Radicular cyst associated with odontogenic maxillary sinusitis in CBCT study

Kista radikuler yang berhubungan dengan sinusitis maksilaris odontogenik dalam studi CBCT

[1]Ifa ariefah, [2]Barunawaty Yunus, [2]Fadhlil UA Rahman, [3]Yossy Yoanita A
[1]Student of Oral and Maxillofacial Radiology Specialist Program, Faculty of Dentistry, Hasanuddin University
[2]Department of Oral and Maxillofacial Radiology, Faculty of Dentistry, Hasanuddin University
[3]Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Hasanuddin University
Makassar, Indonesia
Corresponding author: **Ifa ariefah**, e-mail: **ifaariefah17@gmail.com**

ABSTRACT
Radicular cysts are one of the most common types of cysts that occur in the jawbone, which in the maxilla, may invade into the sinuses. The CBCT radiographs make it easier for dentists to evaluate the boundaries and extension of the cyst lesion. This case report analyses the expansion of a radicular cyst into the maxillary sinus area causing maxillary sinusitis. A 58-year-old man complained of gingival swelling of the left maxilla that occurred in the area of the retained root of tooth 23, and extended to the right maxillary sinus. After CBCT-3D scanning, an osteolytic lesion was found at the periapical area of teeth 22 and 23, which extended to the maxillary alveolar bone and caused perforation at the base of the left maxillary sinus with hyperpigmented appearance along the sinus base on radiographs. The patient underwent cyst enucleation, fistulectomy, sinus washing, and multiple tooth extractions. Biopsy of the lesion showed the character of a radicular cyst. It was concluded that CBCT imaging clearly showed the extension of the maxillary radicular cyst lesion to the maxillary sinus to support an appropriate treatment plan.
Keywords: CBCT, radicular cyst, maxillary sinus, maxillary sinusitis

ABSTRAK
Kista radikuler adalah salah satu jenis kista yang paling umum terjadi pada tulang rahang, yang pada rahang atas, dapat menginvasi ke sinus. Radiografi CBCT memudahkan dokter gigi untuk mengevaluasi batas dan perluasan lesi kista. Laporan kasus ini menganalisis perluasan kista radikular ke daerah sinus maksila yang menyebabkan sinusitis maksila. Seorang laki-laki berusia 58 tahun mengeluhkan pembengkakan gingiva pada rahang atas (RA) kiri yang terjadi di area akar gigi 23 yang tertahan, dan meluas ke sinus maksila kanan. Setelah pemindaian CBCT-3D, ditemukan lesi osteolitik pada daerah periapikal gigi 22 dan 23, yang meluas ke tulang alveolar RA dan menyebabkan perforasi pada dasar sinus maksila kiri dengan tampilan hiperpigmentasi di sepanjang dasar sinus pada radiografi. Pasien menjalani enukleasi kista, fistulektomi, pencucian sinus, dan pencabutan beberapa gigi. Biopsi lesi menunjukkan karakter kista radikuler. Disimpulkan bahwa pencitraan CBCT menunjukkan dengan jelas perluasan lesi kista radikuler RA ke sinus maksilaris untuk mendukung rencana perawatan yang tepat.
Kata kunci: CBCT, kista radikuler, sinus maksilaris, sinusitis maksilaris
Received: 10 January 2024 Accepted: 1 May 2024 Published: 1 August 2024

INTRODUCTION

A cyst is defined as a pathological cavity filled with a viscous fluid or semi-liquid and is lined by epithelium and surrounded by connective tissue walls that can be in soft or hard tissue such as bone.[1-3] Radicular cyst is one of the most common types of cysts in the jawbone; about 52-68% with a male pre delicacy are more often affected by radicular cysts than women.[4] Of all cysts found in the jaw. Radicular cysts can occur due to physical, chemical, or bacterial factors resulting in pulpal death followed by stimulation of residual Malassaez epithelial cells, which are normally found in the periodontal ligament.[5] Larger cysts can cause extraoral swelling and even facial asymmetry. The radiographic appearance of a radicular cyst has a radiolucent internal structure with sclerotic margins. Enlarged cysts can involve the maxillary sinus, while in the mandible, the cyst expansion causes migration of the mandibular canal inferiorly.[6,7]

The base of the maxillary sinus is the alveolar process where the roots of the maxillary teeth are located so that the maxillary sinus cavity is separated only by thin bones with the root teeth, sometimes even without delimiting bone. Infections of the maxillary teeth, such as infection of the apical roots of the teeth or inflammation of the periodontal tissues, easily spread directly to the sinuses or through the blood and lymph vessels. Dental problems such as periodontal disease and periapical lesions are reported cause 58-78% thickening of the maxillary sinus mucosa.[8,9] Limitations of 2D radiography include 3D anatomical superimposition as well as possible exposure or geometrical errors. The integration of CBCT with dentistry has been shown to be helpful in diagnosing periapical lesions that periapical radiographs fail to demonstrate. CBCT provides a 3D view of the object in a sagittal, coronal and axial direction. Currently, available CBCT examinations allow a much more accurate assessment of the teeth and maxillary sinuses.[4,6,7,10] This article reports analyses the expansion of a radicular cyst into the maxillary sinus area causing maxillary sinusitis.

Figure 1 Maxillary radicular cyst, **A** intra oral view, **B** extraoral

CASE

A 58-year-old man came to the Radiology Installation of the Unhas Dental and Oral Teaching Hospital with a CBCT photo reference from a practising dentist, with complaints of swelling in the left maxilla area. The swelling had occurred for about ±2 months. The patient has been taking anti-inflammatory drugs and antibiotics prescribed by the local dentist, the swelling has decreased somewhat, but in the left and right lateral nasal areas, exudate has been released in the lateral nasal area.

On clinical examination, the patient was found to be in good condition. On extra oral examination, the face ap-

peared asymmetrical. Intra-orally, a lump was found in the labial mucosa of the left teeth 22 and 23 with a size of ± 3x5x2.5 cm which was redder in colour than the surrounding tissue and had a rubbery consistency, bled easily, was edematous and oozed exudate.

MANAGEMENT

Supporting examination performed a radiological examination of the CBCT photo. The results showed an osteolytic lesion periapical to tooth 23 with findings of an osteolytic lesion periapical to the tooth extending to maxillary alveolar bone and an impression of perforation of the base of the maxillary sinus due to pressure on the lesion, the average size of the lesion was 7-8 x 8-9 mm, there is also a thickening of the mucous membrane of the sinus floor at the base of the maxillary sinus (mean a widening of ±3.5 mm, radiointermedia image at the base of the sinus), on the periapical tooth 22 there is also an osteolytic lesion with a smaller size (Fig.2).

In the axial view, it can be divided into four slicing: 1) slice 145-147 in the maxillary sinus area shows a comparison of the maxillary sinuses on the right and left sides. The right side shows radiointermediate images in the entire maxillary sinus space, while on the left side, there is a thickening of the maxillary sinus mucous membrane, especially in the anterior area (anterior wall); 2) slice 176-178 shows perforation of the floor of the maxillary sinus due to the extension of the periapical lesion of tooth 23 towards superior; 3) slice 233-235 shows osteolytic lesions with an average size of 8x9 to 9x10 mm and shows destruction of buccal cortical plate; 4) slice 239-241 shows the periapical lesion area of teeth 23 and 22 (Fig.3).

The coronal view shows a periapical osteolytic lesion on tooth 23 with findings of an osteolytic lesion periapical to the tooth that extends to the maxillary alveolar bone and causes perforation of the maxillary sinus floor. Thickening of the maxillary sinus mucous membrane (increased radiointermedia area on the sinus floor and surrounding sinus wall) and the region of teeth 23 and 22 by comparison of the different lesion sizes, the osteolytic lesion in the periapical region of tooth 23 was more extensive and aggressive (Fig.4 and Fig.5).

On the side of the dextra maxillary sinus on teeth 13, 14 and 16, especially tooth 16, it can be seen that the palatal root enters the maxillary sinus accompanied by radiointermedite areas throughout the sinus space and oroantral communication occurs due to periapical lesions.

Based on the history, clinical and radiological examination, the diagnosis of a radicular cyst of the maxilla was made. The next step for cyst treatment is left maxillary A/R cyst enucleation, fistulectomy, sinus wash out with Caldwell bilateral maxillary sinus procedure and multiple extractions. However, before carrying out the series of treatments, the doctor first controls diabetes mellitus and hypertension to speed up the healing process and avoid bleeding during treatment. The results of histopathological examination of the cyst found tissue showing the structure of an ulcerative cyst and partly lined with hyperplastic stratified squamous epithelium consisting of fibrous connective tissue with inflammatory cell infiltrates of lymphocytes, neutrophils and histiocytes accompanied by a proliferation of blood vessels, extravasation of erythrocytes and clusters of cholesterol clefts.

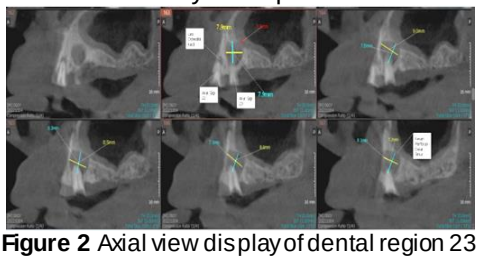

Figure 2 Axial view display of dental region 23

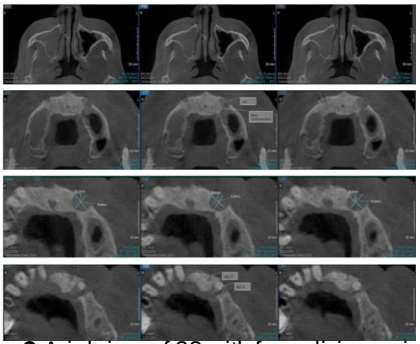

Figure 3 Axial view of 23 with four slicing variations

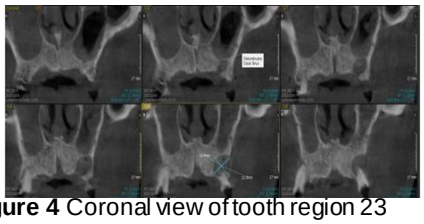

Figure 4 Coronal view of tooth region 23

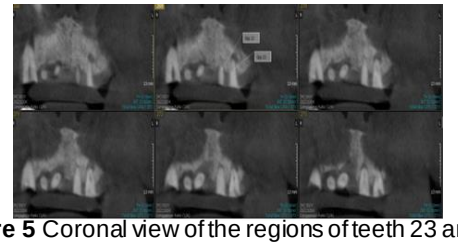

Figure 5 Coronal view of the regions of teeth 23 and 22

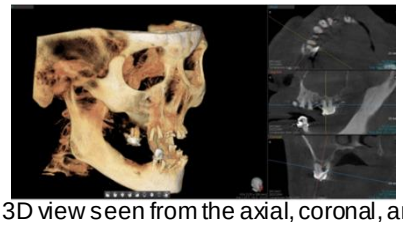

Figure 6 3D view seen from the axial, coronal, and sagittal

DISCUSSION

Radicular cysts, are odontogenic cysts with the highest incidence of around 52-68% of all cases affecting the jaws. The origin of the radicular cyst is from remnants of the malassez epithelium involved during the evolution of the periapical granuloma, characterized by an inflammatory process associated with the formation of a central cavity and lined by stratified squamous epithelium, which may be intermittent. Usually, cysts are associated with teeth that are carious, nonvital, discoloured teeth or fractured. Radicular cysts are painless unless the tooth is infected and the cystic lesion is discovered incidentally during routine radiography that show round, oval or hepa-

DOI 10.35856/mdj.v13i2.1142

tic radiolucent lesions with clear boundaries.[10-12]

Radicular cysts are usually found at the apex of non-vital teeth with a male predilection factor of around 30-40 years and are often found in the anterior maxilla region. In general, cyst develop at anterior maxillary midline near the incisive foramen. This cyst is the most common non-odontogenic cyst of the oral cavity, with an incidence of about 1% of the population. These lesions grow slowly and may extend to the maxillary sinus area, nasal cavity, vestibule, or palate region.[6,11,13]

The base of the maxillary sinus is the base of the tooth root (alveolar process), so a dental infection can cause maxillary sinusitis; maxillary sinus ostium is located in the meatus medius, around the narrow hiatus semilunaris, so it is easily clogged.[9,13] In the exposed pulp, germs will enter and cause decay in the pulp to form pulpal gangrene. This infection spreads and affects the periodontium causing periodontitis and irritation that will last a long time, so pus is formed. This periodontal abscess can then expand and reach the alveolar bone causing an alveolar abscess. The alveolar bone forms the floor of the maxillary sinus, thereby triggering inflammation of the sinus mucosa.[6,9,14]

2D imaging has certain limitations such as superimposition, distortion, and magnification that result in an inaccurate representation of the structure in evaluating a cyst.[15] The presence of a large periapical lesion often creates a dilemma in diagnosis, and a thorough evaluation of the case is necessary to diagnose it. The intra oral periapical is usually sufficient to diagnose a periapical cyst; however, larger cysts require extensive imaging, such as CBCT, to determine the location, extent, and size of the lesion; not only can a periapical lesion be identified, but its associated roots can be clearly seen. The results can be used for treatment planning.[1,16]

3D CBCT is a radiographic technique that utilizes conical x-rays and computerized volumetric reconstruction to produce 3D radiographs, namely sagittal, coronal and axial. 3D CBCT is a new technology in the field of radiology, that has several advantages when compared to conventional radiography tools, such as effective planning of surgery prior to implant treatment, more detail in observing the bone tissue structure due to high resolution and contrast, non-invasive and painless, procedure quick and easy examination, better at preventing superimposition, and can distinguish two tissues that have the same density as soft tissue and water.[17-19] Based on the results of the radiographic examination using CBCT, it can be seen from the sagittal, coronal, and axial views that there is a radiolucent lesion apical to the remaining root of tooth 26. Based on the quality of the radiographic image, the radiolucent lesion has clear and firm boundaries.[1,20]

It is concluded that radicular cysts are the most common cysts of the jaws. These cysts are always associated with non-vital teeth and rarely cause symptoms because they are usually small. Radicular cysts that are not treated, can destroy bone due to their enlargement, so early detection through radiological examination is important to do. The software in CBCT makes it easier for dentomaxillofacial radiologists to narrow the differential radiodiagnosis and determine the radiodiagnosis.

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DOI 10.35856/mdj.v13i2.1142