



Odontogenic sinusitis due to radix perforation into the maxillary sinus on CBCT radiograph: a case report

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ABSTRACT

Objectives: The purpose of this article was to provide an overview and examination guide in identifying odontogenic sinusitis due to radix perforation into the maxillary sinus by dental action or iatrogenic in dentistry using the CBCT modality.

Case Report: A 33-year-old female patient presented to the Radiology Installation of RSGM Andalas University with a referral for CBCT, following a diagnosis of odontogenic sinusitis. According to the patient's medical history, she had been experiencing headache and dizziness for five months after a tooth extraction. The CBCT scan revealed remnants of a tooth root (radix) perforating into the right maxillary sinus, surrounded by a radiopaque intermediate area. Sinus perforation is a known occurrence in dentistry, and it requires thorough diagnostic

imaging for proper evaluation. The tooth root remnants are typically located in the premolar and molar regions, near the base or medial wall of the sinus. The size of the tooth fragments within the sinus can be precisely measured, and the relationship of the remaining fragments to the maxillary sinus anatomy can be clearly defined. This detailed information enables clinicians to assess the extent of the lesion and its impact on surrounding structures, allowing for the development of an appropriate treatment plan for the patient.

Conclusion: CBCT is a very adequate modality for supporting the examination of cases of residual tooth roots perforated to the sinuses because it can provide detailed information about the position, size, and relationship with the surrounding anatomy.

Keywords: Cone-beam computed tomography, perforation, radix, odontogenic sinusitis

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INTRODUCTION

Odontogenic maxillary sinusitis is an inflammation of the sinuses that can be caused by factors related to the teeth such as apical or periodontal lesions that occur in the posterior teeth of the upper jaw or the remaining radix. If obstruction occurs in the ostium sinuses, there is an increase in pressure in the sinus cavity which causes mucosal swelling and complaints in patients. Odontogenic maxillary sinusitis is a frequent complication of dental procedure. It is estimated that the incidence of maxillary sinusitis due to odontogenic factors is around 25-40%. It is generally caused by periapical sepsis, and iatrogenic at the time of tooth extraction.¹

Complications in various procedures in dentistry are conditions that is difficult to avoid.¹ During tooth extraction, radix or part of the tooth can be pushed into the maxillary sinuses.^{1,2,3} In general, the apex of the premolar teeth and molar of the upper jaw is indeed close to the base of the maxillary sinus. Based on Bajoria's research data, as many as 74.9% of dental apical cases touch the base of the sinuses, 16.9% are adjacent to the base of the sinuses, and as many as 8.2% of dental apical cases

are in the sinuses.³

There are several ways to diagnose and determine the position of teeth that have moved into the maxillary sinuses. However, CBCT is a fairly good modality in assessing complex conditions because it can provide a large scope to visualize the entirety of the sinus and detailed information about the size, position, shape, and relationship of anomalies or lesions to the anatomy of the maxillofacial area. CBCT is an option if the simple modality cannot provide complete information to make a proper treatment plan for the patient.^{4,5,6} This article aims to provide an overview and examination guide in identifying odontogenic sinusitis due to radix perforation into the maxillary sinus due to dental or iatrogenic procedures in dentistry using CBCT modalities.

CASE REPORT

A 33-year-old female patient came to the Radiology Installation of RSGM Andalas University

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with a referral for CBCT. From the anamneses, it is known that the patient had performed the extraction of the first right molar tooth about 3 months ago. After the tooth extraction, it was found that there were fragments of tooth roots that had not been found. The clinician then referred the patient for a CBCT photo as a supporting examination of the patient. After the extraction procedure, patients often feel headaches and dizziness.

From the CBCT radiographic examination, it was found that there was a disconnection of basic cortical continuity of the dextra maxillary sinus in the region of the palatal root socket of tooth 16 (Figure 1). There is a radiopaque imaging on the maxillary sinus dextra similar to the image of radix in the tooth area. This residual fragment of radix intersects with the medial wall of the maxillary sinuses. The remaining fragment of this radix has a size of ± 8 mm. In the maxillary sinus area, there is an intermediate radio image on the wall and base of the sinus. The intermediate radio area covers the socket area until one-third of the inferior area of the maxillary sinus. A radio intermediate image can be seen in the area around the remaining tooth roots in the maxillary sinus dextra (Figure 2).

DISCUSSION

Teeth or dental radix, is a foreign object that is often found in the maxillary sinuses. The presence of radix in the maxillary sinuses can occur due to iatrogenic in dental practices.^{2,7} The presence of teeth in these sinuses is also a result of the neglect of clinicians about the need for X-rays before tooth extraction, especially in molar and upper premolar teeth related to the anatomically maxillary sinuses.^{2,3,8,9}

Various variations in the anatomy of the head and neck require a more optimal examination due to the limitations of examination with 2D radiograph.⁸ In simple cases, the use of panoramic photos can already provide quite good information.¹⁰ But in more complex cases, the use of CBCT is the right choice. Accurate information is needed for cases of teeth or radix perforations to the sinuses, so that clinicians can create minimally invasive treatment plans.² In this case, the patient requires a sufficiently adequate examination to identify the position of the roots that have perforated into the maxillary sinuses. The use of CBCT is the golden standard for identifying, diagnosing, and evaluating the details of dental structures that may be involved.

The perforation of the maxillary sinuses appears to be more frequent, especially when clinicians



Figure 1. CBCT coronal view of cortical discontinuity at palatal socket (arrow)

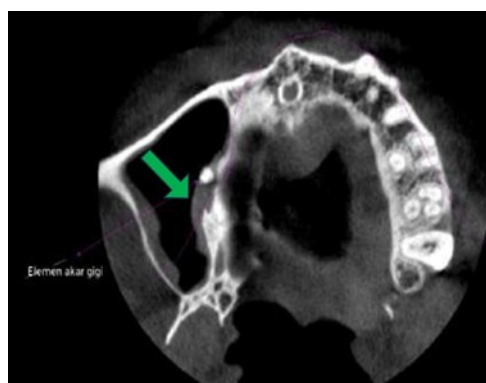


Figure 2. CBCT axial view of radix intersects with the medial wall of the maxillary sinuses and radio intermediate area (arrow)



Figure 3. Oroantral communication on dental socket



Figure 4. Radix in the medial wall of the right maxillary sinus (3D view)

perform extractions of the maxillary molar or premolar.^{2,11} Based on Seigneur's systematic research, 159 cases of teeth being pushed into the sinuses, 72% are molar teeth, 7% are premolar teeth, and 21% cannot be specified. Of all these cases, 26% were found to involve palatal roots.² In this case, the occurrence of radix or tooth fragments in the sinuses also occurs in molar and premolar teeth on molar and premolar region (Figure 3). This is due to the location of the tooth which is adjacent to the sinuses, and tooth fragments or radix are generally at the base of the sinuses, due to gravity. Sometimes it can also be in the submucosa or medial or lateral wall of the sinuses.^{2,12,13}

CBCT is the appropriate modality for examining cases of teeth or radix that perforate the sinuses. CBCT can provide a detailed picture of the case. CBCT provides information about the location of tooth elements or radix within the sinuses.^{4,5} Varied anatomical images of the sinuses require adequate imaging.¹⁴ CBCT images provide sagittal, coronal, axial and 3D views that are very helpful for obtaining complete information. In this case, from a coronal point of view, it is known that the position of the radix is on the medial wall of the maxillary sinus dextra (Figure 4). This information will make it easier for the clinician to determine the direction of tooth fragment placement, as CBCT guide will help clinician to estimate the distance where the fragment position is located, which can be shown in a sagittal view.

How to distinguish healthy sinuses and

radiologically infected sinuses is quite easy considering that the sinuses area space that contains air. In healthy sinuses, radiologically it will provide a clear and defined radiolucent. In diseased sinuses, clinicians will find clouding/radio intermediate conditions, thickening of the mucosa, or fluid accumulation.³ In the early stages, generally the image of the sinus is only in the form of sinus radiolucent and radiopaque that resembles teeth or radix. In the advanced or chronic stage, the sinuses can show a radio intermediate image because there is already an infectious process in the sinuses as a result of the presence of teeth in the sinuses and the presence of oroantral communication.^{15,16,17}

The CBCT image shows the presence of radio intermediate images around the radix in the sinuses, which indicate that an infection has occurred in the sinuses (Figure 1). The CBCT also provides detailed information about the size, number, and shape of the tooth fragments or radix present in the sinuses. In this case, there is one radix with ± 8 mm length. This information can make it easier for clinicians to take radix and minimize surgical wounds because the location and position of the radix are known.

However, negligence in the tooth extraction procedure that causes the entry of the remaining tooth structure into the maxillary sinus, should have been avoided. As a preventive measure that can be recommended to dentists as clinicians is to carry out preoperative actions and radiological examinations in the form of periapical or panoramic. Interpretation of the anatomy, the number of

roots, and their relationship to the maxillary sinus base can avoid complications at the time of retraction.² Consideration to carry out a radiographic examination before tooth extraction is important to do, because it can determine the treatment plan to be carried out and high vigilance in cases that have great potential for complications, especially in cases of teeth adjacent to the maxillary sinuses.^{9,18}

CONCLUSION

Cases of odontogenic sinusitis due to radix perforating to the maxillary sinuses require adequate examination. CBCT is the right choice in this case because it can provide complete information of the shape, size, position, and relationship of the radix to the surrounding anatomy in the maxillary sinuses. Complete information is needed for clinicians to make appropriate and efficient treatment plans for patients.

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FOOTNOTES

All authors have no potential conflict of interest to declare for this article. Informed consent was obtained from the patient for being included in this case report.

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