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CASE REPORT

Huge Radicular Cyst of the Maxilla Treated with Complete Resection and Immediate Reconstruction by Rib Bone Graft

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Abstract Radicular cysts are the most common odontogenic cystic lesions that occur in jaws. They rarely become problematic and are incidentally found on routine dental radiographs. As they appear to reach a considerable size prior to medical attention due to their insidious and destructive growth characteristics during the intraosseous stage, treatment often requires extensive cystectomy and skeletal reconstruction. Here we present the case of an 18-year-old man who was sent to our department, because of a huge, bulging mass in his left cheek. Surgery consisted of complete removal of the cyst and immediate reconstruction of the midfacial buttress using an autologous rib graft in a tongue-and-groove fashion. Histopathological examination of the lesion confirmed the diagnosis of a maxillary radicular cyst. This case underscores the nature of the frequently asymptomatic and long-term evolution of maxillary radicular cysts, with their growth causing massive bone destruction for which skeletal reconstruction is required.

Keywords Radicular cyst · Maxillary reconstruction · Rib bone graft

Introduction

Radicular cysts are the most common type of cystic lesions that occur in jaws. They arise from epithelial rests of Malassez in the periodontal ligament as a result of an inflammatory process in the dental pulp region. They rarely cause any problems and most go unnoticed, until detected by routine dental radiographs. Some long-standing lesions may undergo acute exacerbation of the cystic lesion and develop signs and symptoms such as swelling, tooth mobility, and displacement of an unerupted tooth [1]. The age distribution is wide, but most occur in the 20 s. The most frequent site is the anterior maxilla, although mandibular lesions may be just as common. Diagnosis of radicular cysts is based on clinical, radiographic, and histological evaluation. On radiological examination, these are ovoid, radiolucent areas with dense sclerotic margins in relation to the apex of a tooth root.

The usual management for asymptomatic lesions is endodontic observation. For symptomatic lesions, extraction or endodontic treatment of the involved tooth is advised. For larger lesions, marsupialization for decompression or periapical surgical enucleation is recommended. The authors experienced a case of a huge radicular cyst with maxillary sinus evolution, which was treated with complete resection of the cyst and immediate reconstruction with an autologous rib bone graft.

Patient Report

A healthy 18-year-old male patient was referred to the Department of Plastic and Reconstructive Surgery complaining of an increasingly bulging mass on the left cheek that appeared 1 month earlier. The medical history and

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family history were noncontributory. He had received several endodontic treatments in his #25 tooth about 5 years earlier. A clinical examination revealed a palpable 5 × 5 cm-sized, nontender, fixed mass on his left cheek, causing minor asymmetry of the face (Fig. 1a). On intraoral examination, a protruding mass was present on the left upper gingival sulcus. The panoramic radiograph showed an oval-shaped radiolucent lesion with smooth and well-defined borders, extending into the left maxillary sinus (Fig. 1b). In order to better delineate the extent of the lesion, computed tomographic scans were performed. A huge cystic lesion, measuring about 4 × 5 cm, almost completely occupied the left maxillary sinus. The anterior wall of the maxilla had been eroded by the mass and some parts of zygomatic buttress were replaced by a thin bony structure (Fig. 1c). An operation was planned to resect the cyst completely and reconstruct the zygomatic and naso-frontal buttress with autologous bone. The patient was taken to surgery, where general anesthesia was administered along with endotracheal intubation. An incision was made in the left upper buccogingival sulcus. A mucoperiosteal flap was reflected through subperiosteal dissection to expose the cyst and the left maxilla. The mucosa of the maxillary sinus was intact after the removal of the cyst. Bone was harvested from the right sixth rib. The harvested rib was carved to fit the bony defect (Fig. 2a). The rib bone grafts were stabilized with interosseous wires, miniplates, and microplates (Fig. 2c, d). After massive irrigation to the reconstructed skeleton, the mucoperiosteal flap was repositioned and the oral incision was closed with a 4/0 monofilament absorbable suture, leaving a small silastic drain. Antibiotics and analgesics were given in the postoperative period and continued until postoperative day 5. The drain was removed the day after the surgery. The permanent histopathological examination of the surgical specimen revealed nonkeratinized stratified squamous epithelial lining with inflammatory cell infiltration, consistent with a radicular cyst (Fig. 2b). The offending tooth was extracted after the oral wound healed. The patient was followed up for 2 years without evidence of recurrence. We found the well-reconstructed buttresses at the operation for plates and screws removal (Fig. 3).

Discussion

Radicular cysts, also known as periapical cysts, commonly occur in the maxillary teeth in the third decade of age, showing a slight predominance in males. They are usually associated with carious, nonvital, discolored, or fractured teeth and are found mostly at the apices of the teeth [2]. Several treatment modalities are available for radicular cysts including endodontic treatment, extraction of the offending tooth, and enucleation. The treatment of choice

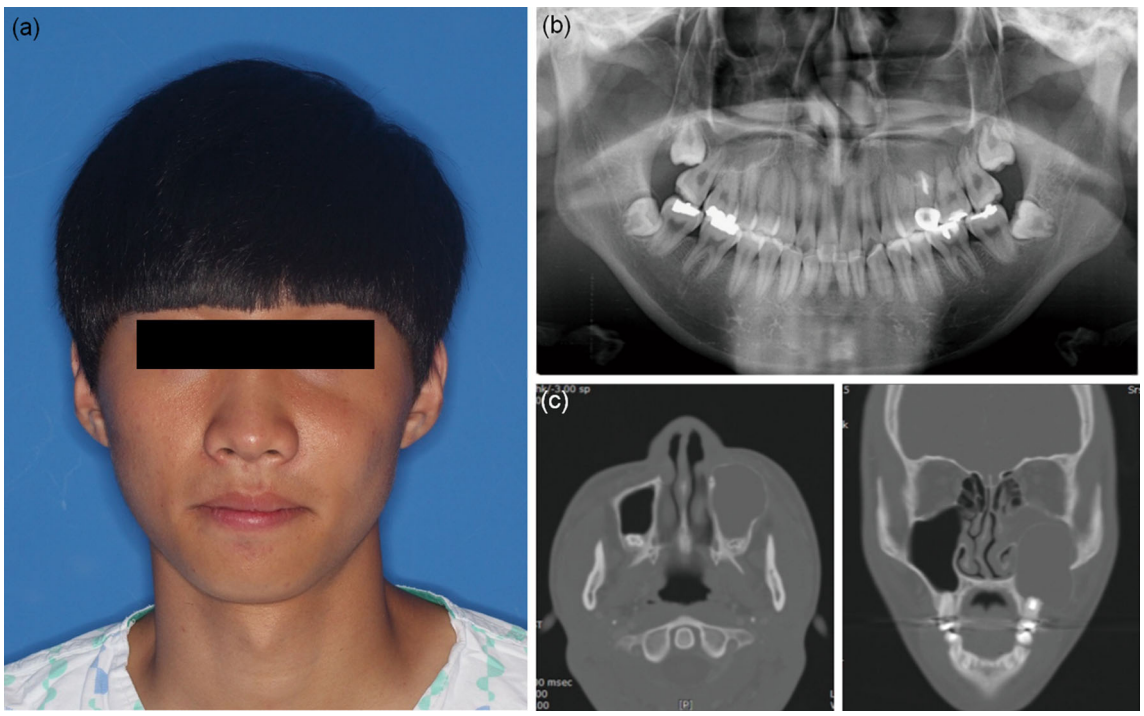

Fig. 1 **a** Preoperative clinical photograph showing bulging mass on his left cheek and **b** panoramic radiograph showing a well-defined radiolucent lesion in the left maxilla. **c** Computed tomographic images showing high-density cystic lesion without contrast enhancement. The thinned anterior wall of the maxillary sinus and zygomatic buttress resulted from bony remodeling

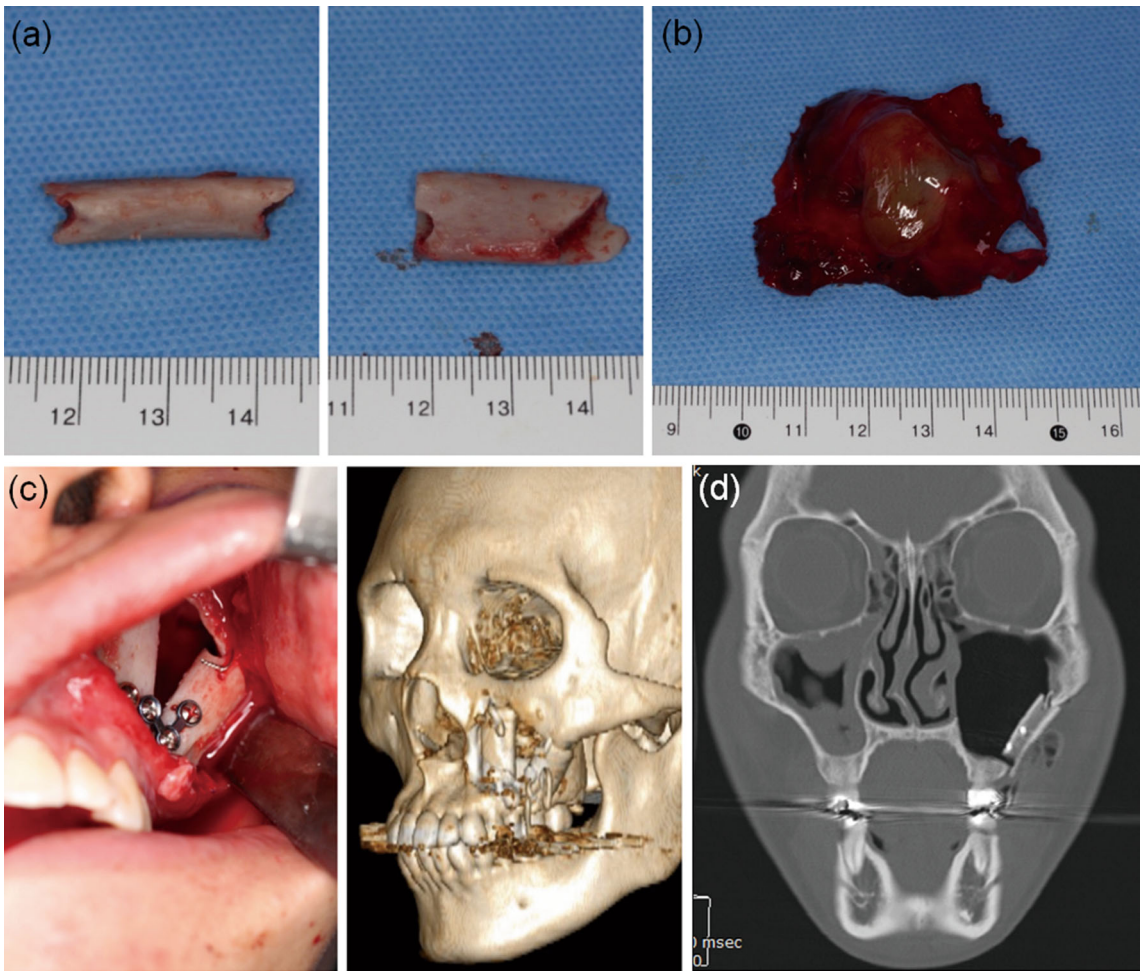

Fig. 2 **a** The bone is carved to fit the interface in a tongue-and-groove fashion. (Left) The bone graft for reconstruction of the medial buttress and (right) the lateral buttress. **b** The specimen resected en bloc along with the thinned anterior wall of the maxillary sinus. The cyst contained clear fluid. **c** Two pieces of rib bone grafts. One is for bridging the defect between the inferior orbital rim and the alveolar bone; the other is intended to be placed between the body of the zygoma and the alveolar bone. **d** The coronal section of the postoperative CT scan showing the reconstructed zygomatic buttress

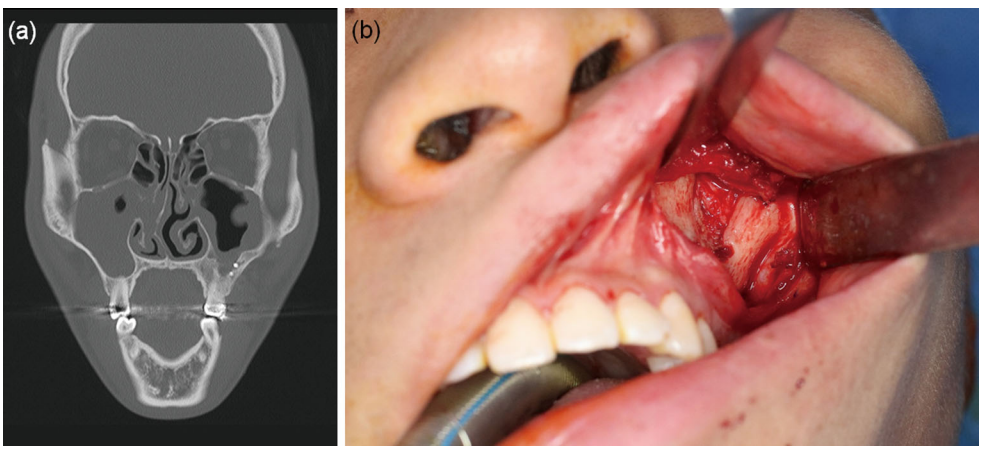

Fig. 3 **a** The coronal section of the CT scan at postoperative 2 years showing no evidence of recurrence and well-reconstructed zygomatic buttress. **b** At the operation for removal of fixation plates and screws, the reconstructed buttresses were well maintained with healed rib bone graft

depends on the size and localization of the cyst, the bone integrity of the cystic wall, and its proximity to vital structures [3]. Small lesions can be managed endodontically. Allon et al. [4] proposed decompression as a treatment option for odontogenic cystic lesions in children to maintain good regeneration potential in the developing facial skeleton. Marsupialization relieves the internal pressure of the cyst, thus inducing the contraction of the cystic lining.

The evolution of radicular cysts has a wide spectrum and is frequently asymptomatic, going unnoticed unless discovered by routine radiological examination. Its slow progression leads to extension into adjacent anatomical structures such as sinuses, the nasal cavity, or soft tissues. Consequently, the patients seek medical help for a palpable mass or facial asymmetry. The previous literature describes the complete removal of radicular cysts with maxillary sinus involvement through an endonasal endoscopic approach [5]. The growth of the cysts is quite slow during the intraosseous stage. When the osteoperiosteal barrier is overcome, the evolution of the cysts is often hastened, resulting in progressive bone resorption and distortion of the neighboring structures [6].

Midface reconstruction is the restoration of the facial skeleton, overlying skin, underlying mucosa, and intervening soft tissue. With intact soft tissue and lining, reconstruction of the facial skeleton should be emphasized on the buttress. The midface is a system of sinus cavities with certain thicker areas (or buttresses) and provides considerable structural support. These areas of structural support acts as pillars and must be anatomically reconstructed to reestablish the bone architecture. The vertical supports consist of the nasal septum in the midline and the nasomaxillary (or nasofrontal), zygomatic (or zygomaticomaxillary), and pterygoid buttresses. Facial fractures involving the buttresses require surgery since they are the cornerstone of the midface and functions to protect against external impact as well as esthetically to maintain the facial contour [7]. A secure buttress of the midface provides support to muscles responsible for mastication, speech, and facial expression. In addition, it maintains facial vertical height and avoids changes in globe position.

In our case, complete healing and restoration of the facial contour was achieved with reconstruction of the facial supportive structure using an autologous rib. For a female patient, the iliac bone would have been grafted instead of a rib bone.

Conclusions

The present case demonstrates the destructive character of radicular cysts. This case highlights the nature of the frequently asymptomatic and long-term evolution of maxillary radicular cysts, with their growing volume causing massive bone destruction in which skeletal reconstruction is required. In addition, to maintain the contour and function of the midface in the case of a large cystic lesion involving the supportive bony structure, it is important to reconstruct the secure buttress of the maxilla with autologous rib grafting after complete removal of the lesion.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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