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LARGE RADICULAR CYST- A CASE SERIES, OUR EXPERIENCE AND REVIEW OF LITERATURE

Dental Science

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ABSTRACT

Maxillofacial region is affected by a various number of cysts when compared to any other part of the body. Radicular cysts are common odontogenic cyst of jaw bone which invariably presents as an oval, well defined radiolucency with radiopaque border around the apex of the involved tooth. They are leisurely growing, inflammatory cysts that arise from the epithelial residues in the periodontal ligament originating from pulpal necrosis of a non vital tooth. Owing to their otherwise asymptomatic nature these cysts sometimes present as large lesion accompanied by substantial amount of destruction of surrounding tissues. There are two recognised types of radicular cysts, those containing cavities completely enclosed in epithelial lining or true cysts, and those containing epithelium-lined cavities with open root canals. Radicular cysts are usually managed either by curettage and enucleation or by more conservative approach which is marsupialisation followed by enucleation.
The purpose of this article is to report a case series of large radicular cysts and their management with review of literature.

KEYWORDS

Introduction

Inflammatory jaw cysts comprise a group of lesions that arise as a result of epithelial proliferation within an inflammatory focus due to a number of causes. Radicular cysts are common odontogenic cyst of jaw bone. They are slow growing, thought to arise from epithelial cells rest of Malassez in the periodontal ligament.[1] They are believed to proliferate as a result of periapical inflammation caused by infection of the root canal system. Owing to their relatively asymptomatic nature these cysts sometimes present as large lesion accompanied by extensive destruction of surrounding tissues. When small the lesion is not clinically detectable it is most often discovered as incidental finding on radiographic survey of teeth with non-vital pulps.[2]

Simon discovered that there are two distinct types of radicular cysts; those containing cavities completely enclosed in epithelial lining or true cysts and those containing epithelium-lined cavities with open root canals.[2,3,4,5,6] Patients only experience pain when inflammatory exacerbation is present. Large cyst usually lead to mobility and not respond to electrical pulp test in affected or involved tooth. Jones *et al*. (2006) found radicular cysts represent 60.3% of all odontogenic cysts.[7] Frequency of occurrence of these cysts rises from the third decade to the maximum occurrence taking place in the fourth and fifth decade of life. Radicular cysts are not often found associated with deciduous teeth. It is has a higher prevalence in the maxillary anterior tooth region and it slightly more predominant in the males.[1,3]

Case 1:

A 45 year male patient reported to the oral & maxillofacial surgery department with a complaint of painless swelling in the upper anterior region of the jaw present since last six months. Intraoral clinical examination revealed an oval swelling located over the palatal region in association with left maxillary canine to right maxillary canine region. On palpation the lesion was approximately 3.5 x 5 cm, soft to firm in consistency and tender. Patient underwent extraction with respect to 16,14,24,25. Complete enucleation of the lesion with apicoectomy was performed. It created a through and through perforation in the palate and buccal plate, followed by primary closure.

Case 2:

A 49 year old male patient presented to our department with a complaint of swelling in the left upper anterior region of the teeth present since four months. Intraoral clinical examination revealed an oval swelling located over the buccal region in association with left maxillary incisor to right maxillary incisor region. On palpation the lesion was approximately 2 x 3 cm, firm in consistency and tender. Complete enucleation of the lesion with apicoectomy was performed.

Case 3:

A 35 year of female patient reported with the chief complaint of pain in right upper anterior tooth region and swelling for the last three months. Intraoral clinical examination revealed a round to oval swelling located over the buccal region in association to the right upper anterior tooth region. The lesion was approximately 2.5 x 2 cm, firm in consistency and tender. Patient had undergone extraction w.r.t 11,12 Complete enucleation of the lesion was performed.

Case 4:

A 18 year old male patient complaint of pain and swelling in the upper anterior left region of the jaw present since three months. Intraoral clinical examination revealed an oval swelling located over the palatal region in association with left maxillary incisor to premolar region. The lesion was approximately 4.5 x 4 cm on palpation, soft to firm in consistency and tender. Patient underwent R.C.T w.r.t 21,22,23,24. Complete enucleation of the lesion with apicoectomy was performed.

Case 5:

A 35 year old male patient complaint of painless swelling in the upper anterior region of the jaw present since 3 months. Intraoral clinical examination revealed an oval swelling located over the palatal region. On palpation the lesion was approximately 3.5 x 4 cm, soft to firm in consistency and tender. Complete enucleation of the lesion with apicoectomy was performed.

Discussion:-

A cyst is a pathological liquid, semiliquid or gaseous filled cavity with a well defined border of connective tissue and an epithelial carpet. Growth of a cyst is usually slow, centrifugal and infiltrative. Radicular cyst are thought to arise from epithelial cells rest of Malassez in the periodontal ligament, and they are believed to proliferate as a result of periapical inflammation caused by infection of the root canal system.

There are two main theories regarding the formation of the cyst cavity:[1,2,6,8,9]

The nutritional deficiency theory is based on the assumption that the central cells of the epithelial strands become removed from their source of nutrition and undergoes necrosis and liquefactive degeneration, the accumulating products in turn attracts neutrophilic granulocytes into the necrotic area. Such microcavities containing degenerating epithelial cells, infiltrating mobile cells and the tissue fluid coalesce to form the cyst cavity lined by stratified epithelium.[1,2,4]

The abscess theory postulates that proliferating epithelium lines an abscess cavity formed by tissue necrosis and lysis. During the third phase the cyst grows, but whose exact mechanism is still unknown. It is generally believed to be by osmosis. The presence of necrotic tissue in the cyst lumen attracts neutrophilic granulocytes, which extravasate and transmigrate through the epithelial lining into the cyst cavity where they perish. The lytic products of the dying cells in the cyst lumen release a greater number of molecules. As a result, the osmotic pressure of the cyst fluid rises to a higher level than that of the tissue fluid. The latter diffuses into the cyst cavity so as to raise the intraluminal hydrostatic pressure well above the capillary pressure. The increased intracyst pressure may lead to bone resportion and expansion of the cyst. [1,2,4]

Pathogenesis

the pathogenesis of radicular cysts in three phases: the phase of initiation, the phase of cyst formation and the phase of enlargement.[1,3]

The phase of initiation

The epithelial linings of these cysts are derived from the epithelial cell rests of Malassez in the periodontal ligament which come to lie in periapical granulomas associated with teeth with necrotic, and often infected, pulps. Thus, the epithelial cell rests are initiated to proliferate by inflammation as a result of necrotic debris and bacterial antigens derived from the dead pulp.[1,3]

Phase of cyst formation

The next phase in the pathogenesis of a radicular cyst is the process by which a cavity comes to be lined by the proliferating odontogenic epithelium. One concept proposes that the epithelium proliferates and covers the bare connective tissue surface of an abscess cavity or a cavity which may occur as a result of connective tissue breakdown by proteolytic enzyme activity (Summers, 1974). The other, and perhaps more widely supported theory, postulates that a cyst cavity forms within a proliferating epithelial mass in an apical granuloma by degeneration and death of cells in the centre.[1,3]

Growth and enlargement of the radicular cyst

The third phase in the pathogenesis of the radicular cyst, its enlargement, has been the focus of considerable experimental work. Toller's studies provided evidence for the hypothesis that osmosis makes a contribution to the increase in the size of cysts.[1,3]

Epidemiology:

Radicular cysts are the most common of all jaw cysts and comprise about 52% to 68% of all the cysts affecting the human jaws.[3,5,6] Actual prevalence of cysts is only about 15% of all apical periodontitis lesions[6]. These cysts arise in the third decade to the maximum occurrence taking place in the fourth and fifth decade of life. Radicular cysts are not often found to be associated with deciduous teeth. They are more prevalent in the maxilla more commonly affection the anterior region. Cysts in the maxillary anterior tooth region are reported to grow to the largest sizes.[1,2] They slightly more predominant in the males. The lower incidence in women could be because they are less likely to neglect their teeth, particularly the maxillary anterior incisors, where most radicular cysts occur. Men however, are more likely to sustain trauma to their maxillary anterior teeth.[1,3] In our cases too out of the 5 cases 4 were male patients.

Site of Presentation:

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. 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.[2,3] all of the lesions in our cases involved the maxillary anterior region

There is low incidence of radicular cyst in primary teeth compared with permanent teeth because it is thought to be because of the shorter life span of primary teeth in the jaw, easy drainage in deciduous teeth due to presence of numerous accessory canals, and radiolucencies in relation to deciduous teeth are usually neglected. Additionally, the lesions tend to resolve on their own following the extraction or exfoliation of the associated tooth and are generally not submitted for histopathological examination. [8,9,10] Similarly in our cases none of the patients had primary or mixed dentition. The most common clinical and radiographic features associated with radicular cyst in children are buccal cortical plate expansion, well-defined unilocular radiolucency, thin reactive cortex, and displacement of succedaneous teeth; [8,10]

Clinical characteristics

Table : 1 [1,2,11]

Most of the radicular cysts are symptomless slowly enlarging swellings.
Most residual cysts are less than 1cm in size. Occasionally, enlarging cysts may cause displacement of the adjacent teeth, as well as bone expansion.
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'.
Eggshell crackling on palpation may be present.
Only when the cyst has completely eroded the bone, there will be fluctuation.
Sometimes may be associated with pain and infection.
Harm to the anatomical structures (maxillary sinus, nasal cavity, and mandibular fractures), especially when they reach large proportions.

Diagnosis

For the accurate diagnosis history should be taken and proper clinical examination is required. Ragiographs can also be of great diagnostic value. The final diagnosis is achieved only by the histopathological examination. In our cases too FNAC was done prior to enucleation and the excised lesions were further given for histopathological examination.

Radiographic characteristics

Serman N described residual dental cyst radiographically as a round unilocular, radiolucency with well defined radiopaque borders around the apex of the involved tooth. All of the cases mentioned above had these features.[11,12]

Histopathological characteristics:

Histopathologically it shows cystic lumen, lined with a thin epithelial lining supported by a fibrocellular connective tissue storma showing dense chronic inflammatory cell infiltrate with few cholesterol clefts. They impart a shimmering gold or straw colour[1,2,3]

Differential diagnosis

Other odontogenic lesions tend to mimic radicular cyst are periapical granuloma and dentigerous cyst. In differentiation from a dentigerous cyst, it is important to confirm whether the position of the permanent tooth germ is retained or displaced. Because it has been reported that a radicular cyst can include the crown of consecutive permanent teeth, a definitive diagnosis of the disease requires a comprehensive assessment based on clinical, radiographic, and histopathological findings. [10,13,14]

Prognosis

The residual cyst has no tendency to relapse, so it has a good prognosis. After excision, bone healing usually occurs in the cyst region. Exceptionally, the epithelium can give rise to squamous cell carcinoma, malignant tumor.[11] Authors showed the fact that incomplete enucleation epithelium can develop a residual cyst after months to years after treatment. If the original radicular cyst, residual cyst remains untreated, their continued growth can cause significant destruction and weakening of the maxilla or mandible. If they are treated adequetely, usually, there is bone repair.[12] In our cases since all of them were recognised on time and compete enucleation was performed none of these patients experienced any reoccurance.

Carcinomatous change

A few well-documented cases have been reported which indicate that squamous carcinoma may occasionally arise from the epithelial lining

of radicular and other odontogenic cysts.[1,2] Eversole *et al*. (1975) reviewed series of cases of central epidermoid carcinoma and central muco-epidermoid carcinoma of the jaws. They found that 75% of the former were associated with a cyst lining and 48% of the latter were associated with either a cyst or an impacted tooth. It is also possible that cyst and neoplasm may have developed independently adjacent to one another and ultimately fused in some parts; or maybe that the neoplasm arose primarily from the oral mucosa, or that it is a metastatic deposit in the jaw.[1,3] A further possibility to be considered is that the lesion was initially an epithelial neoplasm which underwent secondary cystic change. Browne and Gough (1972) have suggested that keratin metaplasia in long-standing radicular and dentigerous cysts may precede malignant change and examples of epithelial dysplasia are occasionally seen in jaw cysts without any evidence of carcinomatous transformation.[1,3]

Treatment Plan

The management of large cystic lesion has been subject of prolonged debate.[15] The treatment options for large periapical lesions range from conventional non surgical root canal to treatment with long-term calcium hydroxide therapy to various surgical interventions.[16] For several reasons, surgical treatment may be the preferred approach for treating a large periapical cyst.[17] The treatment of choice is dependent on the size and localization of the lesion, the bone integrity of the cystic wall and its proximity to vital strutures.[18,19] Cysts are usually enucleated, where the cystic lining is separated from its inner bony surface and removed. Alternatively the cyst may be marsupialised to revive internal pressure.[20] In our cases the lesions were completely enucleated followed by apicoectomy for the involved teeth.

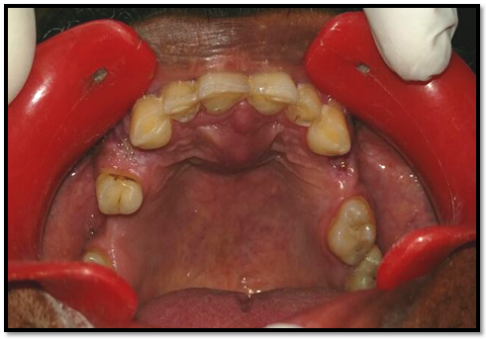
In our cases male patients were higher in number and they were all from the age group ranging from 35-50 years and the lesions were all affecting the maxillary anterior teeth region which is similar to the literature mentioned;[1,3] also all on radiological examination they were round unilocular radiolucency with well defined radiopaque borders around the apex of the involved tooth. In these cases presented, one common finding included that the patients were all medically compromised. 3 were diabetic, 1 was on blood thinner and the female patient was suffering from mild hypothyroidism. This could seem to be an aggravating factor for the growth or increase in size of the radicular cysts. Even though we cannot be sure of this but maybe medically compromised patients could be at a greater risk of developing such lesions. We performed enucleation followed by apicoectomy for all the patients who were then followed upto minimum of 2 years depicting no recurrence and healthy healing of the operated site. It can be concluded that apicoectomy in conjunction with enucleation followed by curettage of the cystic lesion is definitive treatment for radicular cyst.[18,19]

Conclusion

We can say that detailed history and analysis of the clinical, histopathological and radiological examinations is very vital for proper diagnosis and treatment planning. Early detection and accurate diagnosis of inflammatory, cystic or neoplastic lesions in odontogenic fabric are of paramount importance for successful and predictable treatment results.

CASE :1

Fig: 1. Intraoral



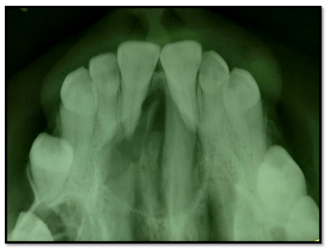


Fig ; 2. Pre op. Occlusal radiograph

Fig : 3 Enucleation done.

Fig : 4 Post op. Intraoral view of closure

Case : 2

Fig : 5 Pre op intraoral view

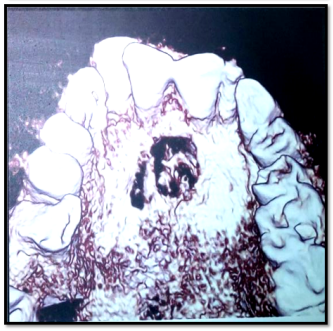


Fig : 6. Pre op. CBCT

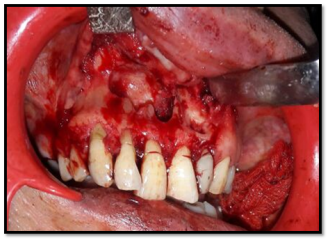


Fig : 7. Post op. Intraoral view

Fig : 8 Post op. Intraoral view (Closure)
Case 3.

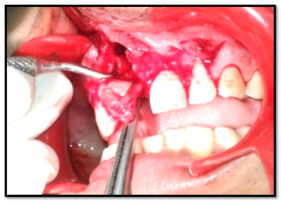


Fig : 9. Enucleation

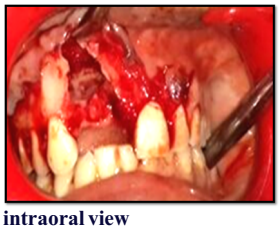


Fig : 10. Intra op intraoral view

Fig : 11 Closure
Case 4

Fig : 12. Pre op. IOPA

Fig : 13. Intra op. Buccal aspect

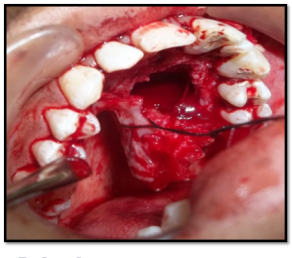


Fig : 14. Intra op. Palatal aspect

Fig : 15 Enucleation done
Case : 5

Fig : 16. Pre op CT

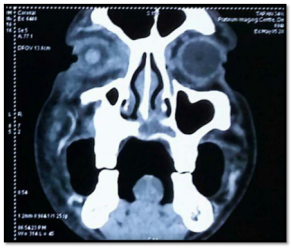


Fig : 17.Pre op CT

Fig : 18. Pre op intraoral view

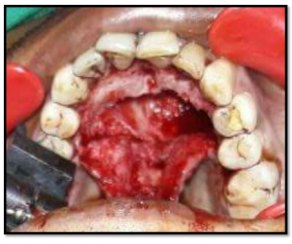


Fig : 19. Intra op. view

Fig : 20 Enucleation

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