radiological outcomes in cases of horizontal root fractures in permanent teeth. The evaluation focuses on the healing of the pulp, periodontium, and fracture without the need for endodontic treatment.

Introduction

Root fractures are fractures that involve dentine, cementum, and pulp, and they account for only 0.5-7% of all dental injuries[1]. Horizontal root fractures are classified based on the location of the fracture line (apical third, middle third, cervical third of the root) and the degree of dislocation of the coronal fragment. Research suggests that long-term splinting results in hard tissue healing more frequently than short-term splinting, whereas short-term splinting results in more connective tissue/bony healing compared to long-term splinting[1].

Case 1

A 16-year-old female suffered a dentoalveolar injury two weeks prior after falling from a 2-meter-high wheel during acrobatics training. The teeth received fixation using an existing orthodontic device (fig. 1,2). Clinical examination showed minimal mobility, tenderness to percussion and palpation, normal shade, and negative sensibility tests in teeth #41 and 42. Radiographic examination revealed multiple root fractures in tooth #42. Follow-up was performed per IADT guidelines, and after 9 months, teeth #41 and 42 had normal mobility and positive pulp sensitivity, with the splint removed at that time. Positive pulp sensibility persisted until the 18-month clinical and radiographic follow-up (fig. 3).

Case 2

A 15-year-old male with recent dentoalveolar trauma was treated in the emergency room and given a semirigid splint. Tooth #11 showed tenderness to percussion and palpation and a positive sensibility test. Radiographic examination revealed a horizontal root fracture in the coronal third of the tooth (fig. 4). Follow-up was performed per IADT guidelines, and after 4 months, tooth #11 mobility was normal and the splint was removed. Tooth #11 showed positive pulp sensibility and healing with hard tissue at the 1-year follow-up (fig. 5).

Case 3

A 35-year-old male with a dental injury during Thai boxing was referred to the Department of Endodontics. Tooth #21 was splinted and presented tenderness to percussion and palpation, normal shade, and negative sensibility tests. Radiographic examination revealed a horizontal root fracture at the middle to cervical thirds of the root (fig. 6-7). After 4 months, the tooth's mobility was normal, and the splint was removed. Tooth #21 showed positive pulp sensibility and healing with soft and hard tissues until the last follow-up, 18 months after the trauma (fig. 8).

Discussion and Conclusion

Andreasen et al[2] have identified four types of responses of teeth and associated tissues to root fractures: (1) healing with hard dental tissue, the ideal response, (2) healing with connective tissue, (3) healing with bone and connective tissue, and (4) no healing, where granulation tissue forms due to pulp necrosis and infection[3]. The long-term prognosis for tooth loss depends on the type of healing and the fracture's location. Discoloration and loss of sensibility do not necessarily indicate pulp necrosis; only 25% of teeth with root fractures develop this condition, according to Andreasen[4].

Figure 1

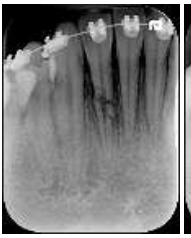

Figure 2 Figure 3

Figure 4 Figure 5

Figure 6

Figure 7 Figure 8

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Calcium Silicates from Apex to Orifice in Weak (Tooth), Thin (Root) and Open (Apex): A Case Report

CP56

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Aim

To predictably manage a weak necrotic tooth with thin root and open apex by filling the entire root canal space with calcium silicate based cements (MTA).

Introduction

Calcium Silicate based cements have been used for more than three decades for various endodontic procedures. Beside it is biocompatibility, MTA obturation has advantage in challenging cases due to its high saleability and antimicrobial activities.

Case Presentation

A 27 years old male patient makes his first time visiting to a dental office. The patient presented with multiple badly destructed teeth with extensive caries lesions (fig. 1). A full arch rehabilitation was planned. Clinically tooth number 12 showed big carious lesion with pathologically pulp exposure (fig. 2). In addition, radiographically the periapical x-ray showed thin root walls with open apex and large periapical lesion (fig. 3).

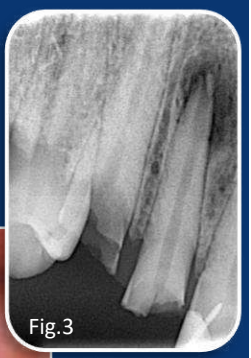
Fig.3


Fig. 2

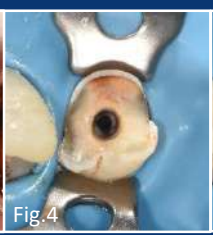
Fig.4


Fig.6


Fig.7

Non-surgical root canal treatment was performed under rubber-dam isolation (fig. 4). The entire root canal space was filled with MTA after thorough cleaning and disinfecting protocol have been followed (fig. 5). Metal post cemented with glass ionomer cement, the built up has carried out using preheating resin composite. Then, vertical tooth preparation was performed for receiving a definitive monolithic zirconia crown (fig. 6-8). The nine months follow up was shown stable periodontium and functional crowns without symptomatic conditions (fig. 9 & 10). The periapical radiograph shows a satisfied healing with sign of apex closer (fig. 11).


Fig.5


Fig.1


Fig.8


Fig.9


Fig.10

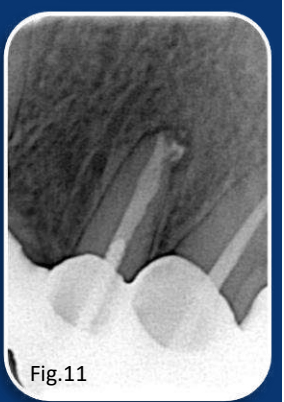
Fig.11

Discussion

MTA could be used to fill the entire root canal space in thin roots with open apex. This was considered to be a predictable material comparing to the gutta percha since MTA binds to the dentinal walls and expands upon setting in addition to its antimicrobial and bioactive affect.

Conclusion & Clinical Relevance

MTA is a reliable and superior material to be used in sealing open apex, and increase resistance to root fracture in weak roots and enhance apical closure in open apex.

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Crown Dilaceration of a Permanent Lower Incisor Due To Trauma

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3. Professor, Department of Endodontics, NKU, Athens

CP57

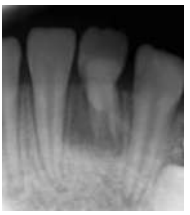
SHEDDING NORTHERN LIGHTS ON ENDODONTICS
HELSINKI 6-9 SEP. 2023 ese

Patient: 10-year-old boy
Dental History: Trauma of primary dentition, causing crown dilaceration of the permanent tooth
Clinical Examination:

- Sensibility tests -
- Percussion +
- Palpation+

Radiographic Examination:

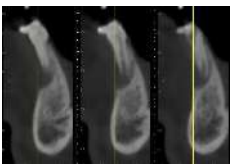
- Immature root apex
- Large periapical lesion

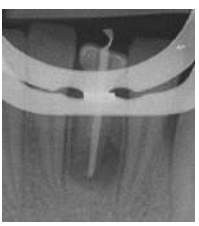


Diagnosis:

- Pulp necrosis due to trauma
- Chronic apical periodontitis

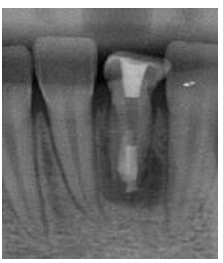
Treatment: Orthograde r. c. treatment
Prognosis: Questionable

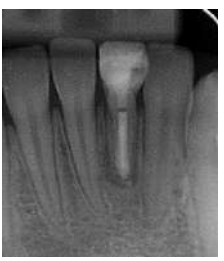




1st Visit

- Anesthesia,rubber dam placement
- Access cavity preparation (lingually)
- WL 16mm
- Minimal instrumentation
- Cleaning (NaOCl 2,5 %, EDTA 17%)
- Apical gauging #70
- Ca(OH)2 placement for 2 weeks





2nd visit

- Sinus tract healed
- Collagen plug, 5 mm apical plug with MTA (Angelus®)
- Backfilling with injectable thermoplasticized gutta-percha
- Composite resin restoration
- Recall: One year later , asymptomatic tooth, periapical tissue healing.

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CP59

HEALING OF PERIRADICULAR LESION AFTER REMOVAL OF SEPARATED ENDODONTIC INSTRUMENT AND ROOT PERFORATION REPAIR

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Aim

To present a successful endodontic treatment of a mandibular molar with a fractured endodontic instrument, root perforation and periradicular lesion.

Introduction

Fracture of endodontic instruments and lateral root perforations, which occur during therapeutic procedures, could be significant cause of treatment failures. These operative complications prevent optimal shaping and cleaning of the canal system and induce loss of dentine and adjacent tissues integrity.

Fig 1 Pre-operative radiograph

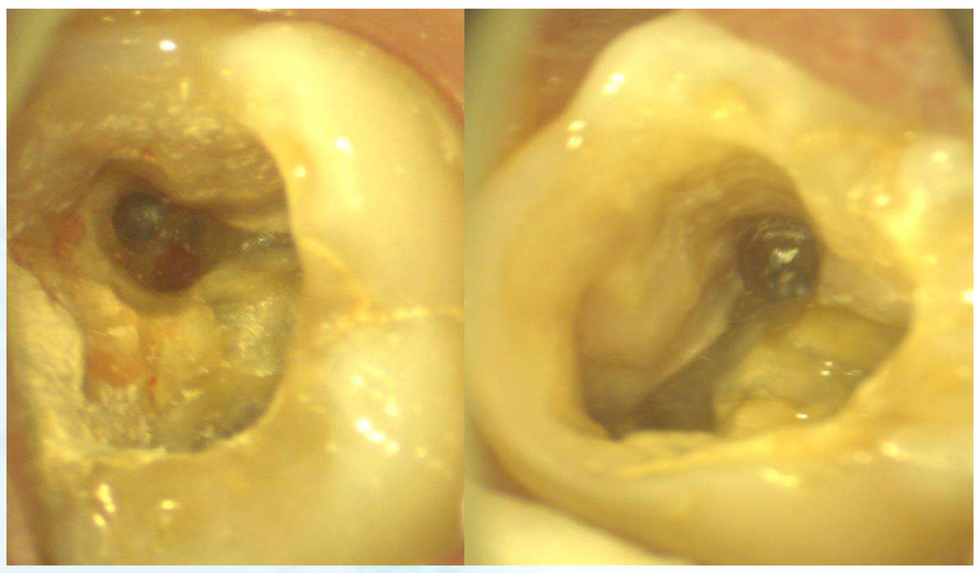

Fig. 2 a) Perforation defect; b) separated endodontic instrument

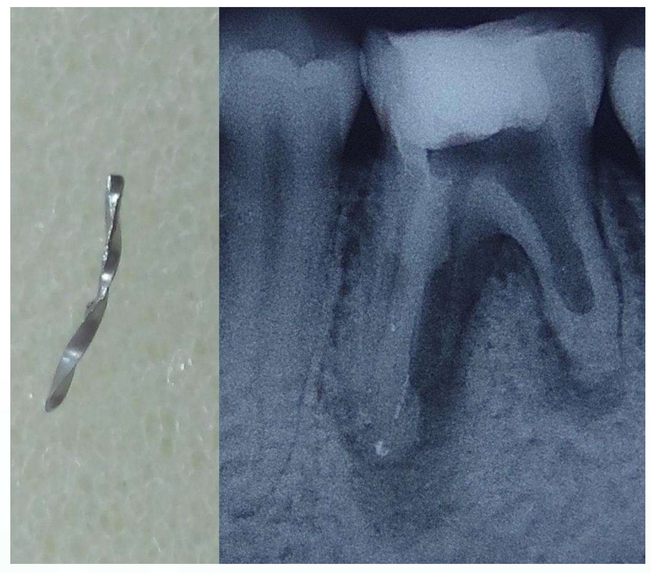

Fig. 3 Radiograph after file removal

Case presentation

A 23-year-old male patient was referred to our department for endodontic retreatment of right mandibular first molar. Patients' medical history was noncontributory and he was symptom free without sensitivity to percussion or palpation. Periapical radiograph showed periapical lesion around mesial root apex extending along its distal side and periapical lesion around distal root. Additionally, radiograph revealed approximately 4 mm long fragment in the middle and apical canal thirds whose appearance suggested that it might be a fractured endodontic file (Fig. 1). After accessing the cavity through composite restoration, previous gutta-percha filling was removed from the root canals using Gates–Glidden burs and hand K-files. There was a block in mesio-lingual canal while the distal wall of mesio-buccal canal had a perforation defect (Fig. 2a). Straight-line access was improved in order to achieve good visibility and enable adequate access for endodontic ultrasonic tip (Fig. 2b). Additional visibility was obtained using dental microscope magnification (40x) that allowed application of ultrasonic vibrations to the coronal aspect of the broken file and its removal. Fragment removal was radiographically confirmed (Fig. 3). Perforation site in mesio-buccal canal was sealed using calcium silicate-based material inserted by a hand instrument and condensed by a plugger (Fig. 4). In subsequent visits four root canals were instrumented using rotary files and medicated with calcium hydroxide. Following obturation with a gutta-percha cone and epoxy resin-based endodontic sealer, radiograph was taken to assess canal filling quality (Fig. 5). After three years, control clinical and radiographic examination, showed satisfactory result and healing of periradicular lesions (Fig. 6).

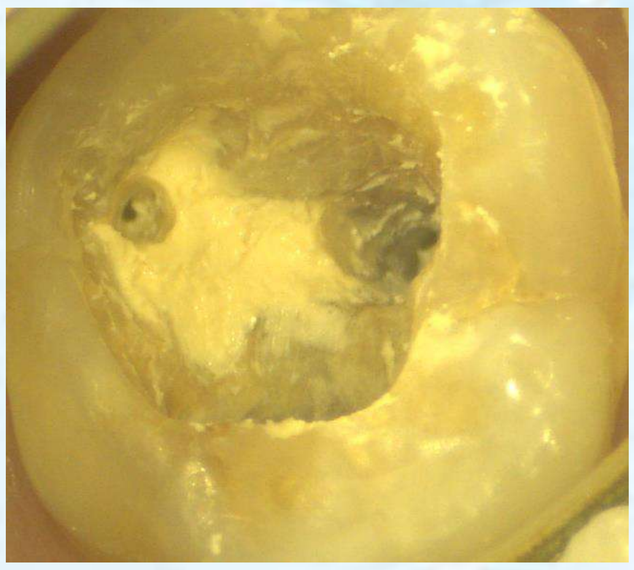

Fig. 4 Perforation defect repair

Fig. 5 Post-obturation radiograph

Fig. 6 Control radiograph after three years

Discussion

Successful treatment of existing periapical lesion requires appropriate access to endodontic space and removal of a fractured instrument as a prerequisite for desirable outcome. Our case was additionally complicated with root perforation that can influence treatment outcome depending on location, size or time of the accident. Calcium silicates are widely accepted as perforation repair materials of choice as they provide an effective, long-lasting seal.

Conclusion & Clinical Relevance

Removal of a separated endodontic instrument could be a challenging process during which it is not always possible to preserve original shape of endodontic space. Conservative retrieval approach that minimizes damage to the dentine wall should always be the first treatment option for teeth with a fractured instrument. Root perforations significantly raise the difficulty degree of endodontic therapy but optimal operative technique and calcium silicate-based materials improve prognosis and predictability in these cases.

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CP60

The effect of photobiomodulation of salivary glands on caries risk factors in patient with acute lymphoblastic leukemia and chronic graft versus host disease – a case report

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Aim: to clinically applicate the advances of research regarding photobiomodulation as an additional therapy for patients with high caries risk caused by salivary gland disfunction.

Introduction: Chronic graft versus host disease (cGVHD) often affects patients after allogeneic hematopoietic stem cell transplantation as the therapy of hematologic disease. In cDVGH many organ systems are affected, including the oral cavity and salivary glands. Saliva has with its secretion rate, its quality and quantity a major role in caries process. Because of its buffering capacity and the ability to neutralize acids, a simple supporting intervention such as stimulating salivary production can help in prevention of caries. Photobiomodulation (FBM) is one form of phototherapy using low energy light. The wavelengths of light used in FBM range from 400 to 3400 nm, and the irradiated power densities range from 1 mW/cm2 to 5 W/cm^2. FBM causes absorption of light in the chromophores of irradiated cells, thereby increasing cellular metabolism and improving tissue immune response.

Case Presentation: The 29-year-old patient was included in our prospective study, between 2019 and 2020. He was diagnosed with acute lymphoblastic leukemia (ALL) 1 year ago, treated with chemotherapy and biological drugs and, due to failure, the treatment was continued with radiotherapy and 3 months after the diagnosis also with the allogeneic bone marrow transplant. This was followed by treatment with immunosuppressants (cyclosporine), which ended 3 months before the start of our research. Due to the treatment of the original disease, the patient developed cGVHD which also affected the skin, oral cavity and salivary glands. He reported problems with dry skin and dry mouth, lack of saliva, white discoloration of the tongue, tooth sensitivity during chewing, and an increased amount of dental plaque. During the clinical examination, we noticed markedly dry facial skin, dandruff, dried, cracked and reddened left corner of the mouth and gingivitis in the upper transcanine sector on the left and right sides. We instructed the patient not to eat or drink, smoke, rinse his mouth or brush his teeth 1 hour before the examination, and not to use antimicrobial mouthwashes at least 12 hours before. Then, using salivary tests, we evaluated the flow of unstimulated and stimulated saliva, the pH value of unstimulated and stimulated saliva, the buffer capacity (pK) of stimulated saliva and also semi-quantitatively evaluated the density of bacterial colonies (colony-forming unit (CFU)) of *Lactobacillus* and *Streptococcus mutans* in stimulated saliva (Table 1). According to the established protocol, the patient was irradiated with LED flashing light (wavelengths 625, 660 and 850 nm and average power 16 mW/cm^2, Ortholumm ML5/1, Votan d. o. o., Ljubljana, Slovenia) 3 times a week, for 4 consecutive weeks on three face regions (Figure 1): extraorally bilaterally over the parotid and submandibular glands for 10 minutes and intraorally over the sublingual glands for 5 minutes, a total irradiation time of 25 minutes. At the follow-up examination, which was performed immediately after completion and 3 months after the completion of therapy, we evaluated the same parameters as at the first examination (Table 1).

Discussion: In the clinical case described, the following investigated parameters improved after FBM therapy: the number of *Streptococcus mutans* bacteria colonies in saliva and the pH values of unstimulated and stimulated saliva. It is necessary to conduct the research on a large sample size in order to determine the radiation protocol.

	U salivary flow rate (mL/min)	pH of U saliva	S salivary flow rate (mL/min)	pH of S saliva	buffer capacity of S saliva	*Lactobacillus* (CFU/mL)	*Streptococcus mutans* (CFU/mL)
before therapy	0,17	6,32	0,82	7,01	high	10^6	10^4
after therapy	0,19	6,89	0,83	7,21	high	10^6	10^3
3 months after therapy	0,16	7,13	0,49	7,13	high	10^6	10^3

Table 1: Values of salivary parameters measured with salivary tests (U-unstimulated saliva, S-stimulated saliva)

Conclusion and Clinical Relevance: In the patient, after 4 weeks of FBM therapy with flashing LED light, the number of *Streptococcus mutans* bacteria colonies and the pH value of unstimulated and stimulated saliva decreased. This reduced the influence of cariogenic factors and thus the risk, or rather the probability, of the occurrence of caries. As a consequence it can also indirectly reduce the risk for dental pulp pathology.

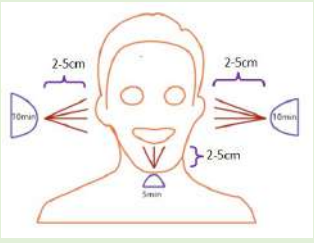

Figure 1: The established protocol of irradiation.

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CP61

Strategies for the Management of Large Periapical Lesions

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INTRODUCTION

Large periapical lesions are classified as being greater than 10mm in diameter.[1] The treatment of large periapical lesions can prove difficult due to long-standing infection and inability to dry the canals.[1] These lesions are generally asymptomatic and can grow slowly in size over many years usually following dental trauma.[1] Treatment modalities range from non-surgical endodontic therapy with or without endodontic surgery to tooth extraction.

AIM

The aim of this poster is to demonstrate the various treatment strategies and provide a decision-making algorithm for the management of large periapical lesions.

STRATEGY 1: Orthograde RCT Only (Webber Technique)

PC: Concerned by the discolouration of tooth 11 and repeated chipping of the composite restoration.
HPC: Tooth 11 was avulsed approx. 13 years ago and both the 11 and 21 were subsequently root filled.
OE: Extensive composite restoration on tooth 11 with GP exposed palatally. There was a draining sinus seen on the attached gingivae adjacent to tooth 12.
SI: IOPA revealed a large periapical radiolucency measuring 12mm in diameter.
Sensitivity testing of tooth 12 was positive.

Diagnosis: Tooth 11 previously root treated; chronic apical abscess.
Treatment Plan: Non-surgical root canal re-treatment.

Treatment included: Removal of restoration & GP under RD. Due to persistent oozing into the canal calcium hydroxide was placed using the Webber technique over two visits. Once the canal was dry, an orthograde MTA apical plug was placed followed by a fibrepost for root reinforcement.
Although tooth 21's root filling showed voids, the tooth was asymptomatic. At the 3-year follow-up, there was evidence of periradicular healing, no further intervention was undertaken.

STRATEGY 2: Orthograde RCT followed by Periradicular Surgery

PC: Three year history of periodic swelling on the gum.
HPC: Previous dental trauma and subsequent RCT of tooth 21.
OE: MCC on tooth 21 with a draining sinus seen on the buccal attached gingivae over tooth 22.
SI: IOPA revealed a large periapical radiolucency encompassing both 21 and 22, measuring 14mm in diameter.

Diagnosis: Tooth 21 previously treated; chronic apical abscess.
Treatment plan: Orthograde non-surgical root canal re-treatment +/- periradicular surgery.

Treatment included: Removal of MCC crown and GP under RD. On removal of GP, suppuration was noted in the canal. Inter-appointment dressing of non-setting calcium hydroxide was placed using the Webber technique over two visits. Once the canal was dry it was obturated with GP and AH plus sealer using warm vertical technique. Six weeks after root filling, a draining sinus was still noted and periradicular surgery was undertaken. Following PBI, a 3-sided flap was raised, lesion curetted, 3mm root end resection, retro-cavity prepared and retro-filled with Totalfill® injectable RRM + putty. The flap was sutured with 6/0 prolene.

Histopathological diagnosis: radicular cyst.

STRATEGY 3: Combined RCT + Periradicular Surgery (Through and Through)

PC: Two year history of pain and swelling in the upper left anterior region but was asymptomatic at presentation.
HPC: Previous dental trauma.
OE: Tooth 21 was discoloured with a small palatal GIC restoration and was tender to percussion.
SI: IOPA revealed the 21 had an open apex with a large periapical lesion encompassing teeth 21 and 22.

Diagnosis: Tooth 21 previously initiated therapy; symptomatic apical periodontitis.
Treatment Plan: Combined approach of orthograde RCT + periradicular surgery.

Treatment included: Despite using the Webber technique over 4 visits, the canal could not be dried.
Before surgery, the RC was irrigated to remove CaOH & access sealed. During surgery, once the root-end was resected, RD was placed, access reopened, canal rinsed with saline & an orthograde MTA apical plug was then placed whilst holding a flat plastic at the root-end through the surgical crypt. RCT was completed after 1m.

Histopathological diagnosis: chronic apical abscess.

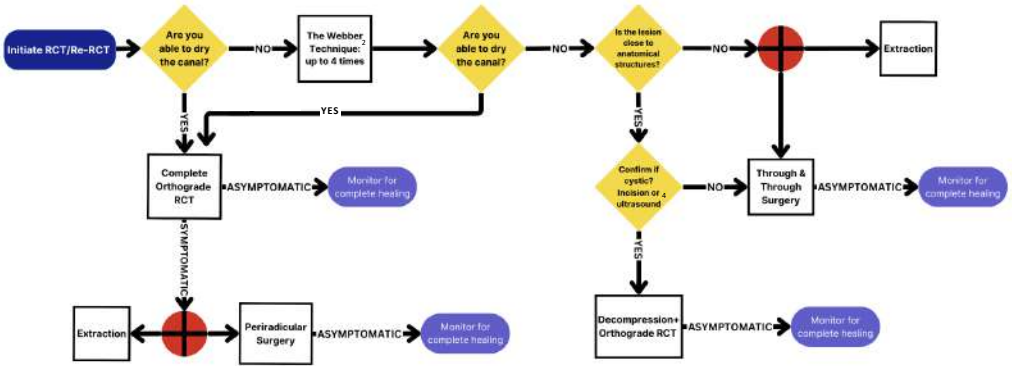
STRATEGY 4: Decompression followed by Orthograde RCT

PC: Firm swelling present on the right side of hard palate.
HPC: History of multiple abscesses since 2007. GDP did RCT 2012 and RCreTx was completed 2013.
OE: Teeth 12 and 13 were both discoloured and heavily restored.
SI: IOPA revealed root filled 12 and 13 with an associated extensive periapical radiolucency measuring 20mm in diameter. A CBCT was carried out due to the large size of the lesion.

Diagnosis: Tooth 12 previously treated; chronic apical abscess.
Treatment Plan: Decompression + orthograde non-surgical root canal re-treatment.

Treatment included: Restorability assessment followed by GP removal from both 12 and 13.
Webber technique: 4 visits → persistent exudate. As the large lesion perforated nasal floor decompression was undertaken. Tubing was inserted to the depth of the cyst cavity and sutured in place. The tubing was left in situ for 6 weeks. RCT completed with MTA apical plug on tooth 12.

DISCUSSION



The decision-making algorithm starts with the most conservative approach first progressing along a hierarchy of treatment options as required. According to the literature, initial management should involve root canal treatment to aid drainage and eliminate any potential source of irritation.[1] If the canal can be dried, then obturation can be completed (Strategy 1). If the tooth is still symptomatic following orthograde RCT then periradicular surgery (Strategy 2) or extraction may be required. All the above cases used the Webber technique which involves densely packing the apical 1/3 of the root canal with calcium hydroxide powder.[2] If following 4 intra-canal placements of dry calcium hydroxide, there is persistent exudate, the treatment strategy may then need to progress to surgical endodontic treatment including periradicular surgery (Strategy 3) or decompression (Strategy 4).[1] If the lesion is cystic and in close proximity to vital structures it is worthwhile considering decompression as a treatment option. Decompression is less invasive than enucleation and allows reduction in intra-cystic pressure which causes shrinkage of the lesion and so less likely to cause damage to adjacent vital structures.[3] Marsupialisation can also be considered in such cases.[5]

CONCLUSION

Overall, the management of large periapical lesions involves a comprehensive and sometimes multidisciplinary approach. Long term follow-up is required to assess for complete healing.

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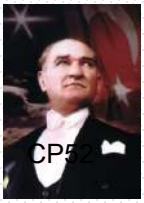
Abbreviations : GP=gutta percha, SI=special investigations, RD=rubber dam, MCC=metal ceramic crown, PBI=papillae based incision, RRM=root repair material, RC=root canal.



CP62

Surgical Management Of Combined Internal And External Root Resorption

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Aim

The aim of this case report is to present the treatment protocol and the follow-up results for the surgical management of extensive inflammatory combined internal and external root resorption on left maxillary central incisor tooth.

Introduction

Root resorptions, especially inflammatory resorptions, are one of the cases that are difficult to diagnose and manage. Inflammatory resorption occurs when the predentin or precementum becomes mineralized, mechanically damaged or scraped off (1,2). In such cases, depending on the defect size and location area of the resorption sites, surgical approach may be considered through clinical and radiographic examination.

Case Presentation

A 21-year-old healthy female patient presented to Marmara University Faculty of Dentistry Department of Endodontics with the complaint of pain and discoloration in tooth 21. The patient notified that she had orthodontic piezosurgery in order to accelerate orthodontic treatment in 7 years back. Clinical examination showed that the tooth was tender to percussion and showed negative response to vitality test. There was a «pink spot» on the cervical area. The tooth is diagnosed with extensive inflammatory combined internal and external root resorption via CBCT imaging and clinic examination.

Fig..1. Preoperative periapical radiography

Fig.2.Axial CIBT images

Fig.3.Preoperative intraoralphoto

Methodology

The full thickness flap opened and hemostasis was achieved. After drying the site, the prepared root canal of 21 and the resorptive area was filled with Biodentine and contoured as per external root anatomy. The surgical area was sutured and the patient was instructed to report after a week for suture removal. At 6 month follow-up, it was noticed that there were some irregularities at the servical area of the tooth. Secondary surgery was completed, servical area was restored with fiber-reinforced composite for dentin, and composite for enamel (Fig. 3.). 1 year follow-up IOPA was taken.

Fig.4..Papilla preservation full thickness flap.

Fig. 5. Postoperative intraoral periapical radiography

Fig. 6. 6 month follow-up surgery

Fig. 7. 1 year follow-up

Discussion

Treatment of resorption sites on tooth can be quite difficult. Following a multidisciplinary approach in the treatment of extensive inflammatory combined internal and external resorptions caused by mechanical reasons (such as orthodontic piezosurgery as in this case) may present more successful results. Biodentin shows itself as a much more compatible material especially in the resorption areas seen in the cervical region of the tooth and has an opening intraorally.(3)

Conclusion & Clinical Relevance

As a consequence, root resorptions are generally rare and asymptomatic cases, but they may require different treatment protocols depending on their progress. It is important to determine the required treatment protocol by assesing the amount of destruction in the case. Such an accurate evaulation is important key to the success of the treatment.

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Management of a mandibular first molar with six root canals

HELSINKI 2023 ese

CP63

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Aim

To describe the unusual presence of 6 root canals in a permanent mandibular right first molar and highlight the importance of searching for additional canals.

Introduction

Numerous studies have investigated the morphology of mandibular first molars. This tooth usually has two roots, with two canals in the mesial root and one or two canals in the distal root. Rarely, a middle mesial (MM) canal is present (0-16.4%) in the developmental groove between the mesiolingual (ML) and mesiobuccal (MB) canals. A middle distal (MD) canal may also be present (0.2-3%) between the distolingual (DL) and distobuccal (DB) canals.

Case Presentation

A 37-year-old Greek female patient with a non-contributory medical history presented at our private office with severe spontaneous pain in the right mandibular region. The patient reported that she had previously initiated a root canal treatment in another dentist. Clinically, the right mandibular first molar had a large amalgam restoration along with a temporary filling. Only the tooth #46 was tender to percussion, while the adjacent teeth also responded normally to the vitality tests. There was no mobility and periodontal probing depths were within normal limits. Radiographic examination revealed no morphological variation of tooth #46, while a small radiolucency associated with its mesial root was reported (**Fig. 2a**). Treatment was initiated with the administration of local anesthesia and rubber dam isolation. After removal of the temporary filling the access cavity was prepared with Endo-z burs (**Fig. 1b-d**). Careful examination of the pulpal floor with an endodontic explorer revealed 6 canal orifices, 3 mesially (MB, MM and ML) and 3 distally (DB, MD and DL). The MM and MD canals were merging with the MB and DB canals in their middle third, respectively. All the mesial and distal canals joined apically. The working length was determined with an electronic apex locator and confirmed with an intraoperative radiograph (**Fig. 1a, Fig. 2b**).

Figure 1-Intraoperative pictures: a) Working length determination, b-d) Access cavity preparation, e)Master cone fitting, f) Access cavity after obturation

Cleaning and shaping was performed using a crown-down preparation with rotary Race EVO (FKG) instruments under copious irrigation with 3% sodium hypochlorite solution. The root canals were then dried with paper points and obturation was carried out with guttapercha cones and Dia-Proseal sealer (**Fig. 1e, Fig. 2c**). A temporary filling was then placed, and 3 postoperative radiographs were taken from straight,mesial and distal angulation in order to assess the quality of obturation (**Fig. 1f, Fig. 2d-f**). The patient was recalled 6 months postoperatively and was symptom free.

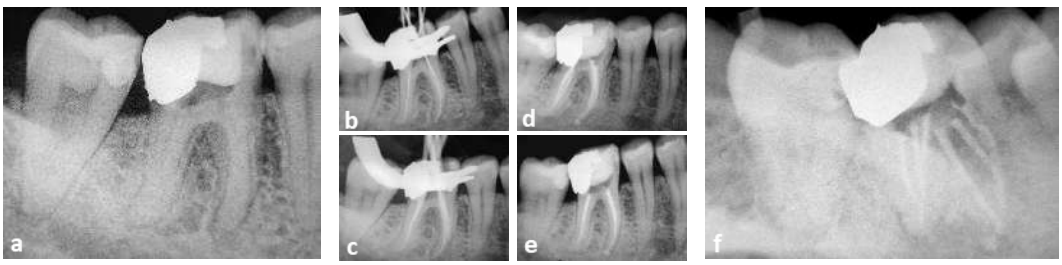

Figure 2- Periapical Radiographs: a) Preoperative, b) Working length determination, c) Master cone fitting, d) Postoperative straight angulation, e) Postoperative mesial angulation, f) Postoperative distal angulation

Discussion

Anatomical variations should be considered when exploring the pulp chamber floor because missed canals can lead to treatment failure. Multiple canals in the mesial and distal roots of mandibular molars have been reported in several cases. However, the presence of six or more root canals is a rare entity and such teeth are described only in a small number of case reports in the literature.

Conclusion & Clinical Relevance

The reported data of this case will remind clinicians to expect variations during routine endodontic treatment and will help them understand the root canal morphology of mandibular first molars.

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CP64

REVITALIZATION TREATMENT OF LOWER SECOND PREMOLAR WITH INFLAMMATORY ROOT RESORPTION AFTER TRAUMA: A CASE REPORT

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Aim

The aim of this case is to present revitalization procedure as an alternative treatment to apexification in case of apical periodontitis with inflammatory root resorption after luxation injury.

Introduction

The revitalization of immature permanent teeth has been shown to be beneficial to reduce the risk of fracture and loss of millions of teeth each year. The main advantage of revitalization is the continuous development of the roots, which is not observed when apexification techniques are used [1].

Figure 1

Case Presentation

An 11-year-old male patient was referred for endodontic treatment of immature lower second premolar (Figure 1) after accident luxation during the extraction of the lower first molar two months ago. Following initial reposition, flexible splinting was applied. No follow up visits were maintained due to patient related reasons. Initial clinical examination revealed negative cold test, active sinus tract and tenderness to the vertical percussion. Dental radiograph showed immature root with severe external resorption and bone destruction. Revitalization procedure was performed under the dental microscope following the ESE guidelines [2]. Necrotic pulp was removed, canal was irrigated, followed by intracanal calcium hydroxide paste placement. Four weeks later sinus tract disappeared. Canal was irrigated with 20 ml EDTA 17% and 5 ml sterile saline solution. Bleeding was induced with sterile size 50 K-file and blood clot was formed 2 mm below cemento-enamel junction. Collagen matrix (Hemocollagene) following hydraulic calcium silicate cement (Biodentine) were placed above the blood clot. Endodontic cavity was restored with glass-ionomer cement. Final composite restoration was carried out 2 weeks later (Figure 2). Follow up visits were performed after 1, 2 weeks and after 1, 2, 4, 7, 12, 24 months and 4 years (Figure 3).

Figure 2

Discussion

The present case indicates revitalization procedure providing satisfactory clinical and radiographical outcomes in traumatized necrotic tooth. Data shows that only 60% of revitalization procedures in traumatic immature necrotic teeth were successful in resolving clinical and radiographic signs. It was claimed that some cases failed due to the absence of bleeding and persistent infection (3). Although some cases present a favourable outcome, current evidence is insufficient to support the claim that revascularization treatment yields superior results in comparison to traditional apexification or accurately measures the success rate of continued root development after revascularization (4).

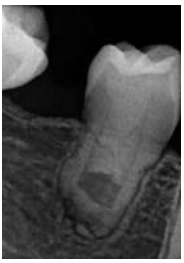

Figure 3

Conclusion & Clinical Relevance

After long-term follow up, no obvious neither root lengthening nor dentinal wall thickening was observed. The tooth was functional with favorable esthetics and evidence of bone healing, and preservation of alveolar bone height, what is particularly beneficial in young patients.

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CONSERVATIVE MANAGEMENT OF MAXILLARY LATERAL INCISOR WITH A LARGE PERIAPICAL LESION

CP65

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Aim

Describe the clinical management of an maxilar lateral incisor with a large periapical lesion, by conservative treatment.

Introduction

A periapical lesion is usually the host response to invasion by microorganisms and their products into the root canal system (1). And the persistence of these can result in a periapical chronic inflammatory process (2). However, it may not be treatable with conservative procedure and may require surgical treatment for the complete removal of the pathologically affected tissues and a decrease in the periapical reaction (3).

Case Presentation

A 41-year-old male patient presented pain on palpation and percussion in tooth 12 and slight swelling in the palate area (Fig. 1). He fell off a bike and landed on concrete 27 years ago. Radiographically, a right upper lateral incisor was observed with a large radiolucent area in the periapical zone and an apparent Dens Invaginatus (DI) type 1. A CBCT was indicated to confirm the presence of DI. Central incissor shows calcification of the pulp space.

Necrotic pulp and Acute Periapical Abscess were diagnosed with a reserved prognosis (Fig. 2).


Fig.1


Fig.2

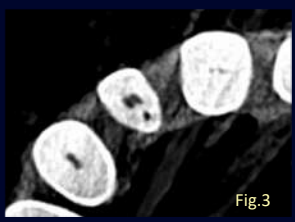
Fig.3

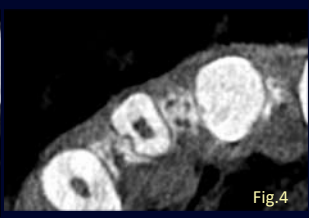
Fig.4

In an axial cut of CBCT, an Oehlers Class I DI (Fig. 3) and a Heithersay Class external cervical resorption in the cervical third was observed (Fig. 4). In a sagital cut, an apical radiolucent with no vestibular and palatal cortical bone can be seen (Fig. 5). After 7 days, under local anesthesia and absolute isolation, root canal instrumentation irrigated with sodium hypochlorite was performed. $Ca(OH)_2$ was placed as intracanal medication and sealed with Cavit®. After 7 days, the patient returned with pain and swelling of the palate (Fig. 6). The same procedure as the previous appointment was done, as well over-instrumentation with a 25 flexofile® file to obtain drainage. $Ca(OH)_2$ was placed as in the previous appointment. 7 days later, the patient returned asymptomatic without inflamattion. The intracanal medication was eliminated with files and irrigation, and the canal was filled with guuta-percha and sealapex® (Fig.7). A control appointment was performed in 1 month and scheduled for periapical surgery.

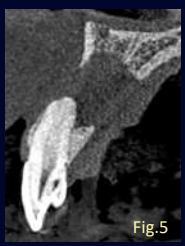
Fig.5


Fig.6


Fig.7


Fig.8


Fig.9

In the follow up at 1 month, the patient shows normal periodontal tissues, no signs or symptoms, and a sligth decrease in the radiolucent area (Fig. 8). With the patient, the decission was made not to perform the surgery and mantain the follow-up. In the control of 3 months (Fig. 9) and 8 mo. (Fig. 10), a notorious decrease in the radiolucent area is observed. The patient remained asymptomatic, without swelling (Fig. 11). At one year, the CBCT shows reduction in the lesion and begining of bone tissue formation in the vestibular and palatal cortical (Fig. 12).


Fig.10


Fig.11


Fig.12

Discussion

Non-surgical root canal treatment (RCT) on teeth with periapical lesions can heal from 68-94% after endodontic treatment (4). The success of RCT is directly affected by the correct choice of clinical protocol of sanitization process (instrumentation, irrigant solution, and technique as well as intracanal dressing); the apical limit of the root canal preparation and filling (4), besides systemic conditions of the patient (5).

Conclusion & Clinical Relevance

- It is imperative to reduce the bacterial load in the canal system in all treatments with a diagnosis of pulpal necrosis and periapical disease.
- Large periapical lesions may respond favorably to non-surgical endodontic treatment.
- If the patient is asymptomatic, it is prudent to wait a little while to observe the evolution before deciding to perform a complementary surgical treatment.
- CBCT and Rx are essential tools in the diagnosis and follow-up of periradicular lesions.

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CP66

Endodontic management of mandibular canine with two canals using cone beam computed tomography : two case reports

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I. Aim

This case report presents that endodontic management of mandibular canine with two canals using cone beam computed tomography and have observed the outcome for 3 years.

II. INTRODUCTION

- The aim of root canal treatment is the elimination of infection from the root canal. Clinicians should be aware of the variation of root canal anatomy and performed root canal treatment.
- 830 extracted human mandibular canines showed that 98.3% of these teeth contain a single root, 92.2% consist of one canal and one foramen, 4.9% have two canals and one foramen, and 1.2% contain two canals and two foramina

III. Case Presentation

< Case 1>

Sex/age	M/73
Chief Complaint	I have pain on left lower anterior tooth.
PMH/PDH	Hypertension/ N-S
Present Illness	#33 severe attrition Air(-), per(++), mob(-), EPT(-)
Impression	Pulp necrosis with symptomatic apical periodontitis on #33
Tx. plan	Root canal treatment on #33

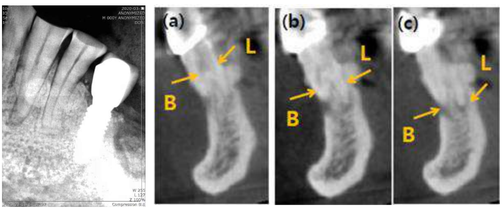


Fig 1. Radiography evaluation
The buccal canal and lingual canal are separated along the entire length on CBCT cross view

Treatment procedure

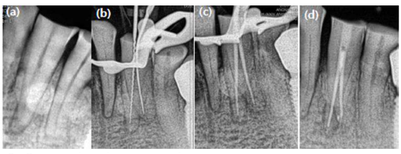
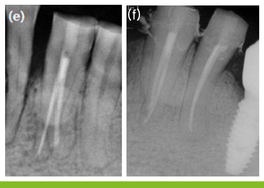


Fig2. Conventional root canal treatment
(a) Initial clinical examination
(b) Access opening and working length determination with apex locator (Dentaports DB-ZW; J. MORITA MFG.CORP) : The buccal and lingual canal were separated. (B: 17mm, #15K, L : 18mm, #15H). Canal preparation and irrigation was performed using PTN(Dentsplay Sirona), 5.25% NaOCl.
(c) On 2nd visit, Master cone fit adaptation.
(d) Canal obturation was performed by continuous wave technique (gutta-percha point and AH plus sealer(Dentsply DeTrey).



(e) 6 month follow up
(f) 3 years follow up

< Case 2>

Sex/age	M/73
Chief Complaint	I have pain on left lower anterior tooth.
PMH/PDH	Hypertension/ N-S
Present Illness	#33 severe attrition Air(-), per(++), mob(-), EPT(-)
Impression	Pulp necrosis with symptomatic apical periodontitis on #33
Tx. plan	Root canal treatment on #33

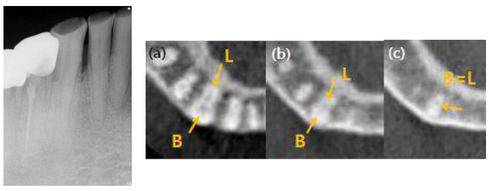


Fig 3. Radiography evaluation
The buccal canal and lingual canal merge into a single canal at apical third.
(a) Coronal 1/3 (b) middle 1/3 (c) apical 1/3

Treatment procedure

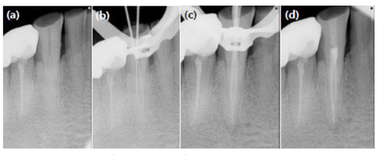


Fig2. Conventional root canal treatment
(a) Initial clinical examination
(b) Access opening and working length determination with apex locator (Dentaports DB-ZW; J. MORITA MFG.CORP) : The lingual canal was merged with the buccal canal forming single canal at the apical third (B: 21.5mm, #15K, L : 19mm, #15H). Canal preparation and irrigation was performed using PTN(Dentsplay Sirona), 5.25% NaOCl.
(c) On 2nd visit, Master cone fit adaptation.
(d) Canal obturation was performed by continuous wave technique (gutta-percha point and AH plus sealer(Dentsply DeTrey).

(e) 6 month follow up
(f) 3 years follow up

III. Discussion

1. Morphology of mandibular canines

- The root canal morphology can be complex and should be understood prior to endodontic treatment.
- The most predominant root morphology in mandibular canine was single root, but sometimes the canine which has two canals or roots was observed.

Table 1. Percentages of number of roots of permanent mandibular canines in various studies.

Author	Country	Study method	Number of teeth	One root(%)	Two roots(%)
Pecora et al.1993	Brazil	Clearing	830	92.2	7.8
You-nong and Bao-li, 1995	China	Clearing	104	88.46	11.54
Aminsobhani et al.,2013	Iran	CBCT	608	96.3	4.7
Zhao et al,.2014	China	CBCT	1542	97.2	2.98
Mirzaie etal., 2014	Iran	CBCT	66	100	0
Singh and Pawar, 2016	India	Clearing	100	100	0
Yang etal.,2016	China	CBCT	3014	99.2	0.8
Soleymanin et al.,2017	Iran	CBCT	300	98.7	1.3

2. CBCT, Dental microscope

- Careful inspection of diagnostic radiographs is very important during diagnosis, Clark's technique(SLOB) or Cone-beam computed tomography gives more accurate information about canal morphology.
- The dental operating microscope helps in the location of exact division point and ultrasonics can be used to access to two orfices.

3. Outcome of root canal treatment

- The follow up period of the treated teeth is 3 years, which was adequate for a radiographic assessment of healing after endodontic treatment.
- Tooth survival following RCT was reduced as time goes on. Therefore we have to follow up during long-term period.

IV. Conclusion

- Comprehension of anatomical variations of the root canal system is essential for successful endodontic treatment.
- The mandibular canines are most frequently single-rooted but, it sometimes has two canals or two roots. Therefore, dental clinician should understand root canal morphology.
- CBCT and dental microscope can be useful tool for root canal treatment.

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CP67

Intentional Replantation: A case report

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Aim

To discuss a clinical case in which intentional replantation was performed in a right first mandibular premolar.

Introduction

The purpose of the endodontic treatment is to prevent and treat apical periodontitis and additional approaches may be necessary when this pathology persists[1].

A weighted mean survival of 88% for intentional replanted teeth has been reported in a recent systematic review and meta-analysis[2].

This treatment option consists of inserting the tooth in the socket after extraction to fill and repair the root at apical level. There are some contraindications for this procedure: tooth with mobility, damage of labial or buccal plate and great loss of dental structure making it nonrestorable[3].

Case Presentation

52 years patient, male. Symptomatic apical periodontitis, no periodontal probing. Tooth with old and well adapted ceramic crown and fiber post. “C-shape” canal with complex anatomy. An intentional replantation was performed. After 1 year the tooth is asymptomatic and presents healthy periodontal tissues.

Fig. 1 and 2 Initial x-ray: ortogonal and mesial angulation

Fig. 3 CBCT axial and sagital view

Fig. 4 and 5 Follow-up x-rays 6 months and 1 year

Fig. 5 Atraumatic extraction with forceps

Fig. 6 Retro-preparation with ultrasonic tips

Fig. 7 Retro-obturation with ProRoot MTA (1)

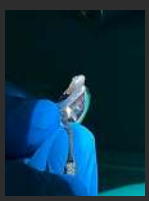

Fig. 8 Retro-obturation with ProRoot MTA (2)

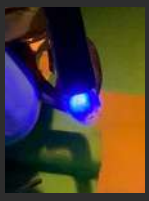

Fig. 9 Light curing of resin modified glass ionomer on isthmus in mesial surface

Fig. 10 Crisscross suture for 1 week

Discussion

Intentional replantation can be performed after the failure of nonsurgical endodontic treatment and apical microsurgery or in cases where conservative treatment is not possible. It is a possibility in situations such to the one just described, where anatomical obstacles like the presence of a fiber post, a well-adapted crown, and the close proximity of the inferior alveolar nerve exist.

Long-term success and survival rate of intentional replantation depends on several factors as: extra-oral time, prior probing depths, tooth location, filling material, and atraumatic extraction[4]. In this case the extra-oral time was 15 minutes, the bone plates were maintained and the root anatomy was favorable to do an atraumatic extraction.

Conclusion & Clinical Relevance

Intentional replantation has been an option increasingly considered due to its success rate, similar to other endodontic treatments and the placement of implants, respecting the specific guidelines.

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Endodontic Management of Maxillary Molar with Dens Invaginatus Type IIIa: A Case Report

CP68

Robert Burgess, Woodlands Health Singapore, Department of Endodontics

Aim: This report discusses the management of an upper right second permanent molar (#17) presenting with a type IIIa (Oehlers 1957a) dens invaginatus and C-shaped canal morphology.

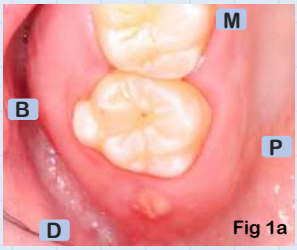

Fig 1a

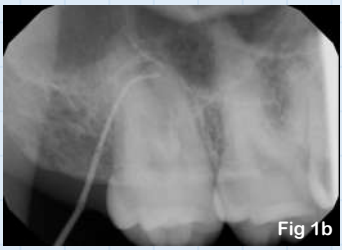
Fig 1b

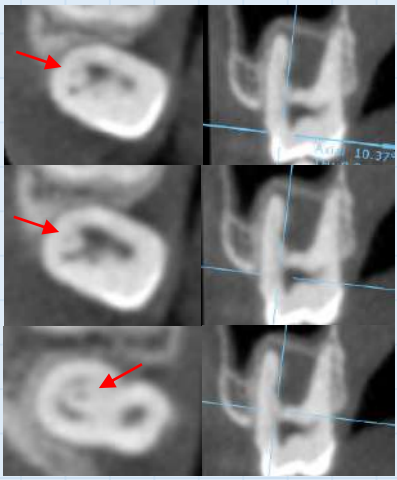
Fig 2: Axial and Corresponding Coronal Slices

Case Presentation

Clinical Findings: A 22-year-old man was referred from the army with pain on #17 triggered by biting as well as jumping. #17 presented with an accessory buccal cusp (Fig. 1a) and displayed inconclusive sensibility test results over the course of 1 year. Eventually a sinus tract formed at the distal alveolus, tracing to the periapex of #17 (Fig. 1b). Despite this, the tooth continued to test positively to vitality tests.

Radiographic Findings: A cone beam computed tomography (CBCT) scan was taken to aid diagnosis. A radiolucency measuring 10 by 10 by 12 millimetres was seen extending from the furcation of #17 to the floor of the maxillary sinus. #17 displayed a C-shaped buccal canal morphology with a round radiopaque structure with an internal radiolucency (Fig 2, red arrow, axial slices from coronal to apical direction) seen running obliquely through the pulp chamber, initiating at the accessory cusp and terminating at the furcation of the tooth.

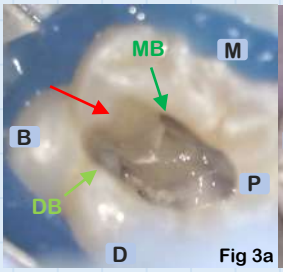

Fig 3a

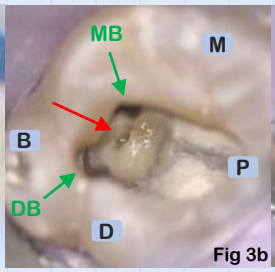

Fig 3b

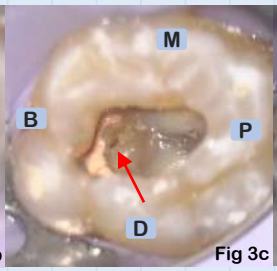

Fig 3c

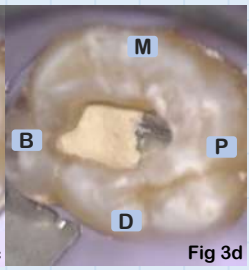

Fig 3d

Treatment Rendered: Root canal treatment was initiated. Vital pulp tissue was encountered upon access and the invagination presented as a hard structure between the buccal and palatal canals (Fig. 3a, red arrow). Cleaning and shaping with 1.25% sodium hypochlorite and calcium hydroxide (CaOH) intracanal medicament was done across 2 visits with no resolution of symptoms or sinus tract. The hard structure was explored using ultrasonics, revealing a small orifice with purulence measuring 1mm in diameter, terminating at the tooth's furcation (Fig. 3b, red arrow). The orifice was surrounded by yellow mineralised tissue differing in colour and texture from the surrounding dentine and cementum. After further dressing with CaOH, the sinus tract and symptoms subsequently resolved.

Restoration & Follow-up: Obturation was done with gutta percha and AH Plus™ sealer (Fig. 3c). The invagination was sealed using Biodentine™ (Fig. 3d). The tooth was restored with composite resin and a crown and was asymptomatic at 6-month review with normal apical tissues (Figs. 4, 5). The patient will return for a 1-year review and follow-up CBCT.


Fig 4

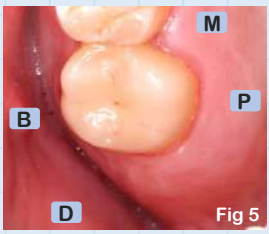

Fig 5

Discussion: Dens invaginatus is a developmental anomaly presenting challenges in diagnosis, root canal instrumentation and obturation. Prevalance is between 0.3-10%[1], and occurrences in molars are extremely rare, with only one case report of an extracted upper right third molar (#18) published by Rucucci et al in 2020[2]. Use of 3D imaging has been suggested to aid in diagnosis and treatment planning of teeth with complex anatomy[3]. Although preservation of vitality of the main root canal and selective treatment of the invagination would have been ideal[4], access of the invagination would have been challenging from a buccal angle given the posterior location of the tooth. The presence of communications between the invagination and the pulp chamber also presents challenges in selective treatment[1].

Conclusion: The above report documents the first such endodontic management of a molar with dens invaginatus type IIIa. Use of CBCT and bioceramics aided in diagnosing and sealing the invagination, allowing for a successful outcome.

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CP69

FACULTY OF MEDICINE AND HEALTH SCIENCES

SHEDDING NORTHERN LIGHTS ON ENDODONTICS
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2) SECTION OF PERIODONTOLOGY AND ORAL IMPLANTOLOGY, DEPARTMENT OF ORAL HEALTH SCIENCES, GHENT UNIVERSITY, GHENT, BELGIUM

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EXTERNAL REPAIR OF AN EXTERNAL CERVICAL RESORPTION: A CASE REPORT

Aim

To describe the management of an external cervical resorption (ECR) in an upper central incisor of a 19-year-old patient.

Introduction

External cervical resorption is the loss of dental hard tissue in the cervical aspect of the teeth as a result of clastic cell action. Several predisposing factors have been described in the aetiology of ECR[1].

Case Presentation

A 19-year-old male was referred to the endodontic department of the Ghent University Hospital for diagnosis and treatment of tooth #11. Clinical (Fig. 3) and radiographic (periapical radiograph and CBCT, Fig. 1-2a-c) examination showed a pink spot, poor oral hygiene and an extensive resorptive lesion in the buccal cervical aspect of the upper right maxillary incisor. Further examination revealed normal response to cold, percussion and palpation. The patient reported no pain. The resorptive lesion was classified as class 2 according to Heithersay[2] and class 2Bp according to Patel[3]. The patient consented to an external repair of the lesion[4] in combination with a crown lengthening procedure on teeth 11 and 21. After reflection of a full thickness flap, clinical crown lengthening on 11 and 21 was performed (Fig. 4a-b). The resorptive lesion was then cleaned (Fig. 5a). The thin remaining dentin above the pulp was covered with Biodentine (Septodont, Saint-Maur-des-Fosses, France, Fig. 5b). Composite (Filtek Supreme, 3M ESPE, USA) was used to restore the defect (Fig. 6). After repositioning, the flap was sutured (vertical mattress + single suture) using 6-0 Seralon (Serag-Wiessner GmbH & Co. KG, Germany, Fig. 7). Treatment steps were performed with the aid of rubberdam and operating microscope (PICO, Carl Zeiss, Germany). At the 17-month follow-up, the tooth was asymptomatic and showed a normal reaction to cold testing/EPT, in the absence of percussion or palpation sensitivity and maximum pocket depth of 3mm. Oral hygiene remained a problem (Fig. 8a-b).

Discussion

The aetiology of the external cervical resorption in the current case is unclear. The patient did not receive orthodontic treatment, nor does he recall any traumatic injury. Mavridou et al.[5] found poor oral hygiene as a potential predisposing factor which could be a factor in this case. Mavridou et al. found higher success rates for external repair of ECR class II lesions compared to internal approach, monitoring and combination therapy, therefore recommending an external approach[4]. While CBCT suggested pulpal involvement, the pericanalar resorption resistance sheet was found not to be perforated during the treatment.

Fig. 1: Preoperative periapical radiograph

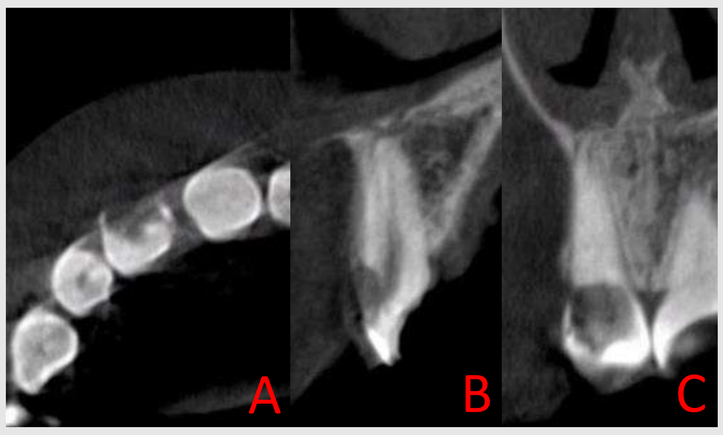
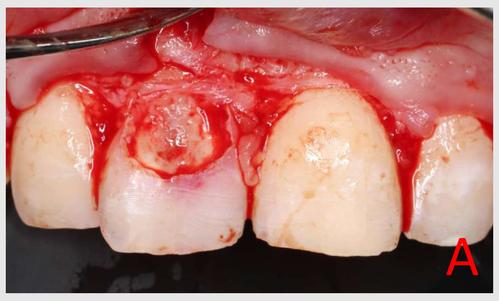


Fig. 2: Preoperative CBCT: (A) axial, (B) sagittal and (C) coronal view

Fig. 3: Preoperative clinical image



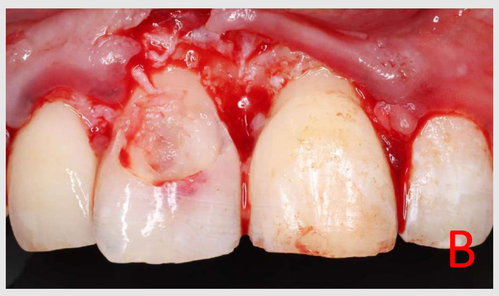


Fig.4: (A) After flap reflection and (B) after crown lengthening

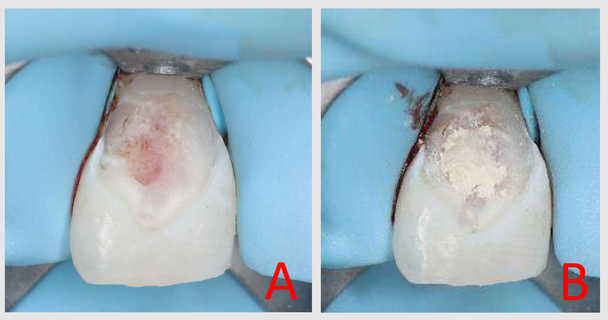


Fig. 5: Clinical image (A) after removal of resorptive tissue and (B) after capping with Biodentine

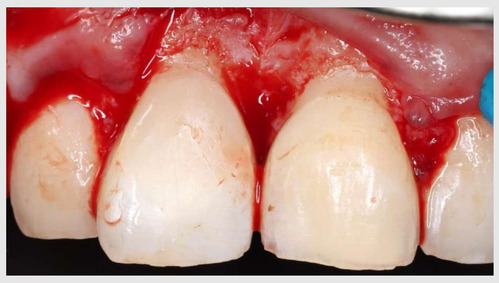


Fig. 6: Tooth 11 after repair of the defect with composite resin

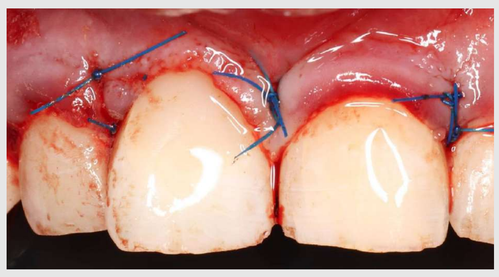


Fig. 7: After suturing

Fig. 8: (A): 17-month follow-up: periapical radiograph, (B): 6-month follow-up clinical image (note marginal gingivitis around 11).

Conclusion and Clinical Relevance

This case shows favourable outcome of external repair without root canal treatment of an extensive ECR lesion with very thin remaining dentin between the lesion and the pulp.

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CP70

Old crestal root perforations repair with Bio Ceramics in a single visit

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Aim

The purpose of reporting the clinical cases here is to demonstrate the outcomes of using bio-ceramic materials in treating crestal root perforation. These cases are accompanied by 12-month clinical follow-up visits to provide a comprehensive understanding of the treatment results.

Introduction

Root canal perforations remain a prevalent complication in modern Endodontics, with iatrogenic root perforations occurring in approximately 2%–12% of teeth that have undergone endodontic treatment[1]. Among them, crestal root perforations are particularly vulnerable to epithelial migration and rapid pocket formation, resulting in the lowest repair success rate[2]. However, the use of bio-ceramic materials offers a significant advantage in achieving predictable repair and healing of root perforations. In comparison to previously used materials, bio-ceramics have a higher success rate, especially for relatively wide or perforations situated in the crest of the bone, due to their superior biocompatibility and sealing ability[3,4].

Case Presentation

Figures A-D and E-H depict two young females who were referred to the endodontics department after experiencing dental complications. In Figure A there's a crestal perforation and separated file in the mesial root of tooth #36 can be observed. In Figures E-F, a crestal perforation in the mesial aspect of tooth #37 is shown.

Methodology

A skilled operator treated all perforations, which had occurred a few weeks prior to treatment, using magnification via a dental operating microscope. The affected areas were irrigated with a 4% NaClO solution, cleaned, and dried before being sealed with bioceramic material (TotalFill BC RRM Putty, FKG). In the case depicted in Figures A-D, a separated file was removed and working length determined (Fig. B). Nickel-titanium files (ProTaper Next, Dentsply Maillefer) were used for chemo-mechanical preparation under constant irrigation with sodium hypochlorite (4%). The root canals were filled using gutta-percha cones (Dentsply Maillefer) and an endodontic cement (AH-PLUS, Dentsply Maillefer) (Fig. C). The tooth was restored. On the follow up visit 12 moths post-op the tooth was asymptomatic with no deep pockets and a minimal loss of crestal bone height (Fig. D).

In the case depicted in Figures E-H, the crestal perforation was sealer the same way as previously described and root canal treatment carried out (Fig. G). The tooth was restored. On the follow up visit 12 moths post-op the tooth was asymptomatic with no deep pockets and no loss of crestal bone height (Fig. H).

Discussion

Bio ceramics have been extensively used in repairing root canal perforations, showing promising results (92%) healing rate[5], The prognostic factors that significantly impacted the failure rates were the presence of a preexisting periodontal pocket (probing > 4.0 mm)[5]. In our study after perforations were sealed - root canal spaces were filled. Casses were followed up after 12 months. The patients presented no compliants and were intended for final restoration. The main issues that were highlighted by our case series is the long-term stability of the Bio ceramics seal and the immediate application to perforation site.

Conclusions

Bio ceramic fillers have a high success rate in sealing perforations in the crestal area in one treatment session, yet longer follow-up is required.

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CP71

ROOT FRACTURE IN AN IMMATURE PERMANENT TOOTH
CASE REPORT

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Aim

To report the conservative management and follow-up of a root fracture in an immature permanent tooth

Introduction

Traumatic dental injuries are common during childhood. Luxation and avulsion injuries are often seen, but root fractures are uncommon in traumatized permanent teeth and they can be very dramatic.

Case Presentation

A 7 year-old girl suffered a fall in April of 2021, leading to an injury to the maxillary right central incisor. The child was conducted to dental office immediately by her parents, both dentists. Based on a radiographic and clinical examination, the traumatized incisor had an immature root formation with a more apical root horizontal fracture and lateral luxation of the coronal fragment. The tooth was repositioned, then splinted with wire and adhesive resin for 8 weeks. After 2 years, the tooth still responds to sensitivity tests and the complete root formation can be observed.

Clinical examination April 2021

After repositioning

November 2021

April 2023

Discussion

Prior to treatment of a fractured incisor in the mixed dentition phase, careful consideration must be given to the normal development of the permanent tooth. The ideal outcome for horizontal root fracture injuries is healing by hard tissue union. If the pulp is intact after injury, a dentin callus is formed between the two fragments. In this case, the prognosis is generally good. Patient´s time referral was a very important factor. The displacement of the coronal part was so severe that favorable healing would be compromised if the tooth were not repositioned at the initial examination.

Conclusion & Clinical Relevance

Potential regenerative properties of the pulp in young permanent teeth are worth the wait to obtain better healing of the root fracture.

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CP72

THE THIRD CANAL IN THE MESIOBUCCAL ROOT OF MAXILLARY FIRST MOLAR

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AIM

To report a non-invasive approach for extra root canal localization and treatment in the mesio-buccal root of maxillary first molar using surgical operating microscope and cone-beam computed tomography (CBCT) and dental operating microscope.

Introduction

Sound knowledge of the internal morphology of teeth and its unpredictable variability is a prerequisite to ensure proper root canal treatment with favorable outcome. Cleghorn et al reviewed the studies that evaluated the anatomy of the maxillary first molars and found that about 56.8% of the mesiobuccal roots had two or more canals.(Cleghorn et al., 2006) Dealing with the human root anatomy and canal morphology as a standardized object may result in missed root canals Thus it serve as a reservoir for micro-organisms and their byproducts that can replicate and overcome the periapical immune response.(Ahmed & Dummer , 2023). Therefore, dental operating microscope (DOM) coupled with CBCT are the optimal guides during treating such teeth.

Discussion

The maxillary 1st molar anatomy most common morphology is the presence of three independent roots. The percentage of MB2 canal presence is highly variable based on populations. However, an MB3 presence is rare. The internal morphology of 3-canals in MBRs configurations were typed in most clinical and laboratory studies as 3-2, 2-3, 1-3, and 3-3. More complex configurations such 1-2-1-3, 1-2-3-2, 2-3-2-1-2, 2-3-2-3-2, and 3-2-1-2-1 also have been reported. Literature review reveals that the incidence of 3-canaled mesiobuccal roots in maxillary molars ranged from 1.3%–2.4% and that the most common root canal configuration was type 3-2. (Ahmad & Al-Jadaa, 2014). Studies have demonstrated that magnification and illumination by (DOM) increased the identification of MB2 (Mamoun, 2016). Regarding clinical assessment (Baratto Filho et al., 2009) represent 0.7% of 291 teeth of 1st maxillary molars have more than 4 canals using DOM. In the present case, CBCT scanning was used for a better understanding of the complex root anatomy of tooth #26, which had type (³ 26 MB3-2 DB1 P1) Hany & Paul canal configuration in the MBR. Thus,MB1 and MB2 are meeting apically whereas MB3 as a single root canal.(Fig E)

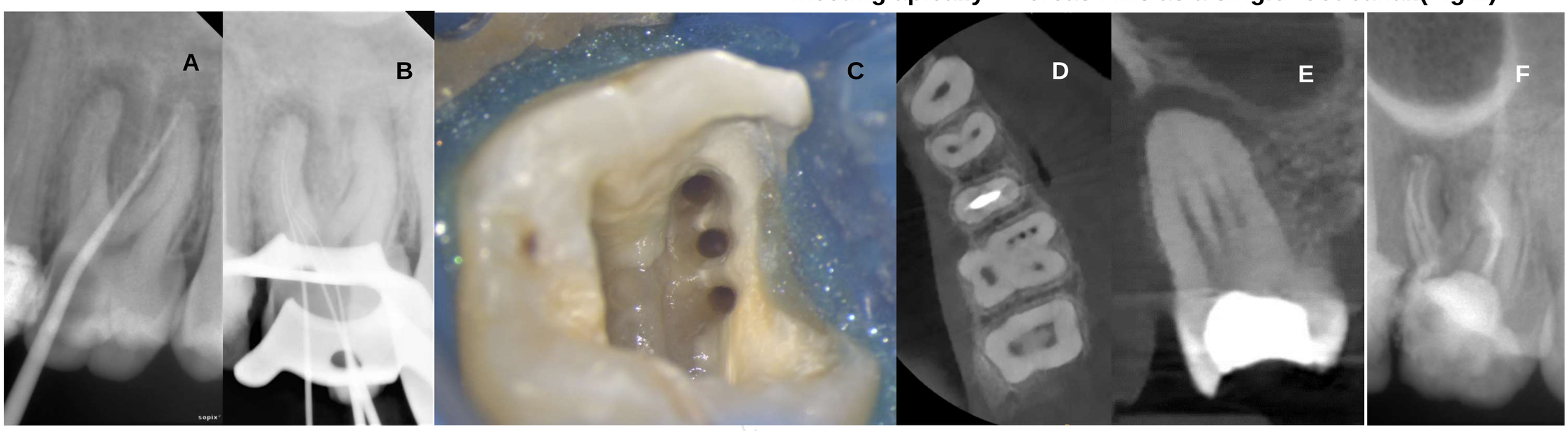

Figure A: Preoperative periapical image with a tracing test. B: #10 K-file represent three canals in MB root. C: three canal orifices for MB root. D: Coronal and middle third: MB1,MB2,MB3,DB,and P. E: coronal view shows three canals for MB root. F: Periapical image represent five obturated canals.

Case Presentation

A 28-year-old female was complaining of a localized severe pain on mastication and bad taste. Clinical examination revealed a sinus tract at tooth #26 roots area and when traced with gutta-percha it reached the apical area of the Distobuccal root of the same tooth, confirmed radiographically (Fig.A). Tooth was tender to percussion. Pre-operative radiographic evaluation revealed periapical radiolucencies in relation to all roots. Tooth # 26 was diagnosed as having necrotic pulp with chronic periapical abscess. Access cavity preparation was made under proper magnification X16 (Leica M320, Wetzlar, Germany) and four canals were found: two MB , one DB and one palatal. The Mesiobuccal canals orifices were far apart, and thorough probing of the developmental fusion groove reflected a sticky feeling between them, file 10 was used to negotiate the area that drove itself into a canal space , electronic apex locator was used to confirm that we were still in the canal, followed by periapical radiograph (Fig B). Thus, confident troughing, coronal flaring followed by cleaning and shaping was carried out.)(Fig C). A CBCT (9600Carestream, New York, USA) scan was captured with a high-resolution and small field of view for a better understanding of the complex root and root canals anatomy. (Fig.D,E). Ca(OH)2 paste was applied as intracanal medication. Obturation was made the next visit using Gutta percha and epoxy resin root canal sealer with vertical compaction technique.(Fig.F).

CP52

Conclusion & Clinical Relevance

While identifying an extra canal in 1st maxillary molar endodontic root canal treatment, magnification combined with coaxial illumination, facilitates creating a conservative access opening, identifying, and debriding canals, spotting microscopic anatomical structures in the pulp chamber and pointing out any extra canal and/or anatomical abnormality.

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CP73

Partial pulpotomy with Pro-Root MTA in a permanent molar with irreversible pulpitis

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Aim

To present a successful case of partial pulpotomy using Pro-Root MTA in a mature permanent molar with symptomatic irreversible pulpitis.

Introduction

The focus of Vital Pulp Therapy(VPT) has become broader; VPT can be considered in mature teeth that are thought to have irreversibly inflamed pulps. In a previous study, when Mineral Trioxide Aggregate(MTA) and other Calcium Silicate-based Cements(CSCs) are used for VPT procedures in permanent teeth with symptomatic or asymptomatic irreversible pulpitis(SIP or AIP), success rates ranged from 85~100% at 1~2years.(1)

Case Presentation

A 65-year-old male patient presented with a mesial proximal carious lesion on Right maxillary second molar with sensitivity to cold. Class II ceramic inlay on #17[MO] was planned.

Fig.1 Preoperative view

1. Caries removal and preparation for inlay

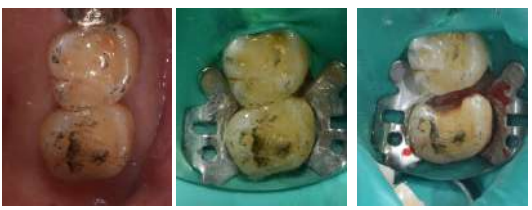

Fig.2 Intra-operative clinical photos

2. After 4 days

4 days after preparation, the patient came to the clinic, presented a lingering pain after chewing that way. Pain on percussion & biting was duplicated on #17 upon clinical tests. The tooth responded positive on cold sensitivity testing. Symptomatic irreversible pulpitis was diagnosed and partial pulpotomy was planned.

3. Partial pulpotomy

Fig.3 Under microscope, pulp removed with a high-speed diamond bur

Fig.4 Hemostasis with NaOCl within 5min. Fig.5 Pro-Root MTA / LC GI filling

4. 1 week Follow-up, final impression

5. Final restoration setting after 2 weeks

6. Prognosis

Upon 5 month follow-up, he had no pain on percussion and biting. The tooth responded positive on cold testing.

Fig.6 Post-operative clinical photo and radiograph Fig.7 5M follow-up

Discussion

According to Ramani et al, there was no significant difference between the success rates of Complete pulpotomy and Partial pulpotomy using MTA in permanent teeth with SIP, and the overall success rate was 85.1%. The only one failed tooth in partial pulpotomy group was designated as an immediate clinical failure.(2)

Conclusion

Pulpotomy treatment using Pro-Root MTA can be considered for a permanent tooth with irreversible pulpitis.

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CP74

CONSERVATIVE MANAGEMENT OF DENS EVAGINATUS WITH NECROTIC PULP: A CASE REPORT

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AIM

This case report aims to describe the conservative treatment of a mandibular central incisor with Dens Evaginatus (DE) Type 3, necrotic pulp, and periapical lesion by addressing only the affected invaginated canal.

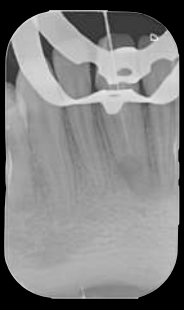
Introduction

DE is a developmental anomaly characterized by an accessory cusp consisting of enamel, dentin, and pulp. Treatment options for teeth affected by DE with necrotic pulp and periapical lesions include apexification, conventional root canal treatment, revascularization, endodontic surgery, or extraction.

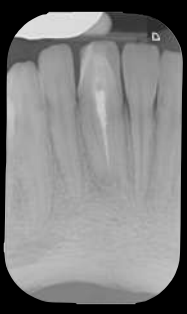
Case Presentation

A 10-year-old female with a history of acute abscess in the right mandibular central incisor was referred for treatment. During careful endodontic evaluation, a normal response was observed for thermal testing. A CBCT scan revealed an inner central canal inside a wider canal with an open apex and a suspected periapical lesion. In the first appointment, a conservative access cavity was created with CBCT guidance, and the inner (invaginated) canal was negotiated and prepared using Hyflex and K-file. Necrotic tissue could be seen. The canal was then rinsed using NaOCl 3% and EDTA, and Ledermix paste was placed inside the canal. After two weeks, the patient was symptom-free and responded normally to thermal testing. Root canal filling was performed only in the invaginated canal. At the one-year follow-up, the patient was still symptom-free, and full periapical resolution could be observed.

Pre-operative Rx



Working length Rx of the inner invaginated canal



1 year follow up

Pre-operative

2 weeks follow up

CBCT scan

Discussion, Clinical Relevance

In cases of Dens Evaginatus with necrotic pulp and periapical lesion, various treatment options are available. In this particular case, the conservative approach was chosen, which involved addressing only the affected canal. This approach is based on the principle of preserving the maximum amount of healthy tooth structure, which is especially important in young patients with developing teeth. The use of CBCT guidance was also helpful in identifying the invaginated canal and planning the conservative access cavity. The use of calcium hydroxide paste has been shown to be effective in disinfecting the canal and promoting periapical healing.

Apexification Treatment of Immature Necrotic Central Incisor with Apical Periodontitis: A Case Report

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CP75

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AIM

This case report aimed to present the long-term rehabilitation of a trauma-related large periapical lesion on the apex of the maxillary left central incisor by apexification treatment.

INTRODUCTION

Apexification treatments can be defined as methods to form a calcified barrier through the formation of mineral tissue in the apical region of the tooth with incomplete root development. Conventional apexification treatments with calcium hydroxide (CH) have been utilized for many years in multiple visits. However, although successful treatment outcomes of apexification treatments with CH were reported, one-visit treatments with mineral trioxide aggregate (MTA) have gained attention from clinicians due to the several advantages.

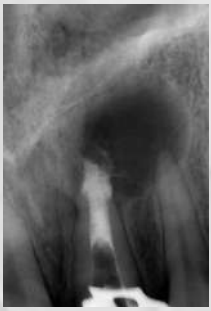
CASE PRESENTATION

A 20-year-old female patient who has a trauma history 10 years ago was referred to the Department of Endodontics due to a sinus tract on the buccal mucosa of the maxillary left central incisor. A tooth had been accessed and CH had been applied in another clinic previously. A radiographic examination revealed a large periapical lesion involving the tooth.

Preoperative radiograph

First Appoipment

- Access cavity
- Working length determination
- Copious irrigation with NaOCl and EDTA
- Application of CH (2 week)



Second Appoipment

- Removal of CH
- Placement of MTA Angelus as a plug

Second Appoipment

- Root canal obturation with warm gutta-percha obturation technique
- Permanent restoration with composite

6 months

12 months

DISCUSSION

Apexification treatment with MTA Angelus has been associated with the reduction of the periapical lesion as well as the maintenance of the tooth integrity. Calcium-silicate-based cement could promote healing considering sealing ability and biocompatibility. Obtained results after 6 and 12 months revealed the successful outcome of this treatment approach.

CONCLUSION & CLINICAL RELEVANCE

The success of treating necrotic immature teeth due to trauma depends on the accurate diagnosis and applying the appropriate treatment protocols. This case report demonstrated that apexification treatment with MTA could heal large periapical lesions.

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Eccentrically positioned necrotic tooth complicates the diagnosis process in cases with radiographic extensive radiolucent area

CP76

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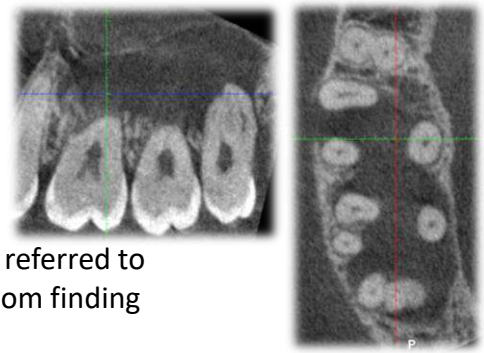
Aim

Presenting a clinical situation of a non-centered tooth as the origin of a large lesion.

Introduction

According to clinical experience, the source of an odontogenic lesion is an infected tooth located at the center of the lesion. However, in rare cases eccentrical position can appear.

An accurate diagnostic process including a CBCT scan can be helpful in this situation. (1)



Case Presentation

A healthy, pain-free, 27 years old patient was referred to perform a root canal treatment due to a random finding of a large radiolucency around tooth 16.

The tooth responded positively to sensibility tests and a sinus tract (ST) was traced to its roots. Tooth 17 responded slightly to the cold test compared to 16 and negatively to EPT. Tooth 18 did not respond to the sensibility tests .

A large hypodense area was detected on the CBCT scan, from the mesial aspect of 16 to the distal aspect of 18.

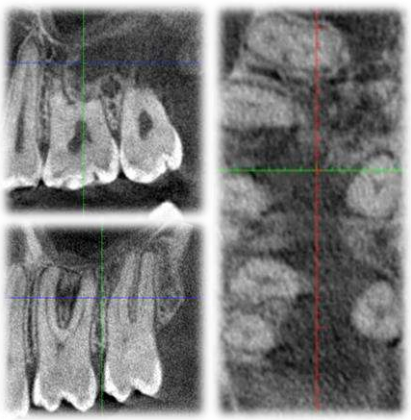
Diagnosis: 18 - Pulp Necrosis, Chronic Apical Abscess. DD's: Odontogenic Keratocyst, Dentigerous cyst

Tooth 18 was extracted and a biopsy was performed.

Histological analysis revealed an inflamed odontogenic cyst and a small fragment of lining epithelium reminiscent of odontogenic keratocyst.

Remainance of the ST was not detected at the 1-month follow-up and no further endodontic treatment was required. Teeth 16 and 17 responded positively to sensibility tests. At the 6-month follow-up CBCT scan revealed an advanced healing process.

Discussion



It is crucial for clinicians to accurately diagnose the source of a lesion to determine an appropriate treatment plan and prevent unnecessary interventions. (2)

Conclusion & Clinical Relevance

Pulp sensibility testing combined with a CBCT scan often enables accurate diagnosis and appropriate management

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Non-Surgical Root Canal ReTreatment of Failed CP77 Apicoectomy with the Use of MTA cement

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Aim

To show the potential of orthograde retreatment of a failed apicoectomy with the use of hydraulic calcium silicate cement

Introduction

Teeth with previous apical resection and persistent apical periodontitis are usually re-treated surgically or with a combination of non-surgical and surgical re-treatment. Alternatively, nonsurgical orthograde treatment of failed apicoectomy can be performed using the apical barrier technique used for apical closure of nonvital teeth with apical resorption or immature nonvital teeth. Mineral trioxide aggregate (MTA) has become the material of choice in such cases due to its excellent biocompatibility, sealing ability, and osteoinductive properties[1,2].

Case Presentation

A 27-year-old man came to dental office to repair a chipped left maxillary central incisor with a history of endodontic treatment and apicoectomy 4 years ago. Intraoral examination revealed tooth 2.1 with old chipped composite filling (Fig. 1). Diagnostic radiograph showed radiolucent lesion in periapical area of 2.1 (Fig. 2). Percussion painless, periodontal probing within normal limits. Cone-beam computed tomography revealed periapical bone lesion, an oblique section of the root apex, buccal ledge in the middle third of the root canal (Fig. 3 a,b). The treatment plan was the replace of the old composite filling and solve the endodontic problem. The patient rejected the idea of another surgery, so nonsurgical retreatment with the use of MTA apical plug was chosen. First visit, initial access revealed a non-hermetic white cement-like material in the root canal, which was easily removed by ultrasonic tip (Fig. 4). Buccal ledge complicated with perforation was found on the root surface. Multiple irrigation with 5.25% sodium hypochlorite solution with ultrasonic agitation, finished with calcium hydroxide dressing for 2 weeks. During the next visit, neither subjective nor objective symptoms were noted in tooth 2.1. Calcium hydroxide paste removed by irrigation with 5.25% sodium hypochlorite solution with ultrasonic agitation. The final irrigation protocol consisted of alternate irrigation with 17% EDTA solution (exposure for 2 min.) and multiple irrigation with a 5.25% sodium hypochlorite solution with ultrasonic agitation. MTA plug was placed in the canal using a special syringe MAP System, including the perforation area followed by radiographic control (Fig. 5). Next visit, the tooth was restored with composite material. 1,5 year radiographic (Fig. 6) and CBCT (Fig. 7 a,b). follow-up revealed complete healing of the periapical lesion.

Fig. 1

Fig. 2

Fig. 3a

Fig. 3b

Fig. 4

Fig. 5

1,5 y Follow-up

Fig. 6

Fig. 7a

Fig. 7b

Discussion

Teeth undergone apicoectomy with the presence of persistent apical periodontitis can be retreated with endodontic microsurgery or combination of non-surgical and surgical re-treatment. However, patients are often reject another surgical procedure, despite the fact that modern microsurgery has a high success rate. The only alternative treatment option is to make an attempt of non-surgical re-treatment using the apexification technique. The apical barrier technique with long-term favorable results in failed apicoectomy cases is of great benefit to both the patient and the practitioner.

Conclusion & Clinical Relevance

The use of hydraulic calcium silicate cements (MTA/Bioceramics) as an apical barrier in cases of orthograde re-treatment after failed apicectomy is a promising solution in microinvasive endodontic interventions.

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CP78

MANAGEMENT OF A SECOND MANDIBULAR MOLAR -A INTENTIONAL REPLANTATION CASE

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Aim: To demonstrate that with an adequate diagnosis we can choose the optimal treatment option in the case of some teeth with a reserved prognosis.

Introduction: Correct diagnosis of the case and identification of the problem before treatment is an essential step. A pre-treatment CBCT scan can supplement existing modalities and provide valuable additional information on failed root canal treatments[1]. The information obtained from a CBCT scan in complex endodontic cases may influence treatment planning strategies [2,3] and ultimately the treatment outcome. When properly planned and executed, intentional replantation has been shown to be quite successful in providing patients with additional years of service.[4,5]

Case Presentation

In a 50-year-old male patient it was clinically observed that on the second lower left molar there was a presence of interproximal deep pocket. Radiographically, the presence of an incorrect endodontic treatment was observed.

There was massive bone loss to the mesial, but apparently no peri-radicular changes (Fig. 1). A fracture was suspected. Evaluation of the CBCT scan revealed a resorptive defect (Fig. 2). The defect could have not been addressed with orthograde retreatment or microsurgery.

Fig.1


Fig.2


Fig.3


Fig.4

A decision was made to extract the tooth, check for root fractures and replant it after adressing the root defect and retrograde filling (Fig. 3). The tooth was reimplanted and suture splint was maintened for 2 weeks (Fig. 4) Radiographic control was made after 1 month, 2 months, 5 months, 12 months (also by CBCT) and 19 months later (Fig. 5, 6). The tooth remained asymptomatic. Healing of the periodontal ligament space was noted. There were no evidence of root resorption or ankylosis both clinically and radiographically during this period.


Fig.5

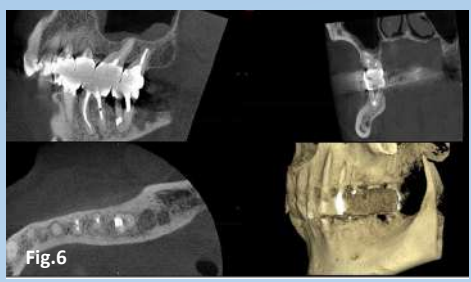
Fig.6

Discussion

Key prognostic factors to increase the likelihood of success include limiting the extra-oral time as short as possible and minimal trauma to the periodontal ligament and cementum. A team of two dentists worked in tandem to prevent prolonged treatment time.

Conclusion & Clinical Relevance

It is important to realize that intentional replantation should be the treatment of last choice, selected only when all other options of treatment have been exhausted. With correct case selection, it can be a reliable treatment modality in an effort to maintain the natural dentition.

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CP79

EXTERNAL CERVICAL RESORPTION

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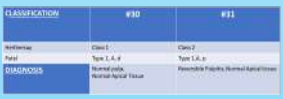
Aim

To address fast growing symptomatic external cervical resorption

Introduction

The condition is usually painless unless there is superimposed secondary infection when pulpal or periodontal symptoms may arise. External cervical resorption has been and continues to be, misdiagnosed as a form of internal resorption. Although the cause of this condition remains obscure, potential predisposing factors have been identified and these include trauma, orthodontic treatment and intra-coronal bleaching as sole factors or in combination.

Case Presentation



Subjective -In 2017 patient had no complaints but in 2019 developed sensitivity to cold that did not linger

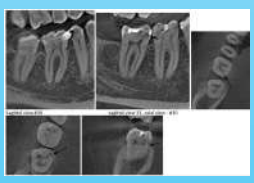
Objective - Pulpal – cold test - #30- normal , #31- hypersensitive non lingering - reversible

Percussion – ; Palpation – ; Probings – #30- 434,444, #31- 434,444, Grade I mobility

Radiographs – Intact LD, Continuous PDL, Normal bone levels and trabeculation

CBCT - Low density area noted in cervical 3rd towards DL #30, ML #31

2017 Vs 2019



Methodology

Procedure- #30 Flap reflection and curetting the active tissue with U/S , resorptive defect repair with Geristore, #31- RCT, irrigation with Sodium Hypochlorite & EDTA, WL – MB-18.5.mm, ML-18mm, D- 19mm, Crown down with Protaper F3 used for Mesial and Distal canals, obturation with GP and bioceramic sealer Bioroot flow, resorptive defect cleaned with U/S and filled with Geristore, CLP on ML to bring margin 2-3mm over Geristore

Discussion

According to Patel, the classification of ECR is 3 D:

Height	Circumferential Spread	Proximity to the root canal
1. At CEJ or coronal to bone crest (supracrestal) 2. Extends into coronal third of thr root and apical to the bone crest (subcrestal) 3. Extends into mid-third of the root 4. Extends into the apical third of the root	A. <= 90^0 B. > 90^0 to <=180^0 C. >180^0 to <=270^0 D. >=270^0	d. Lesion confined to dentine p. Probable pulpal involvement

The ECR is a rapidly progressing resorptive lesion in the cervical third of the root. The management of this case involved a two-step procedure, which started with the nonsurgical approach and ended with surgery. We performed RCT #31, placed Geristore externally followed by ParaCore core build up material. Geristore shows high sealing, is a periodontally compatible restorative material which promotes tissue attachment. CBCT revealed the extent and location preoperatively in 3D which aided in surgical exposure permitting direct access to the lesion.

Conclusion & Clinical Relevance

Treatment of ECR is aimed at debridement and restoration of the resorptive lesion by placing a suitable filling material so the tooth can be retained. When the pulp is exposed options of direct pulp capping or RCT are recommended as a single visit RCT.

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Regenerative Endodontic Treatment of Non-vital Mature Teeth with Large Apical Lesions: A Case Series

CP80

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Aim: To describe the regenerative endodontic treatment of non-vital mature teeth with large apical lesions

Introduction: Regenerative endodontic procedures have been defined as 'biologically based procedures designed to replace damaged structures, including dentin and root structures, and cells of the pulp–dentin complex' (Murray et al., 2007). Regenerative endodontic procedures have recently been suggested for treating mature permanent teeth with closed and fully formed apices (Glynis et al., 2021).

Case 1: A 21-year-old woman presented with pain while chewing on teeth #12 and swelling. Radiological examination revealed a large apical lesion involving both teeth which were non-vital. The decision was made to perform a revitalization treatment following the European Endodontic Society's guidelines for revitalization (2016). After removing the tissue remnants, the roots were irrigated with 2.5% NaoCl and 17% EDTA. Calcium hydroxide (CH) was used as a medicament for 4 weeks.

At the second visit, the root canals were irrigated with EDTA and saline solution. Consistent apical bleeding was induced using a size 30 manual stainless-steel K-file. CGF (concentrated growth factor) was obtained from the patient's venous blood, and it was placed in the root canal space. Then, 2-3 mm of EndoSequence BC RRM putty (Brasseler USA, Savannah, Georgia, USA) was placed directly on the CGF. Finally, the coronal part was sealed with glass ionomer cement (GIC) After 1 month, the cavity was restored with composite resin. Follow-up visits were scheduled every 3 months during the first year and every 6 months for the following 6 years. At recall appointments, clinical and radiological examinations were performed.

Case 2: A 32-year-old man was referred to our clinic due to percussion sensitivity in teeth #31 and #41. Radiological examination revealed a large apical lesion involving both teeth, which were non-vital. Revitalization treatment was performed as described previously, and the case was followed up for 5 years.

Case 3: A 25-year-old woman was referred due to pain and swelling in the maxillary anterior region. Radiological examination revealed a large apical lesion around the root of teeth #12 and #11, both of which were non-vital. Revitalization treatment was performed as described in case 1, and the case was followed up for 6 years.

Discussion: At the recall visits, all teeth were found to be functional and asymptomatic. However, there were changes in the responsiveness of the teeth involved in the first and second cases to electric and thermal pulp tests since the first-year follow-up. The teeth in the third case also began to respond to vitality testing after 18 months. Radiological examinations indicated healing of the apical lesions and deposition of hard tissue.

Conclusion and Clinical Relevance: Regenerative endodontics offer advantages over traditional endodontic procedures, especially in terms of tertiary healing. They provide a predictable, user-friendly treatment option for mature non-vital teeth with large apical lesions.

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Extraction, extraoral recomposition and replantation of a fractured central incisor

CP81

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Lateral translucency

Aim: Save a tooth that seemed doomed to extraction due to the location of the fracture line

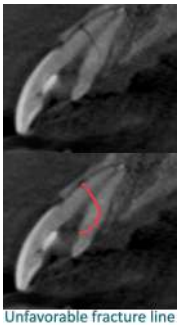
Introduction:

A 16y old male patient who had received initial root canal treatment after trauma with a root fracture 4 years before, showed up with a mid root abscess

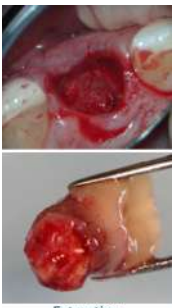
Case Presentation:

The old root canal filling was removed and a CBCT was taken showing a root fracture that curved from labial middle of the root to the palatal crestal area. The fracture line was considered very unfavourable with the fracture gap being a constant source of reinfection; thus classical retreatment seemed hopeless.


Fracture: Photo +CBCT


Unfavorable fracture line


Cleaning, disinfection +filling of apical part


Extraction


Extraction of root tip with Flexipost, place in Dentosafe®


Cleaning of fractured surface with scalpel


Cleaned and disinfected coronal fragment


Tooth repositioned and splinted


Both fragments glued with Superbond®


Access cavity before post placement


Immediate post-operative


+ 12 months


+ 29.5 months

The patient received 2 doses/d amoxicillin 875 mg/clavulanic acid 125mg for 5 days, starting the day before treatment. After taking a silicone key for later repositioning, the apical part of the root canal was retreated first and filled with AH plus® and gutta percha. Then, the coronal part was extracted, the fracture surface cleaned of pus and granulation tissue with a scalpel. The surface was disinfected with 1% NaOCl, rinsed with saline solution and then stored in Dentosafe®. Then the apical fragment was extracted, disinfected and stored in the Dentosafe®. The fragments were removed from the Dentososafe®, the fracture surfaces dried with a Stropko Irrigator® and the fragments were glued together with Superbond®. After reinserting the tooth into Dentosafe®, the excess glue was removed with a scalpel under the microscope. The tooth was replanted to its original position using the silicone key and splinted with a TTS-Splint®. Finally, the root canal was cleaned of excess sealer, a fiberglass post was placed beyond the fracture line. After reducing the fiberglass post, a composite filling was placed on top to seal the access cavity. After 29.5 months, the tooth is fully in function without any symptoms and with no sign of radiographic pathology.

Discussion: With an abscess next to a fracture line going from labial middle of the root to the crestal area on the palatal side , the prognosis of the tooth seemed very guarded. Amputation of the apical fragment would have been an option, but leaving a high risk of persisting infection from the vertical fracture line.

Conclusion & Clinical Relevance: The ultimate goal was to save the tooth for a long time, or at least to gain time for the future placement of an implant in case of failure.

References: The author was inspired by personal communication with Dr. Morio Okaguchi from Tokyo, Japan, who showed a similar technique on vertical root fractures.

CP82

Endodontic surgery on a mandibular premolar with radicular groove : a case report

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Aim To discuss the morphological characteristics and treatment of a mandible premolar with radicular groove limited to middle 1/3 of the root.

Introduction Occasionally, root canal treatment of mandibular premolars is compromised due to the variations of root morphology. Radicular groove is a common developmental malformation that extends along the root to varying lengths. It is relevant to the onset of localized periodontitis and groove itself may act as a haven for bacteria and cause persistent pathosis.

Case Presentation A 38 year-old female without contributory medical history was referred for endodontic treatment on the right mandibular first premolar (#44). The chief complaint of the patient was intermittent swelling around the tooth without any related pain. The tooth had no response on percussion and electric pulp test. Sinus tract was observed and traced with GP cone which led to a radiolucent lesion located mesial to the middle 1/3 of the root (Fig.1a, b). Lateral canal was suspected.

The tooth was diagnosed with pulp necrosis and periapical abscess, and root canal treatment was performed. However, sinus tract was still persistent after root canal treatment and for further evaluation, cone-beam computed tomography (CBCT) was taken. Radicular groove was identified in the middle 1/3 of the root (Fig.2). Periradicular surgery was planned and the radicular groove was prepared with a round bur and filled with Endocem MTA (Fig.3b, c). The radiolucent lesion disappeared and the tooth was asymptomatic until 4 years later (Fig.3d)

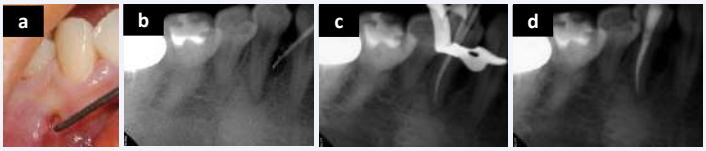

Fig.1

Fig.2

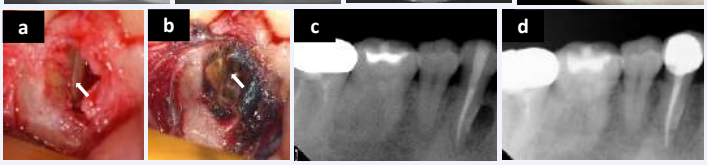

Fig.3

Discussion The radicular groove on the mandibular first premolar is usually located on mesiolingual root surfaces[1)] and the prevalence rate has been reported to be around 10-24%[1-3)]. Since radicular groove is highly related to C-shaped or multiple canals, root canal treatment can be challenging. In addition, radicular groove can act as a continuous reservoir for infectious agents and the periradicular disease cannot be solved by root canal treatment alone[3-5)].

In this case, although the tooth had only a single canal, the radicular groove was located in the middle 1/3 of the root and could be detected only with the help of CBCT which proved to be a powerful diagnostic tool. Surgical approach was necessary to resolve the lesion in addition to conventional root canal treatment and the prepared groove was filled with fast setting MTA.

Conclusion & Clinical Relevance Root canal treatment of mandibular first premolar can be challenging due to radicular groove even when the tooth is single rooted. The clinician should consider taking CBCT of the tooth if the periradicular lesion does not disappear with conventional root canal treatment. Periradicular lesion that appear to be caused by lateral canal could be due to radicular groove and in this case, surgical intervention is needed.

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