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Management of periapical cyst (radicular cyst): A non-surgical endodontic approach

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Abstract

A periapical cyst (Radicular cyst) is most common odontogenic cyst of oral cavity which arises from epithelial remnants which form by an inflammatory process originating from pulpal necrosis of a non-vital tooth. This cyst associated with non-vital tooth and generally visible on radiographs. Radiographic interpretation of the lesion is a round or oval, well-circumscribed radiolucency involving the apex of the tooth. A 14-year-old female patient reported to department of conservative dentistry and endodontics with chief complain of discoloured tooth since one year and mobility in maxillary left anterior teeth (#22) since 3 months. Clinical and radiological findings were suggestive of periapical radicular cyst. Non-surgical endodontic therapy was performed using 5% sodium hypochlorite, 2% chlorhexidine and normal saline and Calcium hydroxide intra canal medicament. A 3 months follow-up radiographic examination revealed progressive involution of periapical radiolucency without any clinical symptoms. Periapical cysts respond favourably to non-surgical endodontic treatment.

Keywords: Non-surgical endodontic therapy, apical cyst, periapical cyst, radicular cyst, periapical lesion

Introduction

Radicular cyst is inflammatory cyst of oral cavity at the apices of teeth with necrotic pulp however, they may also be found on the lateral aspects of the roots in relation to lateral accessory root canals^[1]. A periapical (radicular cyst) cyst is most common odontogenic cyst of oral cavity, this cyst is generally arising from epithelial residues (cell rests of Malassez) in the periodontal ligament as a consequence of inflammation, usually following the death of the dental pulp^[2]. Radicular cysts are associated with non-vital tooth and generally visible on radiographs. This cyst remains over the years, in same size or grow in size. Radicular cyst with a male to female ration of 1.35:1. The lesion was predominantly seen in patients between 11–30 years of age^[3]. Maxillary anterior teeth (50.68%) were most commonly affected. Histopathologically, the cyst is thin with smooth or corrugated inner surface. The most common epithelial lining is stratified squamous; with Rushton's hyaline bodies in 10% of the reported cases. Slow accumulation and deposition of cholesterol during the inflammatory process leads to the formation of "clefts" with acute and chronic inflammatory cells in the proliferating epithelium and connective tissue, respectively. The fibrous capsule is composed mainly of condensed parallel bundles of collagen fibres peripherally and a loose connective tissue adjacent to epithelial lining. Other reported structures include satellite microcysts, calcifications, mast cells and remnants of odontogenic epithelium^[4].

Management of radicular cyst can be done by two approaches one is non-surgical approach and other is surgical intervention either enucleation or marsupialization^[5]. The treatment of choice is dependent on age of patient, size of lesion, bone integrity, involvement of vital structure, health of an individual etc. Whatever matter of choice but treatment should keep conservative as possible.

As reference to many case reports non-surgical management of radicular cyst are done by many clinicians by the involvement of 1-3 teeth with small lesion but in this case report no of teeth involvement was 5 with a well-defined, corticated, osteolytic lesion noted within the

anterior left maxilla i.r.t. 22 involving 23. (11.9mm × 9.9mm × 10.2mm).

The purpose of this case report is to present a case of successful conservative non-surgical management of an infected radicular cyst associated with maxillary anterior in a 14-year-old female patient.

Case Report

A 14-year-old female patient reported to department of conservative dentistry and endodontics, with a chief complain of discoloured tooth (fig. 1) for one year and mobility in maxillary left anterior teeth (#22) for 3 months. Past history revealed trauma to maxillary anterior teeth one year back but when patient visited to department of conservative dentistry and endodontics, at that time there is no relevant history of pain, pus discharge or swelling but anterior tooth was discoloured in appearance.

There is no any relevant past dental history found related to patient as well as no medical history found.

Clinical examination revealed that maxillary left central incisor (#21), left lateral (#22) and left canine (#23) were found to be non-vital after vitality test with grade II mobility with left lateral (#22) and left canine (#23).soft tissue examination revealed normal gingiva coral pink in colour, firm in consistency etc, there is no any pathology seen on any soft tissue then further hard tissue examination revealed there is no pathology present on hard tissue also and patient had deep bite with class II malocclusion, other investigation is done like occlusal radiograph and CBCT.

An occlusal radiographic view of the maxilla (fig.2) revealed well-defined radiolucency of considerable size, involving anterior part of the palate in relation to right central (#11), right lateral (#12) and left central (#21), left lateral (#22), and left canine (#23) with a thin radiopaque border.

An intraoral periapical radiograph (fig.3) shows laterally displaced roots of left lateral incisor and canine. The clinical and radiographic signs were suggestive of chronic periapical abscess in relation with 11, 12 and 21, 22, 23. Hence, surgical treatment was planned and the patient was referred to Department of Conservative Dentistry and Endodontics to perform access opening of 11, 12 and 13.

Further investigation like CBCT (Cone beam computed tomography) (fig.4) showed that A well-defined, corticated, osteolytic lesion noted within the anterior left maxilla i.r.t. 22 involving 23. (11.9 mm × 9.9 mm × 10.2 mm) (Mesiodistally × Labiopalatally × Superioinferiorly). (fig.5). The osteolytic lesion appears to be in contact with the radicular portion of 22 and 23 with loss of lamina dura. Thinning and perforation of labial and palatal cortical bone noted in 22 region.

When patient visited to department of conservative dentistry and endodontics, access opening was done with relation to 11,12,21,22, and 23 and working length determined by using 10K file (fig.6) the patient was further referred to department of oral and maxillofacial surgery for further treatment. But the patient was very anxious and not willing for surgical intervention. Then treatment plan was changed to provide conservative approach of the pathology on patient's demand.

Patient was normal at the time of access opening but on next day patient was revisited to department of conservative dentistry and endodontics with extraoral swelling (fig.7) is formed on right facial region, swelling is extending from

lower right border of ocular region to right oral commissure of face. Then further treatment was done with using proper irrigation protocol (i.e., 5% sodium hypochlorite, 2% chlorhexidine and normal saline) and after 3 days of access opening swelling was subside (fig.8).

Fluid (cystic) was first aspirated with 22-gauge needle from dependent part of the swelling on the left side of face which was slightly pale straw coloured and it was sent to laboratory for microscopic examination. The laboratory result was a periapical cyst (radicular cyst).

Biomechanical preparation (i.e., Cleaning and shaping of canals) was done by Protaper gold files no.20.04% (Dentsply Inc, Dentsply India) using a crown down technique. Irrigation was done using normal saline 0.9% and 5% sodium hypochlorite (Dentpro, India) and 2% chlorhexidine. Provisional dressing was given to the patient and the patient was recalled the after 3 days. On the next visit, calcium hydroxide [Ca (OH)₂] dressing was given to the patient with the help of proper irrigation protocol and cavity was sealed with Temporary dressing. The patient was kept on follow up. The intracanal Ca (OH)₂ dressing was replenished after 15 days interval. After 2 months of commencement of treatment, teeth 11, 12 and 21, 22, 23 were obturated (fig.10).

After 15 days, a significant reduction in the size of lesion was radio graphically (fig.11) observed and after 1-month (fig.12), periapical radiolucency was also reduced in size. After 3 months (fig.13) follow up the radiograph showed Complete radiolucency was disappear in the radiograph.

After the completion of endodontic treatment and prosthetic rehabilitation (fig.14) patient was refer to department of orthodontic for correction of class II malocclusion.



Fig 1: Pre-Operative clinical photograph

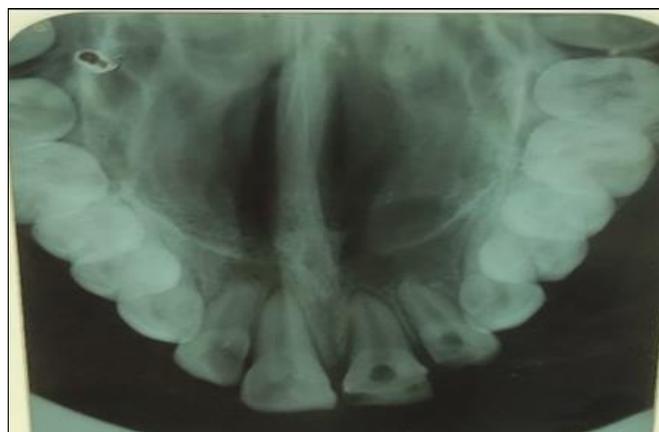


Fig 2: Occlusal Radiograph



Fig 3: Pre-operative intraoral periapical Radiograph



Fig 4: CBCT image – 3D view

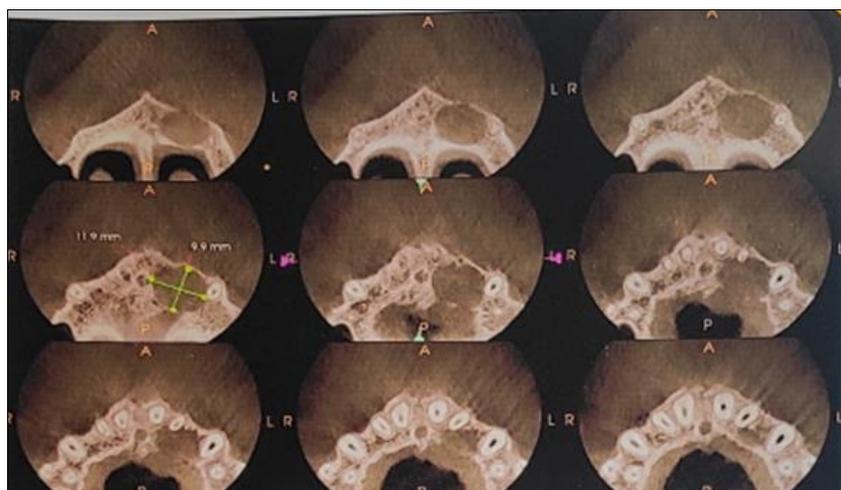


Fig 5: CBCT IMAGE – Axial View

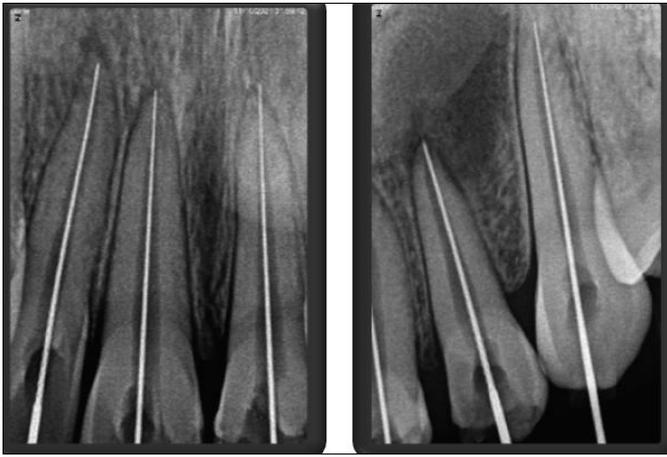


Fig 6: Working length determination radiograph



Fig 9: Master cone Radiograph



Fig 7: Extraoral swelling



Fig 10: Obturation & Post operative Radiograph



Fig 8: Swelling Subside

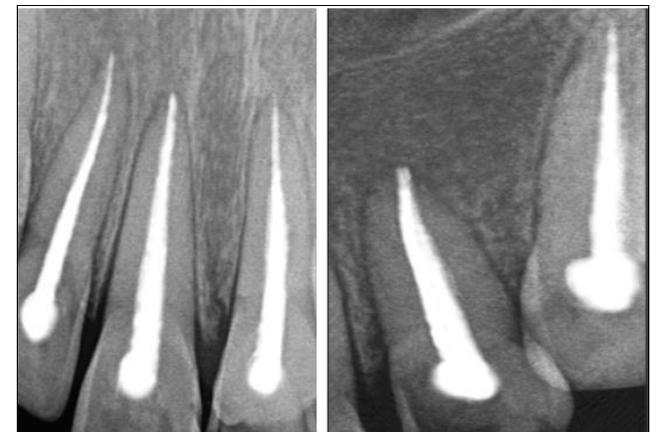


Fig 11: 15 Days follow up



Fig 12: 1 Month follow up



Fig 13: 3 Months follow up



Fig 14: Post operative clinical photograph

Discussion

A radicular cyst is a true cyst that occurs in association with the root of a nonvital tooth. An inflammatory response occurs in the periapical tissue, resulting in resorption of bone and formation of granulation tissue that is infiltrated by acute and chronic inflammatory cells [6]. The epithelial lining for the radicular cyst is thought to develop as a result of proliferation of the rests of Malassez entrapped in the inflamed granulation tissue histologically, the radicular cyst appears as a squamous epithelium-lined cyst lumen surrounded by inflamed fibrous connective tissue [7]. Most radicular cysts appear as round or pear-shaped, unilocular, lucent lesions in the periapical region [8]. The treatment for radicular cysts includes conventional nonsurgical root canal therapy when lesion is localized or surgical treatment like enucleation, marsupialization or decompression when lesion is large [9]. Radicular most commonly associated with permanent teeth and are rare in the primary teeth [10].

The radicular cyst is the most common odontogenic cyst of oral cavity (52.3–70.7%) followed by the dentigerous cyst (16.6–21.3%) and odontogenic keratocyst (5.4–17.4%) [11]. The choice of treatment may be determined by factors such as the expansion of the lesion, relation with vital structures, origin, and clinical characteristics of the lesion, and cooperation and systemic condition of the patient. The treatment of these cysts is still under discussion and many professionals' options for a conservative treatment by means of endodontic therapy. However, in large lesions, the endodontic treatment alone is not efficient and it should be associated with decompression or marsupialization or even enucleation of the cyst, but high percentage of 94.4% of complete and partial healing of small periapical lesions following nonsurgical endodontic therapy has also been reported [12]. Large periapical lesions have been routinely treated surgically however a more conservative non-surgical

approach that can be treated by calcium hydroxide can't be overlooked [13].

In this case most important factor was intracanal medicament that is Calcium hydroxide. Calcium hydroxide, historically, is widely used as an intracanal endodontic material, due to its high alkaline nature, tissue dissolving effect, causes induction of repair by hard tissue formation and has bactericidal effect but will remain in the tissue for considerable time and therefore cannot be considered biocompatible [14]. Its antibacterial actions are due to its effect on bacterial cytoplasmic membranes, protein denaturation, destruction to DNA, action on lipopolysaccharides etc [15].

Calcium hydroxide has been considered as safest agent, but according to some studies it has some negative side effect like neurotoxic effect, cytotoxic effect on cell culture, bone necrosis etc. Also, some studies reported deleterious effects if the material is extruded under a high pressure during endodontic treatment.

Few studies reported that placement of intracanal Calcium hydroxide would have a direct effect on periapical inflamed tissue by diffusion of hydroxyl ions (OH⁻) through the dentinal tubules, and in this manner would favour periapical healing and encourage osseous repair [16]. In areas of root resorption, it also inhibits osteoclastic activity. Besides, a previous study also reported that unintentionally extruded Ca (OH)₂ paste into the periapical lesion had no detrimental effect but healing might take longer [17]. Calcium hydroxide has been found to be resorbed extra radicularly without apparent ill effect and proved to be clinically and radiographically successful [18]. In the present study, Ca (OH)₂ was used extraradicularly in the paste form on the basis of previous study on resorption of Ca (OH)₂ beyond apex and healing with a significant bone formation was observed at the periapical region on regular follow-up visits.

Conclusion

Management of radicular cyst is dependent on various aspect like size of lesion, physical health of individual, age of individual, mental health of individual etc and in this case report, management of radicular cyst was done by non-surgically with help of proper use of intracanal medicament to overcome problem non-surgically, so we conclude that Surgical treatment is indicated only when, nonsurgical treatment is not practically possible or unlikely to provide the desired outcome.

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