CASE REPORT

Does Root Canal Overfilling Cause Development Of Radicular Cyst? Report Of Two Cases

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Abstract

Overfilling of root canal is an endodontic complication, characterized by extrussion of filling materials into the periapical tissues, which might be a causative agent of important pathological changes. This report presents two cases of overfilled left upper and lower molar teeth associated with potential development of large radicular cysts. In the first case a cyst of mandible, causing sensory disturbances, was diagnosed five years after endodontic treatment, while the second case describes a cyst in maxillary antrum, diagnosed two years after an endodontic therapy was performed.
In the present cases, the patients underwent a cysts enucleation with extraction of endodontically treated teeth. This report also discuss about influence of overfilling as a potential etiological factor on radicular cyst development .

Key words: radicular cyst, overfilling, paresthesia, enucleation.

Introduction

Apical periodontal, periapical or radicular cyst (RC) is inflammatory, odontogenic origin developmental cyst, comprising 52 to 65% of all jaw cysts (1,2). RC is a result of proliferation and cystic degeneration of Malassez remnants, the epithelial residues in periodontal ligament, by inflammatory products of non-vital teeth (1-4). The prevalence is more higher in maxilla (especially in anterior portion), than in mandible, among men than female patients, especially in their third decades of life (1,2,4,5).
Clinically radicular cyst grow slowelly do not producing symptomes unless secondary infection develops or the cyst's enormous size cause swelling and pain, which are the most seen symptomes of large RCs occurrence (1,3). Teeth displacement and root resorption might be seen too. In a cases of the cyst location near a nerve structures, a sensory distubances, such as anesthesia or paresthesia might be noted (1). It was repored that in these circumstances, the mandibular alveolar nerve canal may be displaced in an inferior direction (1). The maxillary cysts might invaginates the antrum, displaceing the Schneiderian membrane. Radiographically the cyst is characterised by radiolucent structure with well defined cortical borders (1,3).
The treatment options of radicular cysts range from non-surgical endodontic treatment, extraction of the teeth and curettage of apical zone, apicetomy and cyst enucleation or curretage, and marsupialization or drainage in a cases of a large cysts (1,2,4-6).
Generally, the radicular cyst do not produce recurrences in all cases where the cyst epithelial lining is removed (1,3). In cases of tooth extraction without cyst curretage or enucleation, a residual cyst development starts (1,3).
The aim of this report is to present two cases of large radicular cysts located in left posterior mandible and maxilla, which development might be in association with failing endodontic therapy, due the fact that in both of cases the presence of overfilled teeth associated with cysts were noted.

CASE 1

In May 2010, a 51-year-old male patient was referred to Department of Oral surgery, Faculty of Dentistry University of Istanbul with complaints of several months prolonged swelling and paresthesia in the region of the left mandible. From the patient's health history, it was found out that these symptoms developed by itself a 3 months ago. The patient also reported that five years ago he underwent an endodontic treatment of left lower second molar (no radiographs are available from that period) and extraction of the second premolar from the same side of the mandible a month ago. Clinical examinations revealed a bad oral hygiene with partially toothless in upper and lower jaws. From the left side of the mandible in the vestibular region between canine and second molar the presence of soft expansion covered by normal colored mucosa was noticed. The first premolar and second molar showed a grade mobility. Absence of sensation to light touch, in the form of anesthesia, was noted in the region of the left mental nerve inervation including lip, chin and oral mucosa. Extraorally, no presence of asymmetry or lymphadenopathy was noted. A fine-needle aspiration was performed and suggested to a cystic lesion.

The panoramic radiographs disclosed a well-circumscribed cystic radiolucent mass located between the left canine and the second molar. Inside the lesion below the second molar's mesial root, occurrence of radioopaque formation suspected to be an encapsulated overfilled endodontic material was noted. The lower edge of the cystic formation was in the level of the inferior border of the mandible (Figure 1). After a full clinical and radiographic evaluation, under local anesthesia, the cyst enucleation with extractions of the associated teeth due to their mobility were performed (Figure 2).

The pathological speciment was submitted for histopathological evaluation. The examinations revealed a prominient granular cell layer with inflammatory cell infiltrations separated by anastomosing collagen fibers of connective tissue. A presence of fibrin and bleeding accompanied by dystrophic calcification were noted too. The final diagnose was radicular cyst (Figure 3).

During one month of healing period, the patient felt an anesthesia. However, two months later the recovery of sensation was reported. The patient is under follow up for 24 months without any complaints or complications.

CASE 2

In December 2010, a 20-year-old male patient was referred to the same institution with symptomes of painful chewing and swelling in the region of the left maxilla. These symptomes developed itself a month prior his appointment. The patient's medical history was unremarkable.

Clinical examinations revealed no presence of extraoral asymmetry or lymphadenopathy. However, intraoral examinations revealed a mild swelling in the left festibular fornix beyond a roots of maxillary molars. The overlying mucosa was normal on colour and texture with neighbouring mucosa. The patient had a decent oral oral hygiene with persistence of deciduous 55,52,63,65 and 75 number of teeth. A fine needle aspiration revealed a cystic content. Radiographic examinations disclosed a radiolucent area of left maxillary sinus space, which was not well bordered, but it was in correlation with radiopaque overfilled deciduous first molar (Figure 4A). The patient reported that the tooth was endodontically treated three years ago . A cone-beam computed tomography (CTCB) was required. CBCT examinations revealed an unicystic lesion involving maxillary sinus associated with overextruded foreign bodies from the roots of the tooth (Figure 4B).

Under local anesthesia, the sulcular incision from the first left premolar to the second left molar was performed. A mucoperiostal flap was raised and the second deciduous molar was extracted (Figure 5). A bone corticotomy beyond the empty alveol was performed and yellowish content inside the maxillary antrum was curettaged and submitted for histopathological evaluations, after which it was diagnosed as the radicular cyst.

The patient is under follow up for 16 months without any complaints.

DISCUSSION

Bacteria and their products, especially endotoxins are considered as the primary aetiological factors of pulpal necrosis and periapical lesions (7). However, opinions are contrary. By Çaliskan (4), trauma presents the primary element in pulpal death and development of periapical lesions followed by caries or defective restoration, while the results of some other studies suggest that the extruded filling materials are also capable to induce a periradicular inflammation and necrosis of periodontal ligament, which leads to development of periapical lesions (8,9).

The first step of the radicular cyst development is periapical granuloma, which is initiated and maintained by the degradation products of necrotic pulp of non vital teeth (3). This is very important due to fact, that it is possible to decrease the cyst size after proper non-surgical endodontic therapy (4-6). Although there is an opinion that the ideal filling length of preparation is 1 to 2 mm short of the apex without overinstrumentation and extension of filling materials in periapical tissues, in case of the radicular cyst, overinstrumentation beyond the apical foramen leads to inflammatory reaction that destroys the cyst lining and converts the lesion into a granuloma (4,6).

After elimination of causative factors, the granuloma heals spontaneously. Some clinicians reported a success of non-surgical therapy for large areas of cysts that approach 2 cm in diameter. Recommended minimal follow-up period would be one to two years (4-6). However, some other authors are in opinion that the overinstrumentation may enhance epithelial proliferation and cystic expansion (7,9). During endodontic treatment a dentin fillings, pulp tissue fragments, necrotic tissue microorganisms or intracanal irrigants may be extruded into a periradicular area, forming so called "worm" of necrotic debris responsible for inflamamation, post-

Figure 1. Preoperative panoramic radiograph showing well-circumscribed cystic radiolucent mass with encapsulated radiopaque foreign material suspected to be an extruded endodontic filling beyond the mesial root of the second molar tooth.

Figure 2. Pathologic specimen before fixation with 10% formaldehyde

Figure 3. Histological image of section from the biopsy stained with hematoxylin and eosin shows prominient granular cell layer with inflammatory cell infiltrations separated by anastomosing collagen fibers of connective tissue.

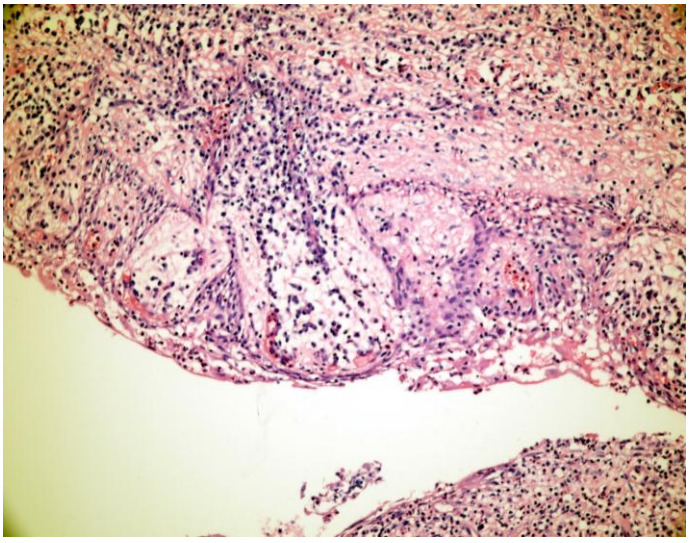

Figure 4A. Preoperative panoramic radiograph showing extruded material around the apex of the upper left second deciduous molar. Arrow shows tooth-to-restoration gap.

Figure 4B. CBCT revealed an overextruded foreign bodies from the roots of the tooth.

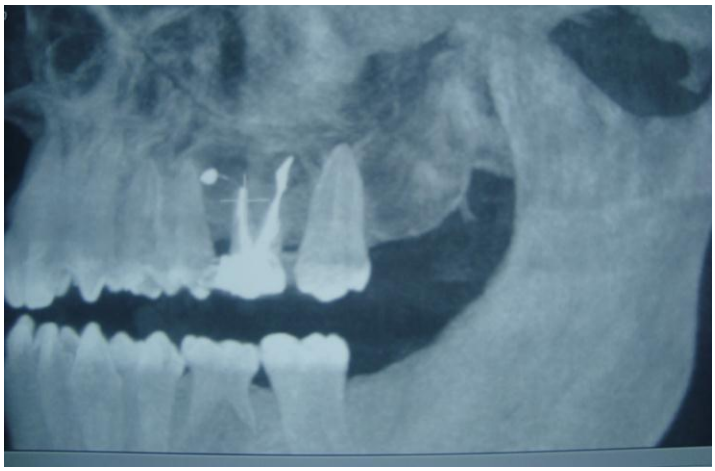

Figure 5. Extracted tooth with pathologic specimen

instrumentation pain and flare up (9). In our described cases a radicular cysts associated with overfilled teeth by extruded gutta-percha were present.

Root canal filling materials due a site of extrusion, might act as a foreign body causing chemical or mechanical irritations of periapical tissues, ranging from mild inflammatory and allergic reactions to neurotoxic damages (10). Extruded beyond the apex of the root, their antimicrobic effects may be neutralized (11). Generally speaking, filling materials are not "harmless", because they are cytotoxic in vitro and/or in vivo.

Gutta-percha is filling more biocompatible with the periradicular tissues than are root canal cements. Extruded beyond the apex may act as a foreign body or hapten, inducing intense tissue reaction, characterized by the presence of macrophages and giant cells. These cells may provide a continuous source of bone resorptive metabolites and cytokines (6). The gutta-percha contains 60-70% zinc oxide, which is cytotoxic and associated with adjacent inflammatory reaction. The mediators of this reaction are prostaglandins, responsible for bone destruction, which synthesis are coordinated by inducible enzyme known as cyclooxigenase 2 (COX-2) (2). Immunoreactivity of this enzyme is expressed in the radicular cysts, as leads to conclusion that the COX-2 may play an important role in the pathogenesis of the radicular cyst (2). In cases of deciduous teeth a pulp therapy by medicaments such as formocresol may be a „triger" for radicular cyst development, thus formocresole in combination with tissue proteins may act antigenic, leading to expansion or development of the cyst (12).

The extruded endodontic sealers associated with periapical lesions were also reported by Love and Firth (8). The authors concluded that cyst development is not influenced by endodontic treatment, but bacterias which are associated or colonize extruded sealers (8).

By Lin et al.(5) root canal infection at the time of root filling and a preoperative periradicular lesions have a direct impact on the outcome of endodontic therapy. However, an improper coronal restoration of endodontically treated teeth should not be neglected, due to bacterial products that can enter the root canal and cause periapical pathology. In our described cases as we did not disposed with radiographs before and during endodontic therapy of the teeth, we are unable to conclude that endodontic overfilling is directly causer of the cyst development. Analyzing a dental restoration of the teeth, especially upper molar it could be concluded that tooth-to-restoration contact had a gaps.

According to radicular cyst's slow growth, we are in opinion that in cases of overfilled teeth, the patients should be informed and under follow-up at least for two to three years, to avoid an heavy defects of bone periradicular areas.

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