



TREATMENT APPROACHES FOR LARGE RADICULAR CYST AND REVIEW ON PATHOGENESIS – A REPORT OF FIVE CASES

Ajay Balasaheb Mohite¹, Priya Nimish Deo², Sudhir Ramlal Pawar³

1. Oral and Maxillofacial Surgeon, Private Practitioner - Ora-Max Oral Surgery Clinic, 1st floor, Surya Commercial, Opp. St Paul School, Civil Hospital Road, Near Powai Naka, Satara, Maharashtra, India.
2. Assistant Professor, Department of Oral Pathology and Microbiology, Bharati Vidyapeeth Deemed to be University, Dental College and Hospital, Pune, India
3. Assistant Professor, Department of Oral and Maxillofacial Surgery, Bharati Vidyapeeth Deemed to be University, Dental College and Hospital, Pune, India

Abstract

Radicular cysts are the most common odontogenic cyst. It is mainly present at the apex of tooth. It is called as a true cyst since the lesion consists of cavity lined by epithelium and the cavity contains fluid. The treatments of Radicular cyst consist of either non-surgical or surgical depending upon size and shape of the lesion. In this article we present five cases in which we have done extraction of tooth in four cases and one case we have tried to save tooth along with cystic excision.

Keywords: Radicular cyst, odontogenic cyst, tooth extraction, enucleation.

I. Introduction

According to Kramer, A cyst is a pathologic cavity having fluid, semi fluid or gaseous contents which is not created by the accumulation of pus.¹ Radicular cyst is the most common cyst of odontogenic origin.² Radicular cyst may present as a swelling of the jaw and may be associated with pain/loosening of tooth. Root resorption of the affected tooth and displacement of the adjacent teeth have also been observed.

Radicular cyst is frequently observed in 3rd to 5th decade of life with a male predilection. The anterior maxilla is more common than mandible.³ The epithelium of Radicular cyst is derived from epithelial rests of Malassez in the periodontal ligament, which proliferate as a result of inflammatory stimulus in a pre-existing granuloma.⁴ Here is one case in which cyst was present at the apex of maxillary anterior tooth which we operated from buccal approach and complete enucleation of cyst done followed by extraction of tooth as the prognosis of the tooth was poor.

II. Operative Cases

A. Case Report 1

A 32 years young female patient reported to our clinic with complains of pain and swelling at maxillary anterior region since last one month. On clinical examination, it was observed that crown and bridge was present on 11 and 22 which had come out and pus discharge was present from buccal mucosa of tooth no.22 region. On radiographic examination it was seen that root canal treatment of tooth no. 11 and 22 was done and extraction of tooth no.21 was done 6 months back. Also a large cystic radiolucency was seen at the apex of tooth no. 22 which extended till tooth no. 21 {Figure no 1}.



Figure no. 1 OPG of Radicular cyst present at apex of tooth no. 22

Treatment plan was made as surgical enucleation of cystic lesion via buccal approach followed by extraction of tooth no.22. Procedure was done under local anesthesia at dental office. Following cyst enucleation and extraction of tooth, suturing was done with silk suture material and sutures were removed after 7days of procedure. {Figure no.2,3,4}.

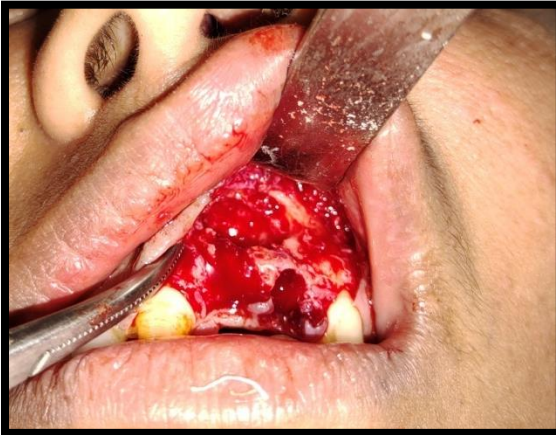


Figure.2 Surgical exposure, Enucleation and Extraction of tooth



Figure.3 Cystic lining along with extracted tooth



Figure.4 Suturing at the site



Figure.5 Follow-up after 7days

During the surgical procedure, the buccal wall was kept intact and was not damaged so that buccal bony bulge can be maintained. This might help for the prosthetic and will give proper esthetics look. The follow-up was taken of the case after suture removal {figure no.5}.

B. Case Report 2

A 25 years old young male patient came to our clinic with complain of pus discharge and mobility of the maxillary lateral incisor tooth. On clinical examination, grade I mobility was present with tooth no 12 and pus discharge was present from buccal sulcus of the tooth. On radiographic examination, a large

radiolucency was seen at the apex of tooth no.12 {Figure no.6}. Patient gave the history of old trauma with the associated tooth.

Treatment plan was made as surgical enucleation of cystic lesion via buccal approach followed by extraction of tooth no.22. Procedure was done under local anesthesia at dental office. Following cyst enucleation and extraction of tooth, suturing was done with silk suture material and sutures were removed after 7days of procedure. {Figure no. 7, 8 & 9}



Figure. 6 IOPA of Cystic lesion



Figure.7 Cystic lesion with tooth



Figure. 8 Intraoperative cystic cavity



Figure. 9 Suturing at the site

C. Case Report 3

A 53 year old patient came to our OPD with complain of swelling and pus discharge from upper maxillary anterior tooth. On examination, apical swelling was seen at 21 & 22 tooth region. CBCT scan was advised, which revealed periapical radiolucency along with 21 & 22 tooth. {Figure no. 10}

Treatment plan was made as surgical enucleation of cystic lesion via buccal approach followed by extraction of tooth no.21 and 22. Procedure was done under local anesthesia at dental office. Following cyst enucleation and extraction of teeth, suturing was done with silk suture material and sutures were removed after 7days of procedure. {Figure no. 11, 12, 13}

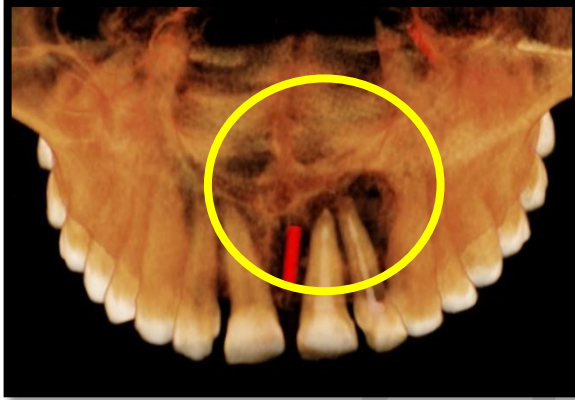


Figure no.10 CBCT revealing radiolucency at apex of teeth no. 21 & 22



Figure. 11 Intraoperative cystic cavity



Figure.12 Cystic lesion with tooth



Figure. 13 Suturing at the site

D. Case Report 4

A young 21 year boy came to our OPD with complain of pus discharge from lower anterior teeth. Patient had history of trauma due to which tooth was discolored {Figure no.14}. IOPA was advised which revealed radiolucency at the apex of tooth no. 41 {Figure no.15}. Treatment was planned as extraction of discolored tooth along with cystic excision. {Figure no. 16, 17 and 18}.



Figure. 14 Discolored tooth



Figure. 15. IOPA of radiolucency at the apex of tooth no.41

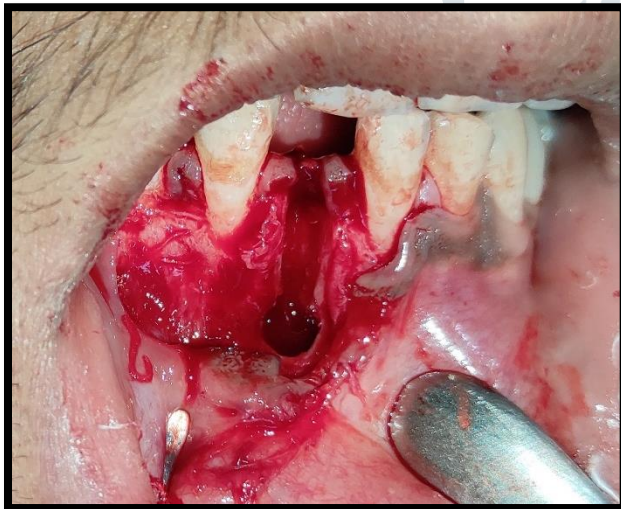


Figure. 16. Intra-operative photo



Figure. 17. Post-Operative suturing photo



Figure. 18. Cystic lesion along with extracted tooth

E. Case Report 5

A 32 years male patient with history of trauma and fractured tooth came to our OPD. On examination, patients both upper central incisors were fractured. {Figure no. 19}. On radiographic examination, large radiolucency was seen at the apex of 21 and 22 tooth. {Figure no.20}.

Treatment plan was decided as root canal treatment of 21 and 22 tooth followed cystic excision. {Figure no. 21 & 22}. Figure 23 shows the post-operative photograph.



Figure. 19. Pre-operative photo of traumatic teeth



Figure. 20. IOPA showing radiolucency at the tooth apex



Figure. 21. Intra-operative photo showing cystic cavity



Figure. 22. Excised Cystic lining



Figure. 23. Post-operative suturing photo

III. Pathogenesis of radicular cysts

The pathogenesis of radicular cysts involves the activation of cell rests of Malassez caused by physical, chemical or bacterial injury. This is found to be associated with difficult mechanical and chemical endodontic procedures due to blockage of the root canal [5]. Infection of the pulp can occur because of exposed dentinal tubules on the root surface at the cervical region, gaps in the cementum. Microbes enter into the necrotic pulp through blood circulation (anachoresis). Bacteria have been suggested to enter into the root canals of the teeth through severed blood vessels from the periodontal ligament [6].

Several theories have been proposed to explain the causes of radicular cyst formation [7].

1. **Nutritional deficiency theory** – The islands of epithelium proliferate, moving the more central epithelial cells away from their source of nutrition and undergo liquefaction necrosis. A cystic cavity is formed within the centre of the cell mass.
2. **The abscess cavity theory** – There is formation of an abscess cavity in the centre of the periapical connective tissue. Eventually the abscess becomes completely surrounded by the epithelium because of the natural tendency of the stratified squamous epithelium to line exposed surfaces of connective tissue.
3. **Merging of epithelial strand theory**- As the epithelial strands continue to proliferate they merge and form a three dimensional ball mass. The connective tissue entrapped inside the ball mass degenerates and a cyst is formed.

The three distinct phases under which the pathogenesis of radicular cyst are described are, namely, the phase of initiation, phase of cyst formation and the phase of enlargement ^[8].

Radicular periodontitis develops in the area of apical periodontitis of endodontically involved teeth. Hence alveolar bone in the periapical region has to be resorbed by an immune-inflammatory process. This process involves an interaction between osteoblasts, osteoclasts and osteocytes as well as the RANK/RANKL and OPG system before a cyst can be formed. It is suggested that the inflammatory cytokines and growth factors which are released during apical periodontitis can stimulate cell rests of Malassez which are the remnants of Hertwig's epithelial root sheath. Some of the epithelial cells in the islands of rest of Malassez must maintain the regenerative capacity of stem cells to undergo intense proliferation. When the basal cells of the cell rest of Malassez receive appropriate signals they are stimulated, undergo proliferation and form a cyst ^[9]. Chemokines such as regulated upon activation, normal T-cell expressed, and secreted, interferon gamma-induced protein, and monocyte chemoattractant protein are found in the radicular cysts and have thought to play a role in formation of cyst. An angiogenic growth factor, the vascular endothelial growth factor has also been found which increases the vascular permeability and leads to the expansion of the cyst. Bone-resorbing factors such as receptor activator of nuclear factor kappa-B ligand and osteoprotegerins expressed in radicular cysts are suggested to play a role in the cystic expansion ^[3].

IV. Discussion

Periapical cysts are inflammatory jaw cyst that appear at the apex of the infected teeth. Among the entire jaw cyst, Radicular cyst makes about 52% - 68% ^[10]. This cyst is more common in males compared to females with ratio of 1.6:1 the reason might be that females are more concerned about their teeth ^[11].

The maxillary anterior teeth are more involved as compared to mandibular teeth and the reason might be because maxillary anterior teeth are more prone to trauma ^[3]. In one of our our cases, the cause was old trauma to the patient that caused radicular cyst.

There are various theories put forward regarding pathogenesis of radicular cyst, however the only accepted theory is “breakdown/nutritional deficiency theory”. The “breakdown” theory suggests that after

provocation, the epithelial cells continue to proliferate following which the central cells become deprived of nutrition from the surrounding connective tissue and undergo liquefactive necrosis, leading to the development of a microscopic cyst.^[12]

The choice of treatment depends on the size and localization of the lesion, the bony integrity of the cystic wall and its proximity to vital structures.^[13] Management of radicular cysts includes endodontic treatment of the infected tooth, marsupialization, and surgical enucleation.^[14]

V. References

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