

**SURGICAL ENUCLEATION OF A LARGE RADICULAR CYST IN THE MAXILLA: A
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ABSTRACT

Radicular cysts usually present as an osteolytic lesion at the periapical area of a tooth with an infected necrotic pulp. This case is a presentation of a massive radicular cyst in the maxillary anterior region of the jaw removed by surgical enucleation after endodontic treatment. A 15-year-old girl had come to the department with a chief complaint of pain and swelling in the left upper front region of the jaw. The girl had fallen down the stairs and hit her teeth 8 years ago. Since then, there was occasional pus discharge from a sinus tract that had formed above 21. Based on clinical, radiological and analysis of aspirate, a provisional diagnosis of an infected radicular cyst was made. Management of cyst by endodontic treatment followed by surgical excision was planned under local anaesthesia. Root canal treatment was done and surgically enucleated lesion was sent for biopsy. Histopathology revealed that underlying sub-epithelial tissue showed moderate inflammatory infiltrates of lymphocytes, plasma cells and few multinucleated giant cells and was rimmed by bony trabeculae confirming a radicular cyst. These cysts can occur in the periapical area of any teeth, at any age but are seldom seen associated with the primary dentition. Anatomically, the apical cysts occur in all tooth-bearing sites of the jaws but are more frequent in maxillary than mandibular teeth. The recommended treatment option available for radicular cyst is the conventional endodontic approach combined with decompression or surgical enucleation of a cyst with extraction of the offending tooth.

KEYWORDS: - Anterior trauma, Infected radicular cyst, Surgical enucleation, Endodontic treatment, Apicoectomy.**INTRODUCTION**

According to the World Health Organization, cysts in the jawbone can be classified as developmental, neoplastic, and inflammatory origin.^[1,2] They are most commonly found at the apices of the involved teeth; however, they may also be found on the lateral aspects of the roots in relation to lateral accessory root canals.^[3]

There are two distinct categories of radicular cysts namely, those containing cavities completely enclosed by epithelial lining, also known as True cysts and those containing epithelial-lined cavities that are open to the root canals.^[4] The later was originally described as a 'Bay cyst', and has been newly designated as a 'periapical pocket cyst'.^[5] The tissue dynamic of a true cyst is self-sustaining however, as the lesion is no longer dependent on the presence or absence of irritants in the root canal. Therefore, true cysts, particularly the large ones, are less likely to be resolved by conventional root

canal therapy.^[6] Radicular cysts are the most common of all jaw cysts and comprise about 52% to 68% of all the cysts affecting the human jaws.^[3]

Radicular cysts usually present as an osteolytic lesion at the periapical area of a tooth with an infected necrotic pulp on conventional radiography and cone beam computed tomography. It is believed if an osteolytic periapical lesion is more than 2 cm² in diameter, it may be a cystic lesion.^[7,8] In addition, if a well demarcated periapical osteolytic lesion is bordered by a thin rim of cortical bone, there is a strong probability that the lesion is a cyst.^[9,10] Radicular cysts are usually asymptomatic unless they become infected.

This case is a presentation of a large radicular cyst in the maxillary anterior region of the jaw removed by surgical enucleation after endodontic treatment.

CASE REPORT

A 15-year-old girl had come to the Department of Pedodontics and Preventive Dentistry, New Horizon Dental College and Research Institute, Chhattisgarh, with a chief complaint of pain and swelling in the left upper front region of the jaw. On obtaining the history, it was known that the girl had fallen down the stairs and hit her teeth 8 years ago. Since then, there was occasional pus discharge from a sinus tract that had formed above 21.

Dental history revealed that there were repeated prescriptions of antibiotics and analgesics which she had been taking in the last 6 months. She had then visited a dentist who had done access opening w.r.t 21, 22, 23, 24

after which she had discontinued her treatment there. Her Medical history was unremarkable.

On extra-oral examination, facial asymmetry was seen with a swelling on the left maxillary region which extended antero-posteriorly from the ala of the nose to the maxillary tuberosity and supero-inferiorly from the infraorbital fossa to the corner of the lip (figure 1, figure 2).

On intra-oral examination, there was a discoloured tooth with respect to the left maxillary central incisor, 21. Access opening was already done w.r.t 21, 22, 23, 24. No palatal or gingival swelling was present. On palpation, the palate felt soft and fluctuant (figure 3, figure 4).



Fig. 1: Facial asymmetry seen on the left side of the face on the side of the lesion.



Fig. 2: Lateral view of the face showing increased swelling.



Fig. 3: Non-Vital tooth w.r.t 21 with discoloration



Fig. 4: Occlusal view showing access opening w.r.t 21, 22, 23, 24.

The patient was advised for an orthopantomography (OPG), Cone Beam Computed Tomography (CBCT), IOPA and routine laboratory investigations. Radiographic examination revealed a large unilocular radiolucency with well-defined radiopaque border extending from the left maxillary central incisor till the

first maxillary premolar. Incomplete development of root, which led to open apex, was seen with 21. Routine laboratory investigations were within normal limits (figure 5).

On examining the Cone Beam Computed Tomography (CBCT), it was seen that there was excessive loss of bone apical to teeth 21, 22, 23, 24. The loss of bone had extended antero-posteriorly from the 21 region till the 25 region. It did not involve the floor of the nose but the bony defect involved the palatal bone. Based on this 3D image, the dimension of the lesion was measured by using measurement scale which was around 30mm x 30mm x 15mm (figure 6, figure 7, figure 8, figure 9, figure 10).

Fine needle aspiration revealed turbid brown-coloured fluid, consisting dense infiltrate of acute inflammatory cells, predominantly polymorphonuclear leukocytes. Few isolated epithelial cells were seen, which were normal in size, shape and appearance. Cytological picture was suggestive of an acute inflammatory lesion. Based on clinical, radiological and analysis of aspirate, a provisional diagnosis of an infected radicular cyst was made.



Fig. 5: Panoramic radiograph revealing radiolucency in the upper anterior region.



Fig. 6: CBCT showing excessive bone loss.



Fig. 7: CBCT, transparent bone view, anterior region.

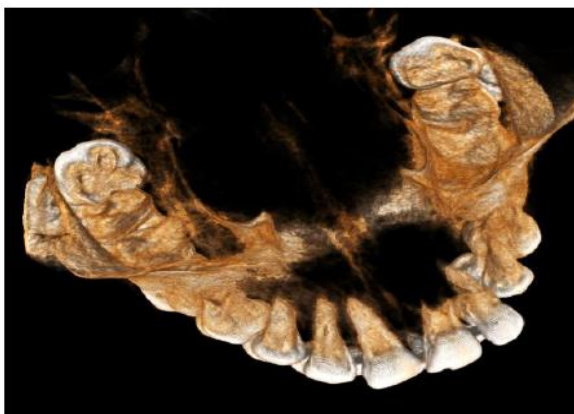


Fig. 8: CBCT, transparent bone view, palatal region.



Fig. 9: CBCT, Bone defect in axial view.

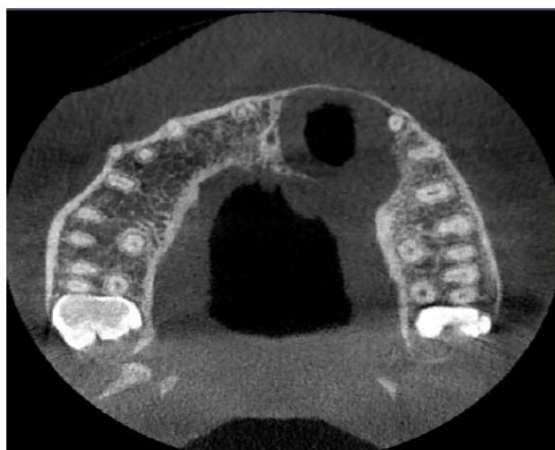


Fig. 10: CBCT, Bone defect in Coronal view.

DIFFERENTIAL DIAGNOSIS

In view of its clinical characteristics, similar to some commonly occurring lesions in the oral cavity, the differential diagnosis were radicular cyst, dentigerous cyst, periapical cementoma, traumatic bone cyst, ameloblastoma, odontogenic keratocyst and malignancy. Confirmatory diagnosis of the radicular cyst can be established only after surgical excision, biopsy and histopathological examination of the lesion.

TREATMENT

Treatment plan was formulated and after explaining it to the patient, her informed consent was taken. Pre-surgical endodontic therapy was done which included root canal therapy (RCT) of the teeth 22, 23, 24. Since the nidus of the infection was 21, it was planned that it would be extracted on the day of surgery. Over-obturation of the teeth were done to prepare it for proper sealing during apicoectomy. After the completion of endodontic procedures, the surgical excision of the cyst was planned.

Patient was prepared for surgery in next visit. During the surgical procedure, local anaesthesia with adrenaline was administered. Crevicular incision was placed in the mesial aspect of upper left central incisor to the distal aspect of the upper second premolar with releasing incision on either side. A trapezoidal mucoperiosteal flap was elevated. A bony window was already present above 21 and 22 (figure 11). This window was enlarged and the cyst was enucleated. Care was taken to remove the epithelial lining properly to rule out any chance of recurrence. Complete curettage along with granulation tissue removal was done followed by profuse irrigation of the bony defect with povidone-iodine solution (figure 12). Apicoectomy was then done with a slow speed handpiece and the flap closure was done with 3-0 silk (figure 13, figure 14). During the surgery, the girl felt extremely insecure about extracting her maxillary left central incisor 21, and therefore it was left in place. Post-operative instructions were given to the patient and patient was kept on antibiotics and analgesics. The enucleated cystic lesion was sent for histopathological evaluation (figure 15).



Fig. 11: Trapezoid flap raised for enucleation of cystic lesion.



Fig. 12: Large bone defect due to the lesion.



Fig. 13: Apicoectomy done w.r.t 21, 22, 23, 24.



Fig. 14: Approximation of flap done for proper healing done.



Fig. 15: Cystic lesion removed.

HISTOPATHOLOGY

Sections of tissue aggregate measuring 3cm x 2cm showed fragments of a cyst wall with extensive ulceration. Underlying sub-epithelial tissue showed moderate inflammatory infiltrates of lymphocytes, plasma cells and few multinucleated giant cells and was rimmed by bony trabeculae. There was no evidence of malignancy. The report confirmed the provisional diagnosis of an infected radicular cyst.

FOLLOW-UP

Postsurgical follow-up after 7 days prompt healing of surgical site (figure 16). Since the tooth 21 was the nidus of infection, and was not extracted on the day of the surgery, the girl was counselled about the need for extraction, possibilities of re-infection and further prosthetic options were discussed. Extraction of 21 was done followed by copious irrigation. After 1 month, there was no swelling on the left side of the face (figure 17, figure 18). On a follow up of 4 months, there was complete formation of bone with proper healing of soft tissues.



Fig. 16: 7 days post operative.



Fig. 17: Extraction w.r.t 21 on 7th day.



Fig. 18: Extracted tooth, 21.

DISCUSSION

Most of the radicular cysts are symptomless and are discovered when periapical radiographs are taken of teeth with non-vital pulps. Patient often complains of slowly enlarging swellings. At first the enlargement is bony hard but as the cyst increases in size, the covering bone becomes very thin despite subperiosteal bone deposition and the swelling then exhibits 'springiness'. Only when the cyst has completely eroded the bone, there will be fluctuation. In the maxilla there may be buccal or palatal enlargement whereas in the mandible it is usually labial or buccal and only rarely lingual.^[11] Pain and infection are other clinical features of some radicular cysts.

Radicular cysts are formed in the area of apical periodontitis of endodontically involved teeth. Therefore, periapical alveolar bone has to be resorbed by immunoinflammatory process that involves interaction between osteocytes, osteoblasts, and osteoclasts as well as RANK-RANKL/OPG system,^[12,13] before a radicular cyst can be formed. It is believed that inflammatory cytokines and growth factors released during apical periodontitis can stimulate epithelial cell rests of Malassez, which are the remnants of disintegrated Hertwig's epithelial root sheath in the apical periodontal ligament to proliferate and form a cyst.^[14-16]

These cysts can occur in the periapical area of any teeth, at any age but are seldom seen associated with the primary dentition.^[11] Anatomically, the apical cysts occur in all tooth-bearing sites of the jaws but are more frequent in maxillary than mandibular teeth. In the maxilla, the anterior region appears to be more prone to cyst development whereas in the mandible the radicular cysts occur more frequently in the premolar region.^[11,17]

Intra-radicular or extraradicular infections can originate and perpetuate periapical pathological changes similar to inflammatory cyst.^[18] However, in the absence of aggressive agents, the immune system is able to initiate and develop repair of tissues and structures that have been affected in the pathological process, such as repair of a cystic lesion.^[19]

Some previous reports have been successfully only with non-surgical endodontic treatment of cystic lesion.^[20,21] However, in the present case, only endodontic therapy was not sufficient for tissue repair, and therefore, surgical procedure was necessary to be made. The treatment of choice depends on the size and location of the lesion, the bone integrity of the cystic wall and its proximity to vital structures.^[22]

Radiographically, the radicular cyst appears as round or pear shaped unilocular radiolucency at the apex of a non-vital tooth. The margin of a radicular cyst is radiopaque with hyperostotic borders, which continues with the lamina dura. However, in infected or rapidly enlarging cysts, the radiopaque margin may not be present. The

chronic radicular cyst may result in the resorption of offending tooth roots.^[23] Radicular cysts are generally associated with the root apex of a carious or fractured tooth due to the presence of dead and necrotic pulp. Massive dental cysts sometimes may extend into the sinus away from the original epicentre^[23] and sometimes present as a large multilocular radicular cyst.^[24] The recommended treatment option available for radicular cyst is the conventional endodontic approach combined with decompression^[25] or surgical enucleation of a cyst with extraction of the offending tooth. Some authors are of the view that suspected radicular cysts must be totally enucleated surgically to remove all epithelial remnants.^[26] The treatment of these cysts is still under discussion and many professionals opt for a conservative treatment by means of endodontic technique. However, in large lesions the endodontic treatment alone is not efficient and it should be associated with a decompression or a marsupialisation or even with enucleation.^[27, 28] When the lesion is small with approximately 1 cm in diameter, most clinicians opt for conventional endodontic treatment but a surgical option for massive lesion is either marsupialisation or enucleation. Endodontic treatment of radicular cysts eradicates microbes or substantially reduces the microbial load from the root canal and prevents reinfection.^[29] Once periapical inflammation is reduced, there will be a decrease in inflammatory mediators and cytokines released by innate and adaptive immune cells and the epithelial cells of a cyst's lining epithelium will die of apoptosis.^[30]

Enucleation of large cysts in the jaws is an invasive method that may lead to complications such as damage of the adjacent teeth or anatomic structures, but contemporaneous and less invasive surgical techniques for treating large radicular cysts have been developed.^[31] In spite of using the conventional surgical technique, vitality of the adjacent teeth and integrity of vital anatomical structures were not violated.

CONCLUSION

The current concept in management of periapical cysts is using nonsurgical means. However, depending on size and extent of lesion, surgical management might be necessary, for achieving success. Current case was managed successfully by performing endodontic therapy with thorough irrigation, cleaning and shaping and obturation of the canal space, followed by surgery. Since there is a high chance of neoplastic transformation, it is advised to carry out proper treatment and follow up patients diagnosed with radicular cyst.

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