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Diagnosing the third dimension of infected radicular cyst on cone beam computed tomography: A case report

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Abstract
A radicular cyst (Periapical cyst, Apical periodontal cyst, Dental cyst) is a true cyst that occurs in association with the root of non vital tooth. It is most commonly occurring cyst in the oral region and found at the apices of teeth, however they may also be found on the lateral aspects of the roots in relation to lateral accessory canals. They arises from the epithelial remnants in periodontal ligament as a result of stimulus from periapical infection following pulp necrosis. This case highlights the Cone-Beam CT- guided diagnosis of a large infected radicular cyst in a 48-year old female patient. The diagnosis was confirmed histopathologic ally, following which marsupialisation was carried out.

Keywords: radicuar cyst, CBCT, marsupialization

Introduction
Kramer (1974) has defined a cyst as „a pathological cavity having fluid, semifluid or gaseous contents and which is not created by the accumulation of pus". Cysts are broadly classified as cyst of odontogenic and nonodontogenic origin, which are further sub-classified as the cysts of inflammatory and non-inflammatory origin [1, 2]. Odontogenic cysts are those which arise from epithelium associated with the development of teeth. These cysts may arise from the reduced enamel epithelium, enamel organ and the cell rests of Malassez, or the remnants of dental lamina.

Radicular cysts are considered to be the most common odontogenic cystic lesions of the oral cavity comprising (52.2%) of all jaw cysts and 62% of all odontogenic cysts [2, 3]. An inflammatory response occurs in the periapical tissue, resulting in resorption of cells. Epithelial lining for the radicular cyst is thought to develop as a result of the proliferation of the rests of Malassez entrapped in the inflamed granulation tissue [4]. It most likely results when these rests in the periodontal ligament are stimulated to proliferate and undergo cystic degeneration by inflammatory products from a nonvital tooth [5]. Frequently radicular cyst persist behind in the jaws after extraction of the offending tooth, referred to as a "residual cyst".

Radicular cysts occurs relatively rarely in the first decade of life, after which there is a fairly steep rise, with a peak frequency in the third decade. There are large numbers of cases in the fourth and fifth decades, after which there is a gradual decline, as reported by Donath (1985). They may occur in all tooth-bearing areas of the jaws, although there is a slightly greater predilection for occurrence in the maxilla (60%), as compared to the mandible (40%) [2].

Most radicular cysts are painless and are discovered during routine radiographic examination, they may become symptomatic if secondarily infected [4]. The classic description of the radiological appearance of radicular cysts is that they are smooth, round or ovoid radiolucency which are corticated, with or without bone expansion or perforation, surrounded by a narrow radiopaque margin which extends from the lamina dura of the involved tooth. In infected or rapidly enlarging cysts, the radiopaque margin may not be present. Root resorption is not often seen on routine radiographs, but it may occur [2].

This case report highlights the importance of 3-dimensional imaging as an important adjunct in the diagnosis and treatment planning of an infected radicular cyst occurring in a 48-year old female patient.

Case report
A 48 year old female patient reported to the Department of Oral Medicine Diagnosis and Radiology at SMBT Dental College, Sangamner with the cjief complaint of pain in lower left back region go jaw since 7 days (fig. 1). Pain was intense, throbbing, continous and aggravated on mastication. She gave a history of night pain. There was no history of trauma or swelling. No relevant medical and dental history was revealed. Intra-oral examination revealed the presence of root-piece with 34 (fig. 2).

Fig 1: Extraoral presentation

Fig 2: Intra-oral presentation

During routine radiographic examination we came across a well-defined radiolucency in the apical area of 34. Occlusal radiograph was adviced, which showed no expansion of buccal and lingual cortical plates (fig 3). Panoramic image showing a well-defined round radiolucency in lower left side of mandible with sclerotic borders (fig. 4).

Fig 3: Occlusal Radiograph of mandible

Fig 4: 3D Panorama view

Further Cone Beam Computed Tomography was performed which revealed the extent of the lesion and its relation with the surrounding anatomical landmarks as shown in axial, coronal, tangential and multiplanar reconstructed view respectively (fig 5,6,7,8). Inferior alveolar nerve of left side appears to be pushed more inferior as compared to its normal extent in 34,35,36 region.

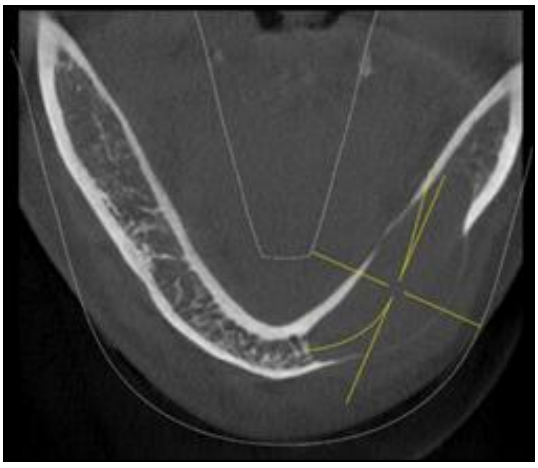

Fig 5: Axial view

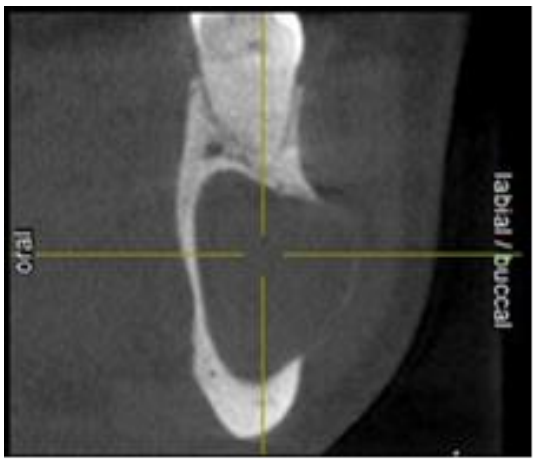

Fig 6: Coronal view

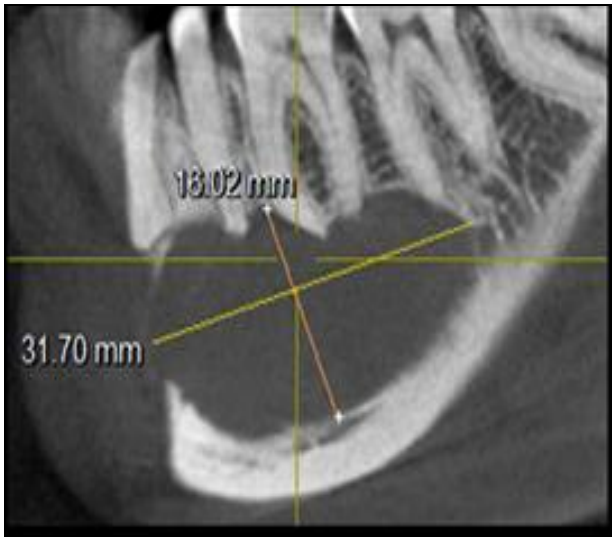

Fig 7: Tangential view

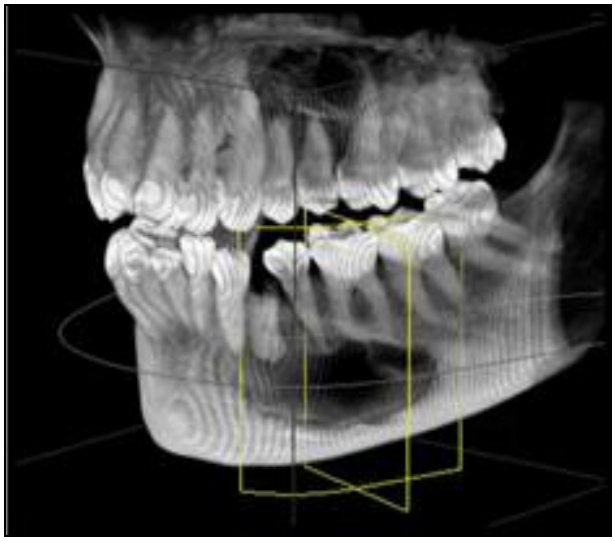

Fig 8: Multiplanar reconstructed image

On the basis of clinical and radiological findings a provisional diagnosis of Infected Radicular Cyst was made. Treatment plan was formulated and procedure was explained to the patient. After obtaining consent from patient surgery was performed with the extraction of 34 (fig 11) followed by marsupialisation. The cyst was opened by raising a mucoperiosteal flap (fig 9) complete curettage of the cystic cavity was done with removal of the granulation tissue (fig 10) and the specimen was sent for histopathological diagnosis, the cavity was initially packed with ribbon gauze (fig 12) and the epithelial lining was closed with two sutures to mucous membrane at margins of opening (fig 13). The aim was to produce a selfcleansing cavity. The histopathology report confirmed the diagnosis of an infected radicular cyst showing stratified squamous epithelium with variable degree of inflammatory infiltratre 6 vizualized under high power 40X microscope (fig. 15). Post-operative instruction were given to the patient and patient was kept under Antibiotics and Analgesics. Patient was recalled after a week, the sutures were removed and the healing was observed (fig 14).

Fig 9: Mucoperiostel flap was reflected

Fig 10: Removal of granulation tissue

Fig 11: Extraction of 34

Fig 12: Ribbon gauze was placed

Fig 13: Cavity was packed with ribbon gauze

Fig 14: Follow up after a week and two sutures were placed

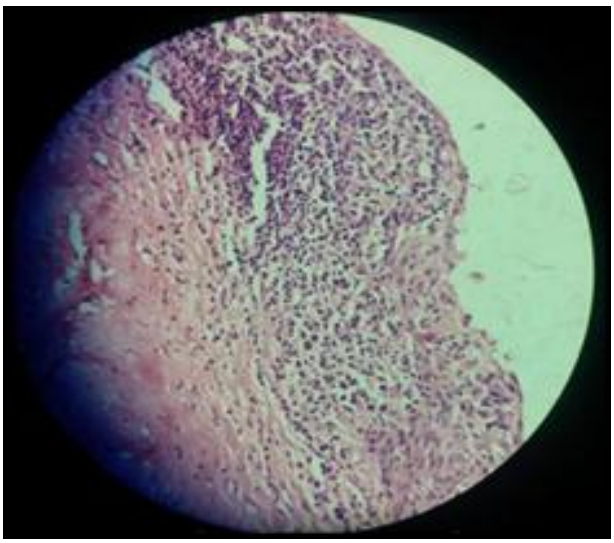

Fig 15: Under High power 40 X- showing stratified squamous epithelium with variable degree of inflammatory infiltrate.

Discussion

Inflammatory jaw cysts comprise a group of lesions that arise as a result of epithelial proliferation within an inflammatory focus. Radicular cysts are the most common inflammatory cyst. Rarely, inflammatory cysts may occur towards the cervical margin of the lateral aspect of a root as a consequence of an inflammatory process in a periodontal pocket. This lesion has been referred to as an inflammatory periodontal cyst or inflammatory collateral cyst (Main, 1970). In 1976 Craig described the cyst on the lateral aspects of the roots of partially erupted mandibular third molars with an associated history of pericoronitis, and termed them as paradental cyst. A similar lesion, usually occurring on the buccal surfaces of the mandibular molars in young children, has been described by Stoneman and Worth (1983) and named the mandibular infected buccal cyst.

Simon (1980) has described that there are two types of radicular cyst, A-True radicular cyst, which contains a closed cavity entirely lined by epithelium.

B-The periapical pocket cyst (originally called the „bay cyst" by Simon) in which the epithelium is attached to the margins of the apical foramen in such a way that the cyst lumen is open to the affected root canal [2].

Thus, it can be expected that the pocket cyst would heal after treatment or tooth extraction, while the true cyst, being completely enclosed is self-sustaining" and may therefore persist in the absence of the cause. Nair et al. (1996) have shown that of the total periapical lesions seen 61% were true cysts and 39% were pocket cysts [2].

Many radicular cysts are asymptomatic and are discovered during routine radiographic examination. However, radicular cysts are probably the most common cause of swelling of the jaws, and slowly enlarging swellings are often complained of. As the cyst increases in size, the bone becomes thin despite subperiosteal bone deposition and the swelling on palpation exhibits „springiness" or „egg shell crackling". Only when the cyst has completely eroded the bone, will the lesion be fluctuant. Pain and infection are other clinical features of some radicular cysts. In this case, patient complained of pain, but no swelling was present. There was no radiographic evidence of cortical expansion.

More than one radicular cyst may be found in a single patient (Shear, 1961a; Stoelinga, 1973) and this has led a number of authors to believe that there are cyst prone individuals who show a particular susceptibility to develop radicular cysts (Oehlers, 1970). Multiple radicular cysts may also be seen in patients with hereditary dental defects (e.g. multiple dens-in-dente or dentinogenesis imperfecta), but in these cases this is because of morphological defects resulting in early exposure and death of the pulp. 2

Radicular cysts arising from deciduous teeth appear to be very rare. In a survey of the documents of 1300 radicular cysts recorded in the University of the Witswatersr and department over a 25-year period, only seven were associated with deciduous teeth (0.5%).

The treatment options for this cyst are still under discussion and many professionals opine for a conservative treatment by means of endodontic technique [7, 8]. However in large lesions, decompression or marsupialization or even enucleation should be carried out; as endodontic treatment alone is not efficient [9, 10]. In this case, as the cyst was relatively large in its anteroposterior dimension, marsupialisation was carried out followed by the extraction of the root piece, which was the known cause of the cyst. Post-surgical period was uneventful. The cystic lesion was submitted for histopathological examination. Histopathological features were consistent with the clinical diagnosis of infected radicular cyst.

The choice of treatment may be determined by some factors such as extension of the lesion, and relation with the anatomical structures, which was revealed in CBCT. The CBCT showed the exact extent, relation with the adjacent structures and dimensions of the lesion, which was could not have been recognized on two dimensional radiographs.

Conclusion

The clinical case reported in this article was managed successfully by CBCT guided surgery. CBCT expanded the scope of imaging from diagnosis to image guidance of operative and surgical procedures and has led to a paradigm shift from 2-dimensional (2D) to (3D) loom for image reconstruction. Rapid development of CBCT is dyed-in-the-wool of dentomaxillofacial imaging for 3D radiographic assessments in routine clinical dental practice. Depending on each case the clinical and radiographic evaluations play a pivotal role in treating large Radicular cysts.

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