CASE REPORT

Uneventful Healing of Periapically Extruded Guttaflow in a Geminated Incisor: A Case Report

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ABSTRACT

Aim: The present case report discusses the non-surgical endodontic management and one year follow-up of a geminated maxillary left central incisor with a cold injectable material, which extruded into the periapex.

Summary: The use of spiral CT confirmed our radiographic findings showing a complex root canal system. A three dimensional packing of the pulp canal space and a proper coronal and apical seal are the steps on which the outcome of the treatment depends. In the present case, after obturating the apical 5-mm of the canal with gutta-percha and AH-Plus sealer, there was an unintentional extrusion of material into the periapical area, which perhaps occurred due to forceful injection without maintaining a proper distance from the gutta-percha segment. As there were no immediate post operative symptoms, and the patient was young and healthy, a less invasive 'wait and watch' approach was taken. Deciding whether to intervene surgically in cases of overextension or overfills depends on pre-operative symptoms of the patient, immediate postoperative symptoms of the patient and looking for any signs and symptoms over the observation period.

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INTRODUCTION

Morphoanatomic variations in the teeth may be found in the crown, roots or root canals, and if not properly diagnosed or treated, may lead to failure of the endodontic treatment.[1,2] The maxillary central and lateral incisors are a common site for anomalies like dens invaginatus, microdontia, anodontia, palatoradicular grooves, fusion and gemination.[3] Gemination is a malformation caused because of an attempt by a single tooth germ to divide, resulting in a large single tooth with a bifid crown, and a common root canal.[3,4] Clinical differentiation of gemination and fusion is challenging, and thus they are often discussed under a common heading of "double teeth".[5] Teeth with varied anatomy often need equipment other than the conventional ones for both diagnosis and treatment. In the recent past, dental operating microscope and CT scan have proved to be of valuable help in identification and management of endodontic complexities.[1] Cleaning and shaping of these teeth are now aided by ultrasonic agitation of the irrigating agents, F- Files and better rotary systems.[6] Traditional lateral compaction of gutta percha has to be substituted with injectable warm or cold materials which can satisfactorily fill the intricate canal system. These injectable systems however may result in extrusion of the obturation material into the periapical space, and sometimes failure of the root canal treatment.[7] The present case report discusses the non-surgical endodontic management and one year follow-up of a geminated maxillary left central incisor with a cold injectable material, which extruded into the periapex.

CASE REPORT

A 22 year old female patient with a non-contributary medical history reported to the Department of Conservative Dentistry and Endodontics with the chief complaint of continuous pain and pus discharge in the left maxillary anterior region since few months. Intraoral examination revealed a discoloured maxillary left central incisor (22) with an abnormal morphology. It was very wide in mesiodistal dimension and had a notched incisal edge (Fig. 1). A draining sinus tract could be seen in the buccal

Figure 1: Preoperative photograph showing a sinus in relation to bifid 22.

vestibule in relation to 22 (Fig. 2). There was no history of trauma to the tooth and detailed family history revealed no hereditary link. Intraoral periapical radiograph presented with a bizarre picture of a bifid pulp chamber and shared root canal space along with periapical radiolucency (Fig. 3). To better understand the pulp canal complexity a spiral CT of the region was performed (Fig. 4). Since the number of teeth in the arch was normal, and considering the morphological features of the tooth, a diagnosis of gemination was made.

Figure 2: Palatal view of the bifid 22.

A non-surgical endodontic therapy was planned. The tooth tested negative to the electric and cold thermal pulp sensibilty tests. After rubber dam application, two separate access cavities corresponding to the mesial and distal pulp horns in the bifid pulp chamber were made (Fig. 5). A minor opening could be seen in the notched space between these two orifices and was negotiated with a #10 K file. After

Figure 3: Preoperative radiograph showing the bifid crown and shared root canal and periapical radiolucency in distal aspect of 22.

initial exploration of the canals with # 15 K-files, working length radiograph of the tooth revealed the two size # 15 files meeting in the main canal, and a # 10 file going to a short distance in the incisal notch (Fig. 6). The canals were copiously irigated with 3% sodium hypochlorite (NaOCl) and normal saline and prepared till size 60 by circumferential filing. Finally, the canals were filled with NaOCl and agitated with ultrasonic files to cleanse off maximum debris and tissue from the complex canal system. The access cavity was then sealed with Cavit (3M ESPE) and patient was recalled after one week. On the subsequent visit the patient was asymptomatic. A 5 mm section of size 60 gutta-percha point was attached to a heated finger plugger and carried into the canal to obturate the apical 5mm of main canal. The backfill was done with a injectable cold obturating material Guttaflow (Coltene Whaledent, OH). Immediate post-obturation radiograph revealed a completely filled root canal system, but a small amount of extruded obturation material on the distal aspect of the root (Fig. 7). Patient was informed about the condition, and since there were no immediate symptoms, the access was temporarily sealed and the she was recalled after 1 week. On subsequent visit, since there were no symptoms of pain or tenderness, the access was permanently sealed, and the crown was reshaped and built up with a nano composite(Filtek Supreme XTE, 3M, ESPE). 1 year follow up of the case showed resolution of the sinus tract (Fig. 8), and till this case report was written, satisfactory radiographic healing of the lesion was appreciated after the non-surgical endodontic therapy (Fig. 9). We intend a longer follow-up of the case, but substantial reduction in the periapical radiolucency one year after the endodontic therapy, inspired us for reporting the case.

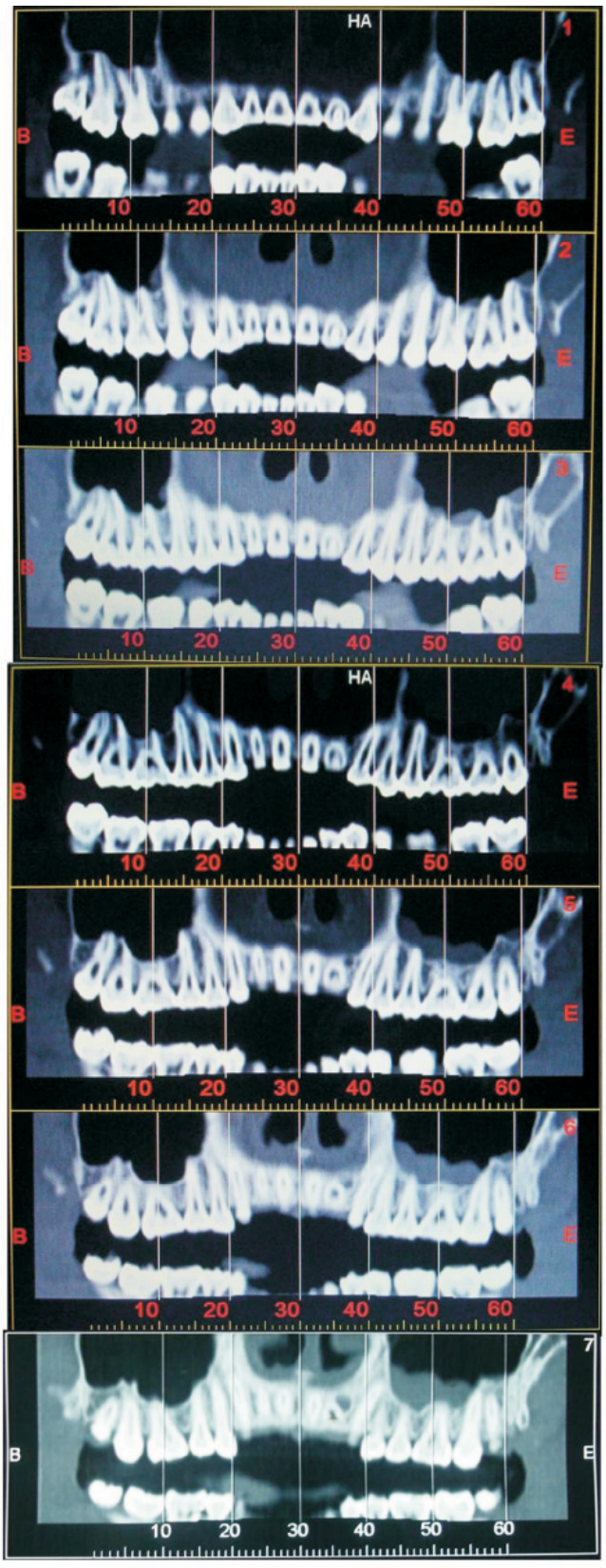

Figure 4: Spiral CT images of the maxilla revealing complex root canal anatomy of bifid 22.

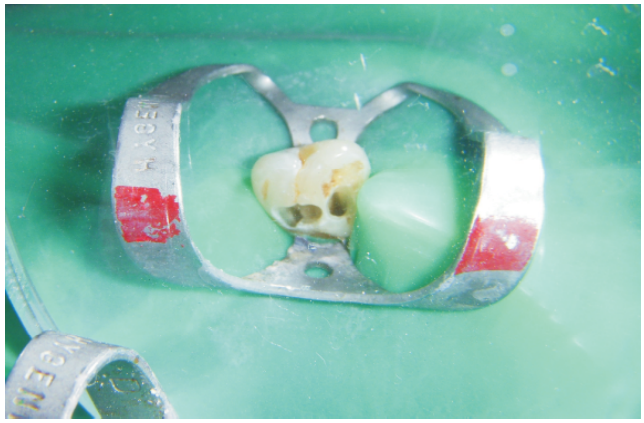

Figure 5: Separate access cavities for the two crowns.

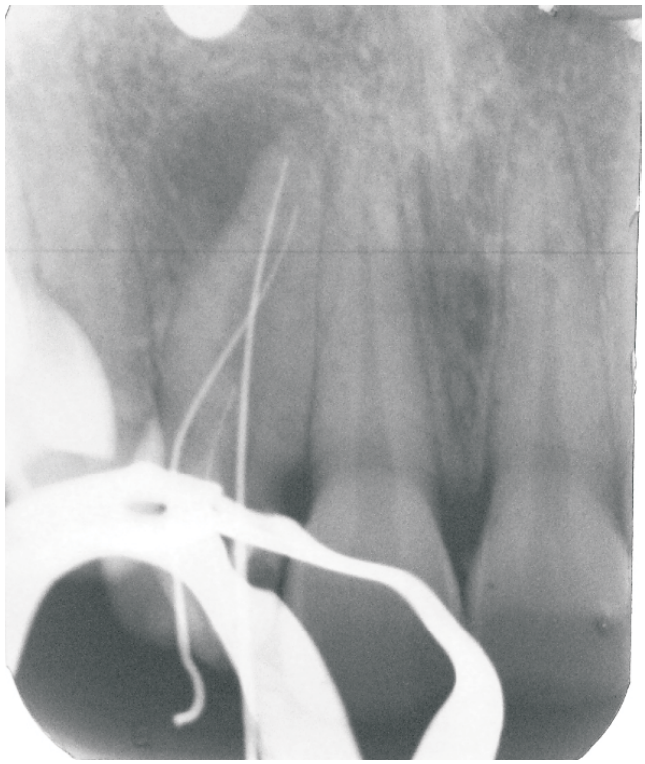

Figure 6: Working length radiograph.

DISCUSSION

Depending on the stage of tooth development, different levels of union of cementum, dentin and/or enamel may occur.[5] The etiology of such anomalies is still unclear and genetic predisposition, racial differences, trauma and environmental factors such as thalidomide embryopathy, fetal alcohol exposure or hypervitaminosis A of the pregnant mother may be some of the possible causes.[8] The double teeth (i.e. gemination and fusion) occur with a slightly greater prevalence in the primary dentition (0.6-2.8%) than the permanent dentition (0.1-1%).[9] Asian populations exhibit a higher incidence of about 5% and the incisors and canines are the teeth most commonly affected.[10]

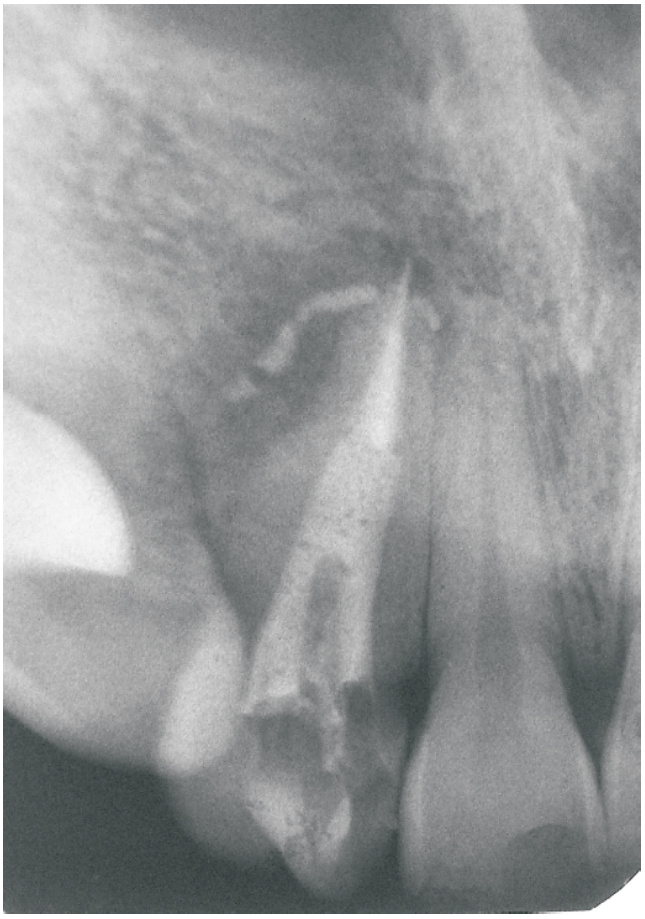

Figure 7: Immediate post obturation radiograph showing apically extruded obturation material.

Figure 8: One year follow up photograph showing resolution of the sinus.

Generally, these situations do not require any intervention and treatment depends on patient's needs. If the tooth is not pulpally affected, selective recontouring or reshaping along with restoring the coronal groove with or without placement of full crowns may be done. Attempts have been made to surgically divide the tooth along with endodontic treatment and full crown placements,[3,5] and here an analogy can be made between these and the "Siamese Twins". The presence of symptoms in this case could be attributed to the enamel deficiency in the notched coronal structure as the tooth was caries free and there was no history of trauma; so it is likely that the deficient enamel allowed bacterial access to the pulp chamber in a manner similar to the cases of dens invaginatus.[10]

Figure 9: One year follow up radiograph showing remarkable healing of the periapical lesion.

Differential diagnosis is very important in these cases and depends on the number of teeth in the arch, clinical features and radiographic findings. In the present case a bifid pulp chamber, a single canal and normal number of teeth in the arch supported the diagnosis of gemination. Radiographs present a 2-dimensional view of a 3D anatomy and geometric distortion of the structures may also occur.[11] The advent of CT and more recently the Spiral CT (SCT) offers a 3D picture of the situation, and has the inherent advantage of faster scanning times and reduced radiation exposure.[1] In the present case, the use of SCT confirmed our radiographic findings showing a complex root canal system.

Clinical situations with complex anatomy require modification in access cavity preparation,[12] irrigating agents/ adjuncts,[6] and obturation materials/methods.[7] Depending on the clinical and radiographic findings, two separate access cavities were made for the bifid crown, and the area of notching was also explored and cleaned. Sodium hypochlorite is a time-tested irrigating agent with excellent

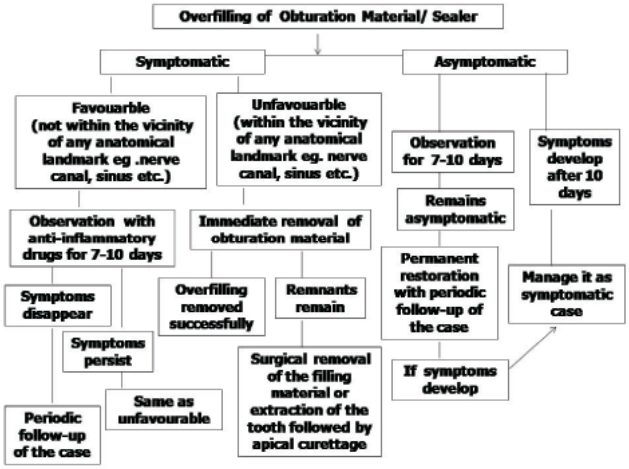

Figure 10: Schematic representation of sequential management of an overfilling.

tissue dissolving properties. Furthermore, ultrasonic agitation has been proven to increase its cleaning efficiency and is particularly helpful in cases where mechanical access by instrumentation is not possible.[6]

Conventional cold compaction with gutta-percha is the gold standard for root canal obturation, but because of lack of flow it is not suitable for cases with complex anatomy.[13] To overcome this limitation many modifications have been introduced for backfilling with thermoplasticized gutta percha. More recently a cold, flowable, self curing obturation material which combines gutta-percha and sealer into one injectable system with the trade name of Guttaflow (Coltene/Whaledent Inc, OH) has been introduced. Since this technique does not use heat, there is no shrinkage and the poly-dimethylsiloxane sealer present in the system is reported to expand for about 0.2% upon curing.[14] If not used carefully periapical extrusion of the obturation material is one of the drawbacks of the injectable systems. Also, incorrect working length determination and over instrumentation are important reasons for overextension of obturating material. In the above case, even after obturating the apical 5-mm of the canal with gutta-percha and AH-Plus sealer, there was an unintentional extrusion of material into the periapical area, which perhaps occurred due to forceful injection without maintaining a proper distance from the gutta-percha segment. The overextension of the gutta percha into the periapical may also be due to lack of apical constriction, especially in cases of young patients, as in this case.

Owing to their better flow properties, cold injectable and/ or thermoplasticised gutta-percha techniques are particularly valuable for ovoid canals and canals with abnormal anatomy as it can easily move into canal shape and replicate the intricacies of the root canal system.[15] To prevent overfills, precautions must be taken, such as maintaining the apical constriction while shaping the canal or limiting the size of the apical constriction by prefitting a sectional master cone. Even packing of dentinal chips in the apical third has been used, but it has the disadvantage of containing infectious or antigenic material.[16] Some clinicians have suggested that a zinc-oxide eugenol based sealer should be used with these methods as this cement sets to form zinc–eugenate, which is a prostaglandin inhibitor (prostaglandins are known inflammatory and pain mediators). Thus, even if overfills occur, the patient will not have an increase in post-operative flare-ups.[17] However, according to Johnson and Guttman,[18] resin-based sealers must be used with the thermoplastic gutta-percha, as the sealability of these sealers is comparatively undisturbed by the use of heat.

The decision to intervene surgically in cases of overextension depends on pre-operative symptoms of the patient, immediate postoperative symptoms of the patient and any signs and symptoms over the observation period. Blanas *et al*.[19,20] reported two cases of inferior alveolar nerve injuries secondary to extrusion of thermoplastic endodontic materials into the nerve canal and in one of the cases the patient was symptomatic even after extraction of the obturated tooth. They also suggested an algorithm for management of thermoplastic inferior alveolar nerve injuries depending on the resolution or persistence of the symptoms. Similarly, a sequential approach needs to be taken in any case of overfilling, whether a nerve injury has taken place or not (Fig. 10). Depending on the conditions such as the amount of obturation material, the proximity of the overfilling to any anatomical landmark of significance, particularly the sinus and the nerves, a sequential management can be carried out. If the patient is symptomatic and material is in close proximity to any anatomical landmark, immediate removal of the obturation, and if needed, a surgical intervention may be required. On the other hand, if the obturation material is not encroaching any sinus or nerve canal, then even the symptomatic patient can be put on an anti-inflammatory regime, an observation period of 7-10 days and a long term follow-up thereafter.

As there were no immediate post operative symptoms, and the patient was young and healthy, a 'wait and watch' approach was taken. Guttaflow has a good biocompatibility and acceptable tissue toxicity as shown by various histological[21] and animal studies.[22] Silicon (polydimethyl siloxane) has a good track record in oral and maxillofacial surgery and prosthodontics and has been used for correcting facial defects and as soft liners since a long time. Moreover, a silicon-low temperature isotropic carbon (LTI) alloy implants used for subperiosteal implant or an endosteal blade are reported to be very biocompatible.[23] Thus, keeping in mind all the factors of material's good biocompatibility and tissue tolerance in young healthy adult, the case was followed up without any further intervention, and twelve

month follow-up appointment showed good clinical and radiographic healing. The authors agree that further follow-up is required, but wanted to report and emphasize on the fact that a non-surgical, less invasive treatment plan should be considered if the factors of biocompatibility, clinical signs and general health are favorable and give the tissues a chance to heal naturally. Although the evidence based studies are the need of the hour, but carrying out randomized controlled clinical trials for studying such treatment outcomes are neither practical nor ethical. Hence, clinical reports giving systematic management of such cases should be of significance to the clinicians.

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