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CASE REPORT

A case of radicular cyst on deciduous tooth in a 7-year-old child

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Abstract

Radicular cysts are the most common cystic lesions in the oral cavity, and have a rare occurrence in the primary dentition. We report a case of radicular cyst of mandible in child by multimodal imaging including panoramic radiography, CT, and MR imaging. A 7-year-old girl presented with swelling and without pain, and hypoesthesia on the right side of the mandible. On clinical examination, an expansive lesion with undulation was found to the buccal cortex of the right side of the mandible. Panoramic radiograph showed a unilocular radiolucency with well-defined margin, displaced tooth, and root resorption in the right mandible. Regarding CT imaging, axial soft tissue algorithm CT and bone tissue algorithm CT showed a low-attenuation internal structure and expansion of the buccal cortex of the right side of the mandible. Three-dimensional-CT showed expansion of the buccal cortex of the right side of the mandible. Multiplanar reformation imaging showed displaced tooth, root resorption, and expansion of the buccal cortex of the right side of the mandible. On T1-weighted image, the expansive lesion showed low signal intensity, and T2-weighted and STIR images revealed high signal intensity. A partial biopsy of the mandibular region was performed. Histopathological diagnosis was radicular cyst caused by apical periodontitis with abscess. This case suggests that multimodal imaging, especially CT and MR imaging, could be effective for evaluating mandibular lesions in child.

Keywords Radicular cyst · Child · CT · MRI

Introduction

Although pathology in the maxillary and mandibular bones is rare in young patients, the differential diagnosis is broad. The dental surgeon should be prepared to provide a differential diagnosis and discuss management options when maxillofacial bone pathology is encountered [1]. The diagnosis and treatment of jawbone lesions in children and adolescents can be enhanced with the use of epidemiological, clinical, and imagistic information [2].

Inflammatory radicular cysts are chronic nature lesions that occur after the development of periapical granulomas, and the result of multiple inflammatory reactions [3]. Radicular cysts are the most common cystic lesions in the oral cavity, and have a rare occurrence in the primary dentition [4–8]. Multimodal imaging, such as intraoral periapical radiography, panoramic radiography, CT, and MR imaging, is an effective tool for detecting and managing radicular cyst [9, 10]. However, few results were found for multimodal imaging of radicular cysts in children using PubMed. We report a case of radicular cyst of mandible in a 7-year-old child by multimodal imaging including panoramic radiography, CT, and MR imaging.

Case report

A 7-year-old girl presented with swelling and without pain, and hypoesthesia on the right side of the mandible. Regarding the clinical history, the patient noticed swelling on the

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right side of the mandible one week ago. Since it did not alleviate the symptoms, she visited our hospital. On clinical examination, an expansive lesion with undulation was found to the buccal cortex of the right side of the mandible.

Panoramic radiograph showed a unilocular radiolucency with well-defined margin, displaced tooth and root resorption in the right mandible (Fig. 1). Odontogenic keratocyst or ameloblastoma was suspected with panoramic radiography at first.

She underwent CT, although she becomes exposed to radiation, because the CT is effective for evaluating expansion of the lesion and differential diagnosis. Regarding CT imaging, axial soft tissue algorithm CT and bone tissue algorithm CT showed a low-attenuation internal structure and expansion of the buccal cortex of the right side of the mandible (Fig. 2a, b). Three-dimensional (3D) CT showed expansion of the buccal cortex of the right side of the mandible (Fig. 2c). Multiplanar reformation (MPR) imaging showed displaced tooth, root resorption, and expansion of the buccal cortex of the right side of the mandible (Fig. 2d–f). Ameloblastoma was suspected from the CT images of the lesion in addition to panoramic radiography.

Furthermore, she underwent MRI, because the MRI is effective for evaluating properties of the lesion and differential diagnosis. On T1-weighted image, the expansive lesion showed low signal intensity, and T2-weighted and STIR images revealed high signal intensity (Fig. 3a–d). The final diagnostic imaging was ameloblastoma.

A partial biopsy of the mandibular region was performed. Histopathologically, the lumen was lined by nonkeratinized stratified squamous epithelium. The granulation tissue with a dense infiltration of lymphocytes and plasma cells and congestion and bleeding, and connective tissue were subjacent to the lining epithelium. Osteoclasts were observed in Howship's lacuna on the bone surface, and odontoclasts were observed in resorption lacunae on the dentin surface of tooth root. Immunohistochemically, receptor activator of NF-κB ligand (RANKL)-positive lymphocytes and fibroblasts were observed. Histopathological diagnosis was radicular cyst caused by apical periodontitis (85) (Fig. 4a–d).

This study was approved by the Ethics Committee (ECNG-R-400), and the patient gave written informed consent.

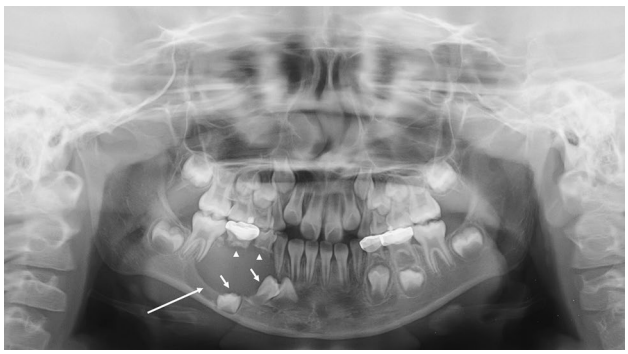

Fig. 1 Panoramic radiograph showed a unilocular radiolucency with well-defined margin (long arrow), displaced tooth (short arrows), and root resorption (arrowheads) in the right mandible

Discussion

Radicular cysts associated with deciduous teeth are very rare [5]. Talukdar et al. [5] reported that panoramic radiograph in a 7-year-old boy with radicular cyst revealed radiolucency involving enamel, dentine, and approximating pulp in relation to 74 and deviation in the path of eruption

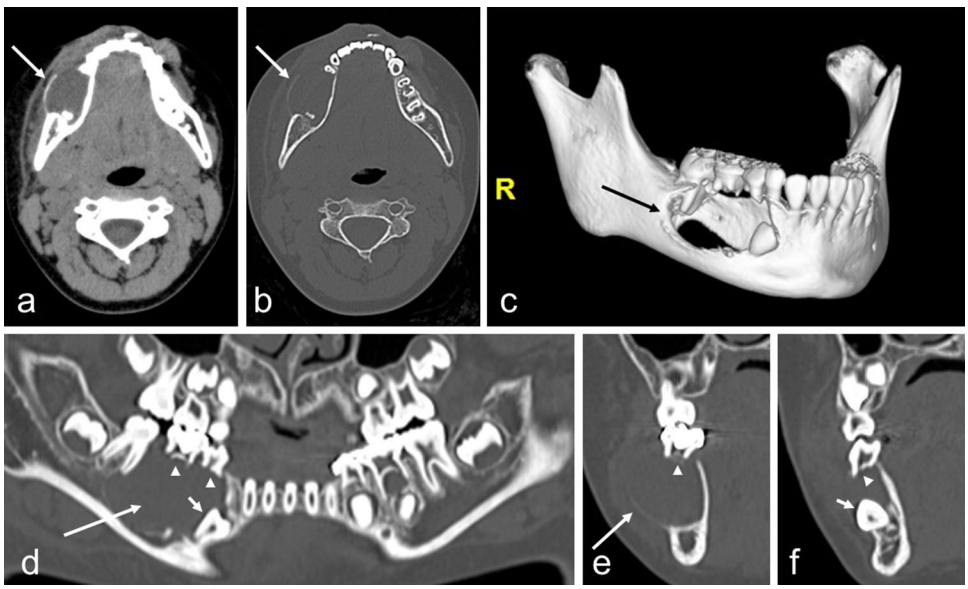

Fig. 2 Axial soft tissue algorithm CT (**a**) and bone tissue algorithm CT (**b**) showed a low-attenuation internal structure and expansion of the buccal cortex of the right side of the mandible (arrows). Three-dimensional CT (**c**) showed expansion of the buccal cortex of the right side of the mandible (arrow). Multiplanar reformation imaging (**d**, panoramic view; **e**, **f**, buccal-lingual views) showed displaced tooth (**d**, **f**, short arrows), root resorption (**d**–**f**, arrowheads), and expansion of the buccal cortex of the right side of the mandible (**e**, long arrow)

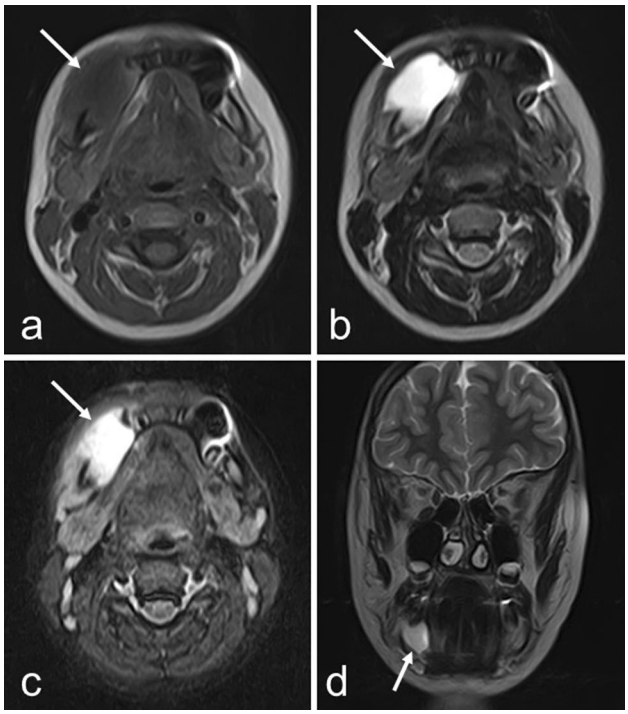

Fig. 3 On T1-weighted image (**a**), the expansive lesion showed low signal intensity (arrow), and T2-weighted (**b**, **d**) and STIR (**c**) images revealed high signal intensity (arrows)

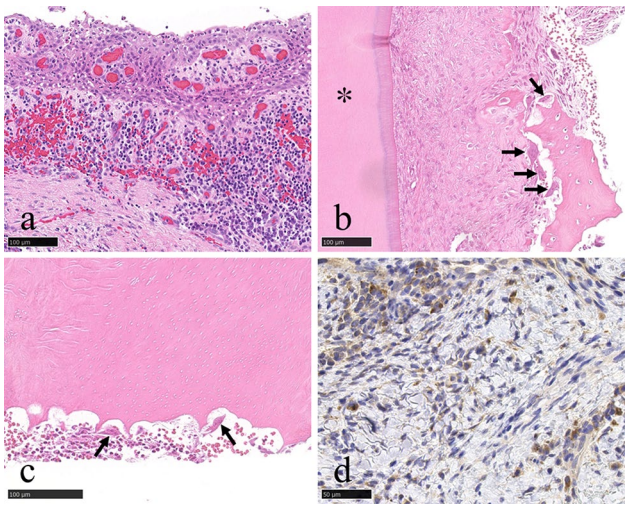

Fig. 4 Histopathological and immunohistochemical findings. **a** The cyst lumen is lined by nonkeratinized stratified squamous epithelium. The granulation tissue with a dense infiltration of lymphocytes and plasma cells and congestion and bleeding, and connective tissue are subjacent to the lining epithelium. Scale bar: 100 µm. **b** Osteoclasts (arrows) are observed in small hollows (Howship's lacuna) on the bone surface near the tooth root (*). Scale bar: 100 µm. **c** Odontoclasts (arrows) are observed in small hollows (resorption lacunae) on the dentin surface of tooth root. Scale bar: 100 µm. **d** Receptor activator of NF-κB ligand (RANKL)-positive lymphocytes and fibroblasts are observed. Scale bar: 50 µm

of 34. Kajjari et al. [6] reported that panoramic radiograph in a 5-year-old girl with radicular cyst showed the radiolucent area around erupting second premolar in the mandible. Ahmed et al. [7] reported two cases of radicular cysts in children, such as panoramic radiograph in a 7-year-old boy showed a well-defined radiolucent lesion at the apex of 75 with a displacement of permanent tooth bud 35, and panoramic radiograph in an 8-year-old girl showed a radiolucent lesion in relation to 84 with a displacement of 44 and 43 permanent tooth buds. We reported a 7-year-old girl with radicular cyst presented with swelling and without pain, and hypoesthesia on the right side of the mandible. On clinical examination, an expansive lesion with undulation was found to the buccal cortex of the right side of the mandible. Panoramic radiograph showed a unilocular radiolucency with well-defined margin, displaced tooth, and root resorption in the right mandible. We consider that the findings of the radicular cysts on panoramic radiographs were similar to ours.

Viggness et al. [9] indicated that radicular cyst can be better radiologically evaluated three-dimensionally with the help of CBCT than conventional intraoral periapical radiographs, which do not reveal the exact side of perforation of the cortical plate caused by expansion of the cyst. Mahesh et al. [4] reported that a 7-year-old boy, with a complaint of swelling in the maxillary anterior region, was diagnosed with radicular cyst in relation to primary maxillary right central incisor based on CBCT and histopathological features. Ahmed et al. [7] reported two cases of radicular cysts in children, such as CBCT in a 7-year-old boy showed the extent of the radiolucent lesion, and CBCT in an 8-year-old girl showed buccal cortical plate expansion and the extent of the radiolucent lesion. Our case showed that axial soft tissue algorithm CT and bone tissue algorithm CT showed a low-attenuation internal structure and expansion of the buccal cortex of the right side of the mandible, three-dimensional CT showed expansion of the buccal cortex of the right side of the mandible, and multiplanar reformation imaging on CT showed displaced tooth, root resorption, and expansion of the buccal cortex of the right side of the mandible. We also consider that CT and CBCT are essential for the three-dimensional visualization of the radicular cyst.

Wamasing et al. [10] investigated the MR imaging characteristics of radicular cysts and granulomas, and indicated that all radicular cysts (27/27 cases, 100%) showed a hyperintense signal in the lesion center on T2-weighted images with fat saturation; however, only 6 granulomas (6/9 cases, 66.7%) showed a hyperintense signal in the lesion center. Our case showed that the expansive lesion showed low signal intensity on T1-weighted image, and T2-weighted and STIR images revealed high signal intensity. We consider that the findings of the radicular cysts on MR imaging were similar to this study.

In this case, osteoclasts were observed in Howship's lacuna on the bone surface, and odontoclasts were observed in resorption lacunae on the dentin surface of tooth root. Immunohistochemically, receptor activator of NF-κB ligand (RANKL)-positive lymphocytes and fibroblasts were observed. Furthermore, 3D-CT showed expansion of the buccal cortex of the right side of the mandible, and MPR imaging on CT showed displaced tooth, root resorption, and expansion of the buccal cortex of the right side of the mandible. We consider that the radicular cyst shows expansion of the buccal cortex of the right side of the mandible, because RANKL expression is highly observed by immunohistochemical staining, and as a result, bone resorption by osteoclasts is remarkable.

In conclusion, we reported a case of radicular cyst of mandible in a 7-year-old child by multimodal imaging including panoramic radiography, CT, and MR imaging. This case suggests that multimodal imaging, especially CT and MR imaging, could be effective for evaluating mandibular lesions in child.

Declarations

Conflict of interest Takaaki Oda, Masanori Takada, Junya Ono, Yoriaki Kanri, Yasuo Okada, and Ichiro Ogura declare that they have no conflicts of interest.

Human rights statement and informed consent All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008 (5). Informed consent was obtained from all patients for being included in the study.

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