

Large radicular cyst with both buccal and palatal cortical bones perforation secondary to vital pulp therapy failure

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Abstract

Radicular cyst as the most common odontogenic cyst usually arises from residual epithelial cells stimulated by inflammatory factors initiating by pulpal necrosis of a non-vital tooth. Radicular cyst is commonly asymptomatic, slow grower, and rarely invade near bony structures. Many treatment approaches are presented for a radicular cyst like surgical endodontic treatment, tooth extraction, enucleation, and marsupialization. In this case treatment plan compromised with root canal therapy and surgical enucleation of cystic lesion. This case report presents a large radicular cyst in a vital maxillary first molar with only one necrotic root canal secondary to direct pulp capping with mineral trioxide aggregate with buccal and palatal cortical bone perforation.

Keywords: Radicular Cyst; Bone Resorption; Maxilla; Vital Pulp Therapy

1. Introduction

A 20-years old female patient reported to the Department of Endodontics, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, with chief complaint of wound in palatal gingiva of upper jaw which had occurred six months ago. She had undergone direct pulp capping with mineral trioxide aggregate (Angelus Soluções Odontológicas, Londrina, Brazil) and MO composite filling (Z100, 3M dental product, USA) four years ago for 16. Intra oral evaluation revealed an oval, non-tender, and inflamed swelling which was located on palatal mucosa of 14, 15, and 16 (Fig. 1). On palpation, the swelling was soft, localized, fluctuant, and pus discharge was observed. Thermal and electrical pulp vitality tests showed positive response in the tooth in question (tooth 16), 14, and 15. All of these teeth were not found to be tender to percussion. A radiolucency was seen in the periapical radiography in the preapical region of 14, 15, and 16. Panoramic view radiography also showed a large unilocular radiolucency with a well-defined border (Fig. 2. A & B). For delicate investigating the relation of the lesion with the nasal cavity and maxillary sinus, the patient was subjected to cone-beam computed tomography (CBCT) scans. These scans confirmed a 2 cm × 1.5 cm lesion and indicated that the nasal and maxillary sinus floor were intact. Both buccal and palatal cortical bones were perforated according to saggital, coronal, and three dimensional reconstruction images (Fig. 3. A-C). Needle aspiration revealed straw-colored fluid, which was sent for further cytological examination. Based on these findings, the differential diagnosis included radicular cyst (RC), and odontogenic cyst. After all, treatment plan was designed with and presented to the patient and her informed consent was taken. The maxillary right first molar was subjected to endodontic treatment prior to cyst enucleation and decided to follow for evaluation

of the initial outcome of endodontic therapy. Root canal therapy was planned for 16 based on clinical and paraclinical examinations. The tooth was anesthetized 68 mg articaine 3% (Darupakhsh co., Iran) containing 0.017 mg epinephrine (1:80000) and isolated with rubber dam to prepare the access cavity with a round diamond bur (Dentsply, Maillefer, Ballaigues, Switzerland) (Fig. 4). Pus discharge was not seen after penetration into pulp chamber. Palatal root's pulp tissue was egressed completely (Fig. 5. A) and sent for histopathological examinations. These evaluations indicated a severe fibrous connective tissue as scar-like soft tissue consists of intensive collagen bundles and massive dystrophic calcification (Fig. 5. B). Thus, Palatal root recognized as necrotic pulp. However, both buccal canals during working length determination showed bleeding and based on the previous clinical examination, they recognized as irreversible pulpitis. Working length determined and root canals were flushed gently by sodium hypochlorite (NaOCl, 5.25%). Then, root canals were dried using paper points, filled with a calcium hydroxide paste (Golchadent, Iran), and the access cavity was closed with 3 mm of Cavit (ESPE, Seefeld, Germany). After fourteen days, obturation completed by lateral compaction technique. After two weeks, due to ambiguity in definite diagnosis and residual symptoms patient was prepared for surgery. After local anesthetization, a trapezoidal mucoperiosteal flap were created in buccal region and cyst was enucleated. The specimens were sent for histopathological evaluations. Post-operation instructions were given to the patient. Histopathologic examinations showed a granulation tissue with cystic configuration with lining which demonstrates sever chronic inflammatory cells infiltration, and foamy macrophages (Fig. 5. C). The patient was called 2, 4, and 6 months after endodontic treatment. Follow ups revealed healing process and she mentioned no symptoms (Fig. 6). In the second follow-up tooth 15 was symptomatic due to extensive caries in distal surface and root canal therapy was done.

2. Discussion

Odontogenic cysts (OCs) are rare lesions in which influence the maxillofacial bone (IRHPJ and Shear, 1992) and more common in the mandible (Avelar et al., 2009). Moreover, OCs usually occur in adult men than women (Avelar et al., 2009). OCs compose approximately 7% to 12% of biopsies referred to oral and maxillofacial pathology laboratories. Meanwhile, radicular cysts (RCs) as the most common odontogenic cyst constitute 52.3% to 70.7% of them (Kontogiannis et al., 2015, Sagit et al., 2011, Kocyigit et al., 2012, Ali and Baughman, 2003). These lesions usually lined by epithelium, grow expansive and centrifugal (Sailor and Pajarola), less than one centimeter in diameter and surrounded by a thin rim of cortical bone (Weber, 1993). However, in this case the diameter of defect was 2 cm × 1.5 cm and buccal and palatal cortical bone were perforated. RCs frequently occur in preapical region of necrotic teeth in the mandibular bone (Avelar et al., 2009). The differential diagnosis of RC may consist of residual cyst, gingival cyst, traumatic bone cyst, dentigerous cyst, and odontogenic tumors (Sagit et al., 2011). In this case report, our differential diagnosis was decided based on the size and location of pathologic lesion, vitality tests, histopathological examinations, and radiological evaluations. In the first place, thermal and electrical tests did not show devitalization of dental pulp. Although, because of this the early diagnosis of preapical lesion was under question, further clinical and histological examination made the diagnosis possible. These findings indicated the scar-like soft tissue devitalization in palatal root canal and vitality of both buccal root canals in which explain the condition of RC cyst formation. We hypothesized that the previously vital pulp therapy created this scar-like soft tissue due to coronal leakage or low amount of MTA placement. It seems in tooth 16 constantly loss of seal and coronal leakage allowed microorganisms and endotoxins to pass through the palatal root canal and consequently the cystic pathologic lesion formed. However, reactive hard tissue formation such as osteodentin and scar-like soft tissue consider as success in vital pulp treatments, these processes cannot guarantee a permanent barrier to protect dental pulp from destruction (Iwaya et al., 2011, Klinge, 1999). Root resorption, cortical expansion, and tooth displacement frequently seen in RCs (Weber et al., 2003). Both buccal and palatal

bone cortex were perforated in this case. However, adjacent teeth were intact and did not show hyper mobility.

Although the treatment of RCs is still controversial, generally includes root canal therapy, apical resection of involved tooth, surgical approaches in large cases such as marsupialization and enucleation (Domingos et al., 2004). Therapeutic approach can be influenced by the size and location of lesion, concurrence to vital anatomic structures and bone integrity (Bodner, 2002). Therefore, both clinical and para clinical examinations should be used for each case to achieve an appropriate treatment approach (Ribeiro Jr et al., 2004, Valois and Costa-Júnior, 2005).

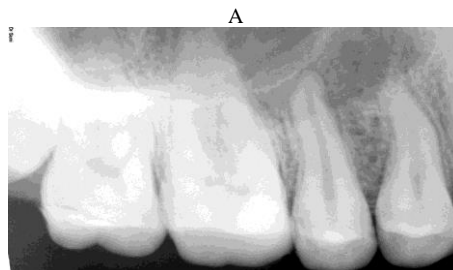
In this study, the endodontic therapy was carried out in multiple visits with calcium hydroxide dressings in order to reduction of bacterial contamination and exudate (Leonardo et al., 2002). According to Takahashi et al. (Takahashi et al., 1992) at least 14 days needed for achieving bactericidal effects of this material. After root canal therapy, only infected tissues were eliminated by a conservative surgical approach instead of conventional methods in which remove the normal surrounding tissues in addition to the lesion. After two weeks, post-surgical period for soft tissue healing, patient subjected for amalgam restoration for tooth 16. Bone healing in the pre-radicular region has not yet been accomplished because of large volume of the defect. Patients is still under control and she is asymptomatic.

In conclusion, the present case with unusual characteristics indicated that clinicians should be aware of uncommon clinical manifestation of RCs. In this article we managed a large RC located perforating buccal and palatal bone by successful root canal therapy and surgical enucleation. Although the authors suggested non-surgical approaches, in such large cases a combination of endodontic and surgical treatments is a viable choice with good prognosis. An endodontist should have complete knowledge about treatment options, materials, and reevaluation of treated teeth periodically.

3. Legends



Fig. 1: Palatal Gingivae Swelling and Inflammation in Relation To 16.



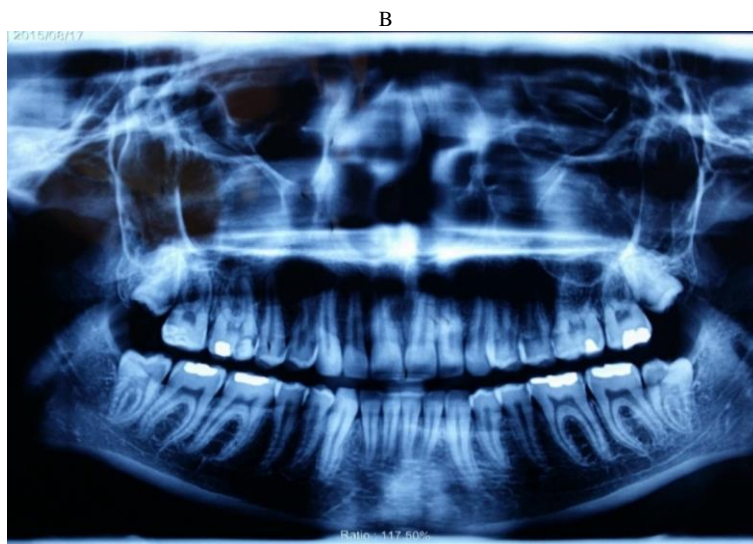
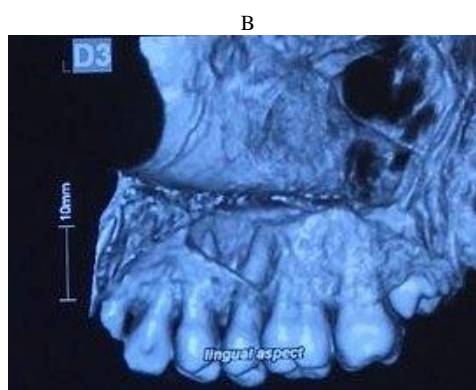
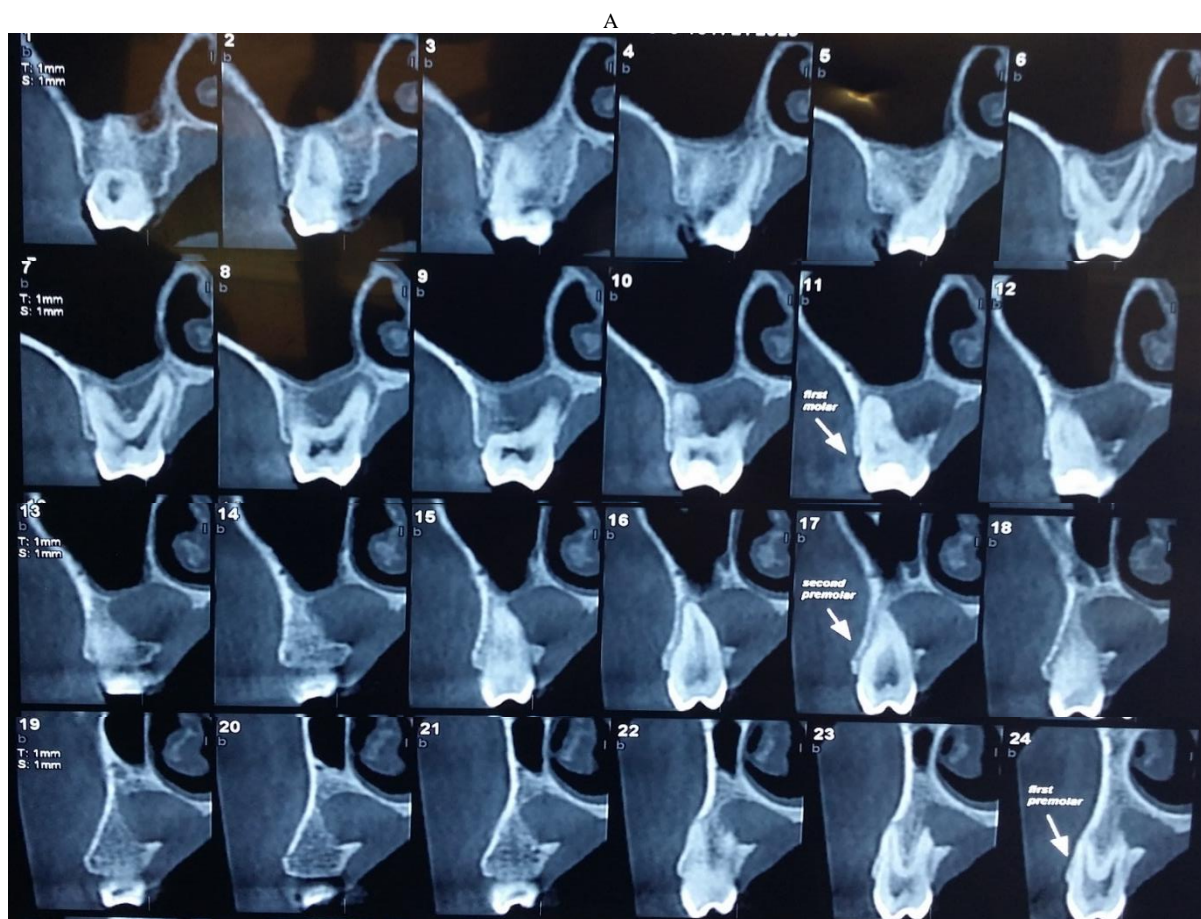


Fig. 2: A: Preapical Radiograph Showed a Large Radiolucency in Relation to 16. B: Panoramic View Showed a Large Radiolucency in Right Premolar Maxillary Region.



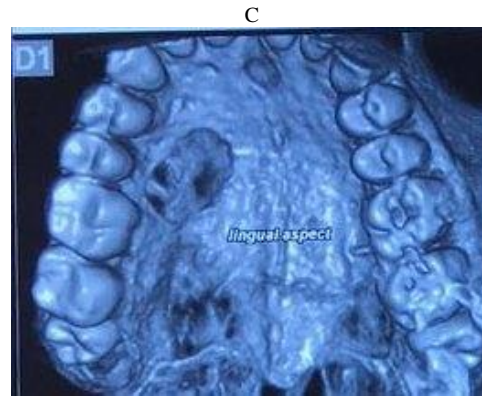


Fig. 3: A: Saggital Slices of CBCT Image Showed the Location of Lesion and Cortical Bone Destructions. B: Buccal Bone Perforation in Buccal View of Three Dimensional Reconstructed CBCT Image. C: Palatal Bone Perforation in Palatal View of Three Dimensional Reconstructed CBCT Image.



Fig. 4: Access Cavity.



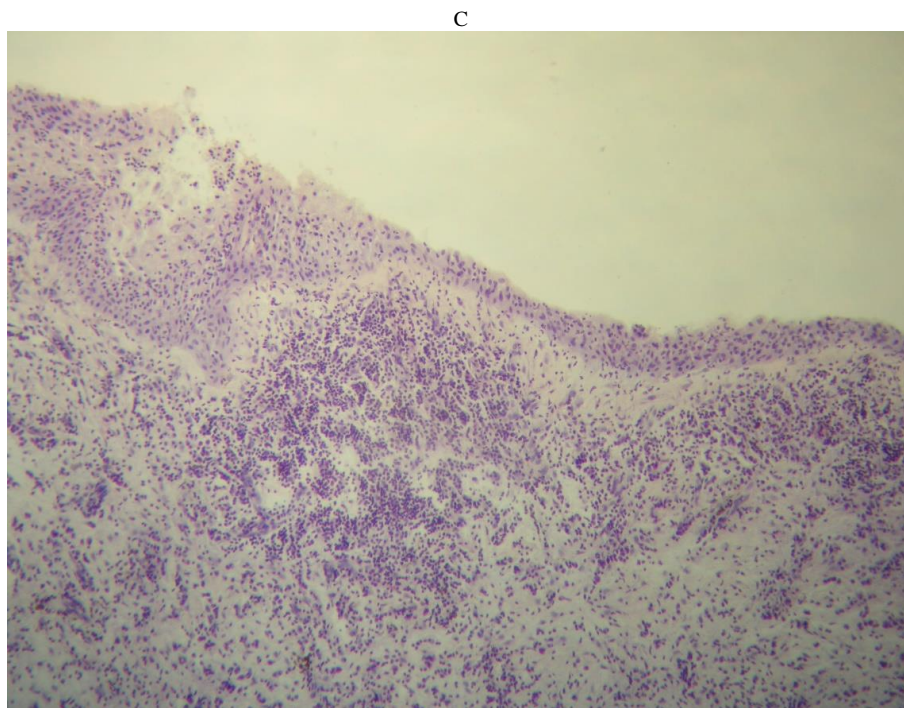
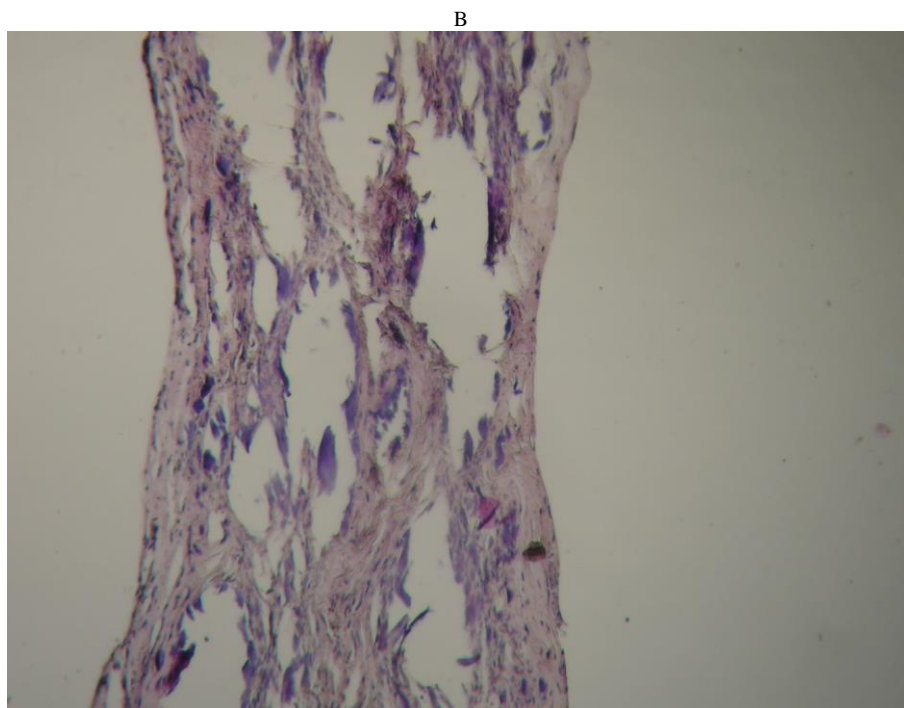
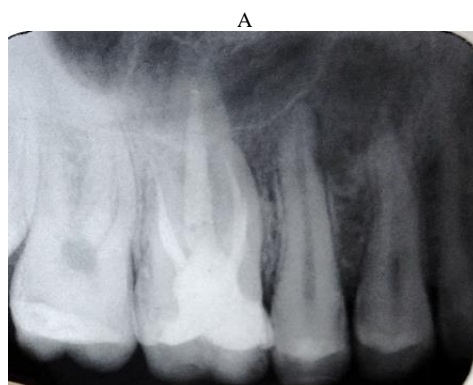


Fig. 5: A: Gross Clinical Feature of Palatal Root's Pulp Tissue. B: Histological Examination of the Dental Pulp Tissue (Magnification 40 X). C: Histological Examination of the Cyst (Magnification 40 X).



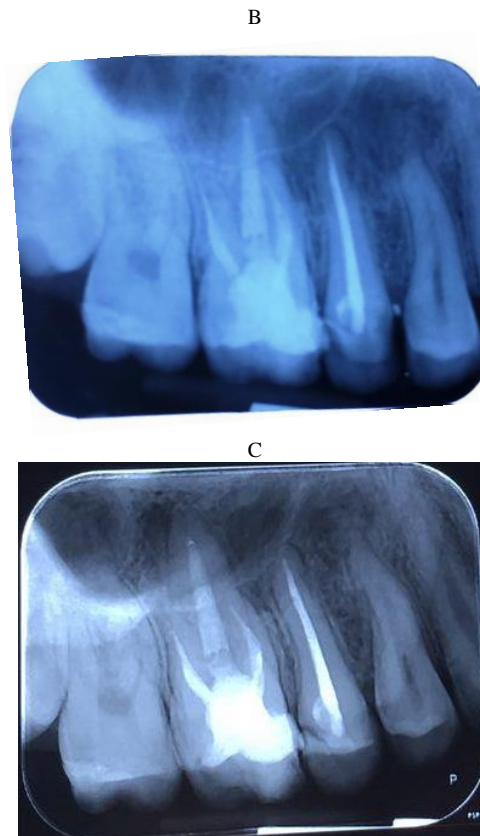


Fig. 6: Preapical Radiograph Taken 2 (A), 4 (B), and 6 (C) Months after Surgery.

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