Radicular Cyst Associated with Primary Molar: Surgical Intervention and Space Management

Abstract
Radicular cysts associated with primary teeth are rare. This case report describes radicular cyst associated with carious primary mandibular second molar in a 5-year-old patient and discusses its surgical intervention, space management, and follow-up for 3½ years.

Keywords: Enucleation, primary tooth, radicular cyst, space management

Introduction
Radicular cysts are known to be the most common cystic lesions of the jaws. They comprise about 52.3% of jaw cysts and 62% of cysts of odontogenic origin. They develop from cystic degeneration of cell rests of Malassez, secondary to inflammatory stimulation arising from the necrotic pulp. Surprisingly, those arising from primary teeth are considered rare. In an extensive survey of 1300 radicular cysts associated with primary and permanent dentition, the prevalence of radicular cyst arising from primary teeth was only 0.5%. The low frequency is puzzling, assuming that there is no difference in the developmental mechanism of radicular cyst in primary and permanent dentition.

Radicular cysts associated with primary teeth pose a diagnostic challenge as they mimic dentigerous cyst clinically, histologically and radiographically. Differentiation between the two is essential to prevent unwarranted extraction of permanent successor.

Case Report
A 5-year-old male patient reported with a swelling on the lower right side of the face. Swelling was present since 1 month. On extraoral examination, a diffuse, nontender, and bony hard swelling was noticed on the lower right side of the face. Intraoral examination revealed grossly destructed deciduous mandibular molar. The parent did not give any history of previous dental treatment. The panoramic radiograph showed a unilocular radiolucent lesion with smooth, well-defined borders measuring about 1.5 cm × 2 cm in relation to distal root of 85. There was considerable displacement of tooth buds of second premolar and permanent first molar [Figure 1]. Based on the clinical and radiographic findings, provisional diagnosis of radicular cyst was made with differential diagnosis of lateral dentigerous cyst arising from 45.

Extraction of 85 and cyst enucleation under general anesthesia was planned. As permanent first molar showed excessive mesial inclination, we decided to place distal shoe space maintainer to prevent it from further tipping mesially. An incision was made from left canine to the left second primary molar along the gingival margin and the site was exposed. The buccal cortical plate was considerably thin over the lesion. The grossly carious second primary molar was extracted. Piezoelectric device was used to cut buccal cortical plate. The cystic lining was enucleated. Enucleated cystic lining was preserved for histopathology examination. Distal shoe space maintainer was cemented. After the bleeding was controlled, the flap was sutured back and primary closure was achieved [Figures 2 and 3].

Microscopic examination revealed a cystic lumen lined by nonkeratinized stratified squamous epithelium. The cyst was covered by fibrous connective tissue that was infiltrated by mixed inflammatory cells [Figure 4]. Orthopantomography...
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Figure 1: Well-defined radiolucent lesion in relation to distal root of 85 and displaced permanent tooth buds

Figure 2: Distal shoe appliance in situ and primary closure of the surgical site

Figure 3: Immediate postoperative radiograph

Figure 4: Histopathologic section of cystic lining under ×100 magnification

(OGP) obtained at 6-month follow-up showed good amount of bone regeneration in the area of cystic lesion. First permanent molar and second premolar showed continued development [Figure 5]. At 1-year follow-up, first permanent molar had erupted with favorable crown angulation [Figures 6 and 7]. Distal extension of the space maintainer was cutoff and rough edges were smoothened using rotary instrument. As contralateral permanent molar had also erupted to favor band placement, lingual arch space maintainer was fabricated and cemented to maintain space for 34 and 45. OPG at 3½-year follow-up showed complete bone regeneration in the cyst region and continued development of second premolar [Figure 8].

Discussion

Radicular cyst comprises about 52% of all the jaw cysts. However, radicular cysts arising from primary teeth are considered to be rare.[1] The reason for the low incidence of radicular cyst in primary teeth compared with permanent teeth is not clear. There is no difference in the inflammatory response to caries in both primary and permanent teeth.[4] Low incidences could be because primary teeth are present in the jaw for short period. However, this period should be sufficient for the development of cyst because primary teeth remain in the jaw for five to six years after the pulp has become nonvital.[9] According to Mass E et al. (1995),[2] prevalence is probably higher than that reported. In a survey of radiolucent lesions associated with primary molars, 73.5% were diagnosed as radicular cysts. They suggested that radicular radiolucencies related to primary teeth tend to be ignored and often resolve after the extraction of the tooth. Moreover, pulpal and radicular infections in primary teeth tend to drain through sinus tract or the marginal gingiva, thus causing less severe symptoms, which may remain untreated.[2] Mandibular molars are the favored site for the development of radicular cyst as they are frequently affected by caries.[5,6] Cortical bone in this region is thick; therefore, lesions may not drain readily through sinus tract.[7] In case of permanent teeth, maxillary anterior region is the most common site for radicular cyst, because of high frequency of trauma and dens in dente in anterior teeth.[1] In case of primary teeth, failed pulp therapy is considered...
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the major contributing factor for the development of radicular cyst. Several authors have reported radicular cyst associated with primary teeth, following pulp therapy.[6-12] A review of the literature shows the total cases reported from 1927 to 2014, to be 112 and attributes 56% of them to be in response to pulp therapy.[4] Some of these cysts showed rapid growth, large size, and cortical plate expansion.[5-7] In case series presented by Grundy GE et al. (1984), radicular cysts were presented at an average of 20 months after pulp therapy with formocresol, KRI paste, or caustinerf.[7] It has been hypothesized that pulp therapeutic agents such as formocresol along with tissue protein may induce antigenic stimulation of periradicular tissue resulting in rapid growth and cortical plate expansion.[9] However, our patient had not undergone any previous dental treatment and presented with large radiolucent lesion.

Highest incidence of radicular cyst arising from primary teeth are seen in 7–8-year olds.[4] Growth rate of radicular cyst associated with primary teeth is reported to be 4-mm annually. Considering the age of our patient and size of the lesion, we suspect rapid growth of the cyst in the current case.

Radicular cyst associated with primary molar can be mistaken for dentigerous cyst arising from permanent successor.[9] Differential diagnosis is vital to avoid extraction of permanent successor. Comprehensive assessment of clinical, radiographic, and histopathology examination and surgical findings can aid in this process. The clinical and radiographic signs that help in differentiation between the two have been enumerated by Wood RE et al. (1988).[3] The following features can help in confirming the diagnosis of radicular cyst.

- There should be evidence of carious/traumatized/endodontically treated tooth
- Loss of lamina dura around the roots of the suspected tooth
- Follicular space around the permanent successor is intact and clearly visible.

In case of radicular cyst, complete enucleation of the cyst and preservation of permanent successor is a suitable treatment option.[8] Children have high propensity for bone regeneration. Faster healing of the postsurgical osseous defects can be expected.[13]

Marsupialization of the cystic lesion and using an appliance with projection for decompressing the lesion is another treatment option. However, the postoperative care
is more demanding. Patient and parent cooperation are needed for success.\cite{8} In adults, following marsupialization, the time required for radicular cyst to reduce to their half size is approximately 6 months (Kubota Y et al. 2013).\cite{14} Although healing in children can be expected faster, still considerable time will be required.

Spontaneous alignments of the permanent teeth are likely even if their initial positions are not favorable.\cite{8} The present case showed good amount of bone regeneration and considerable alignment of displaced permanent teeth at 6-month follow-up. Distal shoe space maintainer with intra-alveolar extension aided in preventing first permanent molar from further tipping mesially and helped in achieving satisfactory crown angulation.

Conclusion
Clinician should always consider the possibility of radicular cyst arising from carious primary teeth. Radiographic follow-up of endodontically treated primary teeth at regular interval is crucial for early discovery of radicular cyst. Early diagnosis is important to avert adverse effect to the underlying permanent teeth.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

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