CASE REPORT

Jurnal Radiologi Dentomaksilofasial Indonesia April 2024, Vol. 8, No. 1: 29-32
P-ISSN.2685-0249 | E-ISSN.2686-1321

http://jurnal.pdgi.or.id/index.php/jrdi/index

Enhancing the diagnosis of sublingual sialolith using CBCT: a case report

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ABSTRACT

Objectives: This case report was created to provide further insight into the use of CBCT in detecting sialolith lesions.

Case Report: A 27-year-old female patient was referred to the radiology department of Padjadjaran University Dental Hospital for CBCT radiograph examination related to complaints of swelling in the right lingual area of the mandible and pain. The results of the radiograph examination analysis showed irregular, well-defined radiopaque, in the lingual area of regio 44-45, measuring 34.31 mm2, and the lesion was not associated with the mandible. Intra-oral examination revealed irregular swelling and the same color as the lingual mucosa of regio 44-45. The analysis showed that the lesion was located in the salivary duct of the sublingual area and the patient was diagnosed with sublingual sialolithiasis dextra.

Conclusion: CBCT analysis can be used to accurately identify the position, quantity, and morphology of sialoliths and interpret their three-dimensional positioning in relation to adjacent structures.

Keywords: *Sialolithiasis, salivary stone, CBCT 3D*
Cite this article: Putra DS, Epsilawati L. *Enhancing the diagnosis of sublingual sialolith using CBCT: a case report.* Jurnal Radiologi Dentomaksilofasial Indonesia 2024;8(1)29-32. https://doi.org/10.32793/jrdi.v8i1.1114

INTRODUCTION

Sialolithiasis is a condition marked by the presence of sialoliths in various regions of the salivary glands. This disease is the most common condition affecting the salivary glands and is a significant factor to dysfunction in these glands, resulting in swelling and pain in one side of the salivary gland.[1,2] The prevalence of this condition is estimated to be 1.2% among adults, typically manifesting between the ages of 30 and 60. Males face a higher frequency of occurrence compared to females, whereas children are rarely affected.[3]

Various imaging techniques have been used to accurately diagnose and treat this condition. Ultrasonography (USG) is widely used because to its widespread availability, affordability, and lack of radiation exposure. The previous case from Kim J et al. (2016), compared the diagnostic performance of panoramic and occlusal radiograph. Although the result displayed satisfactory diagnostic performance but they concluded that three-dimensional radiograph is required for surgical planning.[4]

Cone-beam computed tomography (CBCT) is being used more and more for diagnosing conditions related to the head, neck, and dento-maxillofacial area. CBCT scanners give high-resolution imaging of the hard tissues in the maxillofacial region, allowing for the assessment of skeletal structure and the observation of sialolith lesions in three dimensions.[5] The aim of this case report is to see the ability of CBCT to diagnose sialolith lesions.

CASE REPORT

The 27-year-old female patient was referred to the Dental Radiology installation of Padjadjaran University Dental Hospital for CBCT examination due to complaints of swelling in the area under the tongue and intermittent pain for 2 months. Intra-oral clinical examination showed that there was swelling in the lingual area of the tongue in the region of 44-45, and the swelling area was the same color as the surrounding mucosa (Figure 1). There was no extraoral swelling, no medical history, and no previous treatment related to the complaint.

CBCT examination showed a radiopaque, well-defined mass in the lingual area of regio 44-45 with a size of 34.31 mm2 around 7,2 x 3,9 mm. In axial and sagittal views, the lesion did not appear to be associated with the mandibular bone area (Figure 2). Density examination using region of interest (ROI) showed 950-1065 Grayscale, which is similar to hard tissue. It was also confirmed by the 3D view on the CBCT software where the radiopaque lesion did not attach to or involve the hard tissue area (Figure 3).

Based on the patient's history of intermittent

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Received on: November 2023
Revised on: April 2024
Accepted on: April 2024

pain and hard swelling for 2 months, clinical examination with findings of hard and mucosa-colored swelling, as well as findings on radiographic analysis, it was concluded that the lesion was soft tissue related and located in the sublingual area dextra region 44-45 involving the salivary ducts. Thus, we gave a suspect radiodiagnosis of sublingual sialolithiasis dextra.

DISCUSSION

Sialolithiasis is considered to be the most common salivary gland disorder and it accounts for about 1.2% of unilateral major salivary gland swellings. Submandibular gland has the highest predilection for sialolithiasis with 80% occurrence

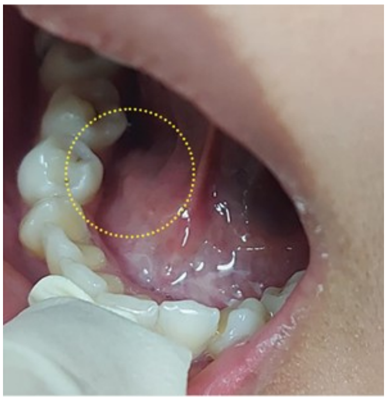

Figure 1. Intra-oral showing irregular swelling on the right lingual posterior of the mandible

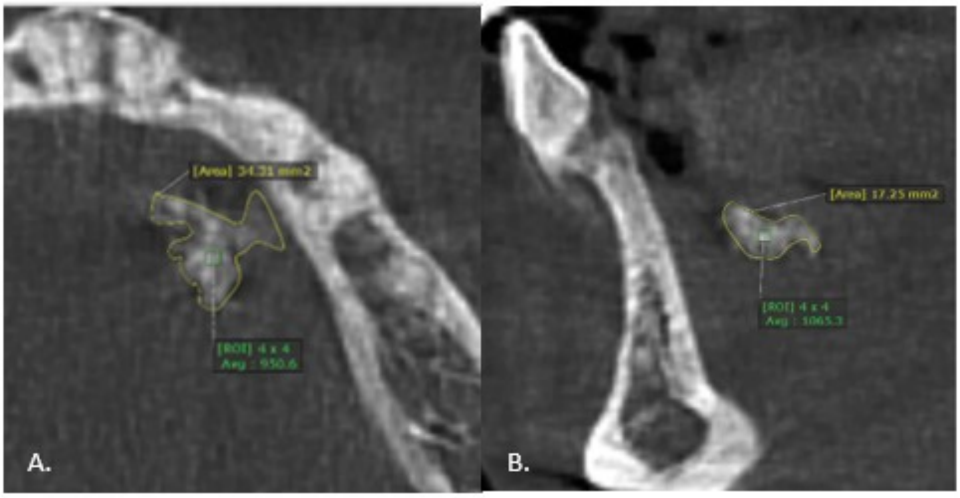

Figure 2. CBCT analysis, (A) A right mandible sialolith lesions (yellow border) from axial view,
(B) Sagittal view shows the radiopaque lesion (yellow border) did not involve mandibular bone structure

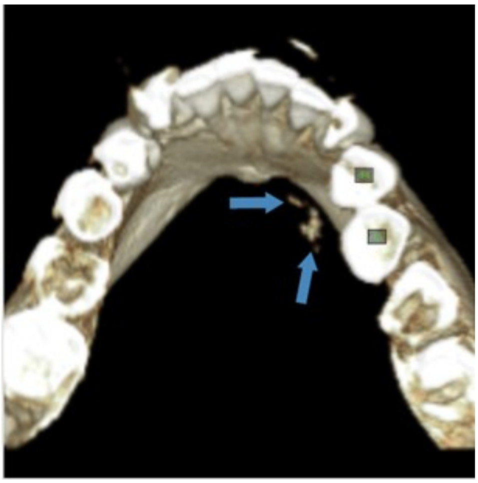

Figure 3. 3D Visualization of Sialolith in right lingual mandible (blue arrow)

rate, followed by the parotid (19%) and the sublingual (1%) glands. Sialolithiasis is usually seen between the age of 30 and 60 years. It is uncommon in children as only 3% of all sialolithiasis cases has been reported in the pediatric population. Males are affected twice as much as females.[6] The etiology of sialolithiasis is currently unclear however, some researchers hypothesize that changes in saliva flow and an excess of mucus contribute to the formation of amorphous phosphate tricalcium, which then crystallizes and converts into hydroxyapatite. The matrix contains many components that oppose each other and subsequently undergo calcification, resulting in the formation of the sialolith.[7,8] Sialolithiasis is frequently accompanied by clinical manifestations, such as intermittent pain or swelling of the affected salivary gland.[9] Radiographicly sialolith are visualized as single or multiple radiopaque lesion, round or oval shape, and cylindric or irregularly shaped calcifications.[10] In this case, the lesion appeared in a female patient under 30 years old, therefore making this case quite uncommon. Similarity was found in the characteristics of the lesion with the theory, the lesion in this case is well-defined, irregularly shaped, radiopaque calcification.

Various diagnostic tests are employed to identify salivary calculi. Each of these imaging techniques has its own set of advantages and disadvantages when it comes to the usage of ionizing radiation, price, availability, and the ability to visualize the ductal system. USG and 2D radiography are commonly employed in daily medical practice due to their cost-effectiveness, widespread accessibility, and minimal or negligible radiation exposure. Panoramic radiograph are extensively utilized in dentistry to assess overall pathological characteristics in the maxillofacial region due to their ability to capture a broad range of locations with minimal radiation exposure and at a cheap expense.[5] Panoramic radiograph can be used to diagnose many disorders, such as soft tissue calcification. Nevertheless, panoramic radiograph have fundamental limitations in accurately diagnosing sialolithiasis, even when augmented with artificial intelligence. Approximately 20% of siaoliths are poorly calcified, and therefore not visible on 2D radiographs. moreover, the deposition of a radiopaque sialolith on the body of the mandible area is barely visible on 2D radiographs.[11,12]

The use of CBCT has become increasingly common in maxillofacial radiology due to its superior image quality and reduced radiation exposure in comparison to Computed Tomography (CT). It provides enhanced visualization of the ductal system compared to traditional sialography.[13] The CBCT scanner employs a cone X-ray beam and utilizes two-dimensional detectors to gather data through a solitary spin around the patient, which typically lasts between 9 and 40 seconds. The reconstruction is subsequently conducted, resulting in an isotropic picture matrix. The system's software offers a range of processed images, including multiplanar reconstruction, volume rendering, cross-sectional, and partly panoramic images. The use of isotropic voxels allows for explicit and accurate reconstruction of anatomic features in any plane.[14]

There has been limited study on the potential use of CBCT in diagnosing salivary stones.[13] CBCT offers excellent spatial resolution, a wide variety of grey densities, and high contrast, collectively with a favorable pixel-to-noise ratio.[15] Tomographic images can be transformed into three-dimensional images, which offer a more accurate representation of the anatomy and allow for a better understanding of anatomical structures and the operative condition that needs to be taken into consideration.[16,17] The grey density of a sialolith is similar to hard tissue, thus making CBCT an effective method for accurately visualizing the location and morphology of the lesion. In this example, the lesion is immediately visible through 3D viewing (Figure 3). Jadu et al. (2010) concluded that the effective doses from CBCT tests centered on the parotid and submandibular glands were comparable to those calculated for plain radiography for sialography. This similarity was shown when a 15 cm field of view (FOV) was selected, along with exposure conditions of 80 kVp and 10 Ma.[9] As in this case, CBCT analysis can provide clear information about the location and size of the lesion so that it can facilitate the operator in performing treatment.

Multiple researchers have previously reported the usefulness of CBCT in the precise detection of sialolithiasis. The primary objective is to enhance intraoperative orientation through a more comprehensive understanding of the stone's location. Additionally, CBCT enables accurate diagnosis and identification of the stone's spatial topography in relation to the surrounding structures. This will boost the surgeon's confidence in utilizing a direct method and raise the probability of quickly finding the sialolith.[9,13,18,19] CBCT can be used to verify the full removal of calculi by comparing the number and shape of the extracted stones. The significance of these additional findings will be notably relevant in situations involving many calculi or megaliths, as they are vulnerable to fragmentation during the extraction process. The morphology of the sialolith observed on a CBCT can assist in reconstructing the stone in cases of disintegration. Consequently, CBCT is equally reliable as medical CT in accurately diagnosing and measuring sialolith lesions.[18,19]

CONCLUSION

The utilization of CBCT analysis can be an additional examination method for precise identification of the position, quantity, and morphology of the sialoliths, and specifically for a precise interpretation of the three-dimensional positioning of the salivary stones in relation to the adjacent structures.

ACKNOWLEDGMENTS

None.

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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