REVIEW ARTICLE

Jurnal Radiologi Dentomaksilofasial Indonesia August 2024, Vol. 8, No. 2: 89-96
P-ISSN.2685-0249 | E-ISSN.2686-1321

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

Ameloblastoma radiograpic imaging on 3D CBCT: a literature review

Waode Anita Wulanduri Uke[1*], Barunawaty Yunus[2]

ABSTRACT

Objectives: This review article is aimed to provide an overview of 3D CBCT in determining the diagnosis of ameloblastoma.

Review: This study is a literature review consisting of English articles about the ameloblastoma radiographic imaging on 3D CBCT, published 2013-2023.The article search databases used were Google Scholar, Ebsco, PubMed. The total search results for articles based on keywords obtained were 552 articles, and only 9 articles were include. Ameloblastoma is a persistent and locally invasive tumor; with aggressive but docile growth characteristics. Ameloblastoma is generally associated with impacted teeth, so it requires a more detailed radiographic examination. Computed cone-beam tomography (CBCT) is a more advantageous imaging system with a lower radiation dose and smaller area requirements. 3D CBCT is a radiographic examination with a high modality, so it is very important in helping to establish a diagnosis, especially for cases that show radiographic differences. Ameloblastoma is divided into several types based on the radiological picture. Odontogenic Keratosis Cysts and ameloblastoma may exhibit similar radiographic features, which make diagnosis difficult.

Conclusion: 3D CBCT examination is helpful in diagnosing and validating the treatment of ameloblastoma.

Keywords: *Ameloblastoma, CBCT, radiographic*
Cite this article: Uke WAW, Yunus B. *Ameloblastoma radiographic imaging on 3D CBCT: a literature review.* Jurnal Radiologi Dentomaksilofasial Indonesia 2024;8(2)89-96. https://doi.org/10.32793/jrdi.v8i2.1273

INTRODUCTION

Ameloblastoma is a highly aggressive odontogenic epithelial tumor. The determination of an ameloblastoma diagnosis is supported by clinical and radiographic examination. The radiographic appearance of ameloblastoma frequently serves as a differential diagnosis for numerous cysts and other benign mandible tumors, necessitating a more accurate scan. During surgery, the panoramic radiograph depicts an ameloblastoma-like lesion known as Central Ossifying Fibroma (COF). Dentigerous cysts or odontogenic keratocyst tumors (OKC) are among the differential diagnoses for ameloblastoma.[1,2]

Computed tomography (CT) is a suitable alternative to conventional radiography for defining bony and soft tissue lesions—unquestionable specificity and sensitivity for planning surgical procedures and biopsies. Contrarily, cone-beam computed tomography (CT) does not provide information regarding the boundaries of soft tissues. Cone beam computed tomography (CBCT) can display borders, internal structures, cortical expansions, erosions, and adjacent structures, which aids in preoperative diagnosis and treatment for physicians and radiologists. [3,4]

Cephalometric images synthesized from CBCT can be utilized to reconcile the gap between 2D and 3D analysis, as demonstrated by the 3D scoring method currently under development. Reconcile the gap between 2D and 3D refers to bridging the differences or disparities in information obtained from two-dimensional (2D) and three-dimensional (3D) imaging techniques. Traditional radiographic examinations, such as panoramic radiography, provide 2D images that lack depth and may not fully capture the complexity of anatomical structures. On the other hand, CBCT produces 3D images that offer detailed spatial information, allowing for a more comprehensive assessment of the structures being examined. A 3D CBCT radiographic examination was conducted because the panoramic radiographic examination results required additional information. 3D CBCT is a high-resolution radiographic examination that provides a clearer image.[5]

Radiologically, ameloblastoma can be polycystic or monocytic, and histopathologically, it presents a distinct picture; therefore, it is sometimes necessary to obtain multiple slices to make the correct diagnosis.

[1]Oral and Maxillofacial Radiology Specialist Program, Faculty of Dentistry, Hasanuddin University, Makassar, Indonesia 90245

[2]Department of Oral and Maxillofacial Radiology, Faculty of Dentistry, Hasanuddin University, Makassar, Indonesia 90245

*Correspondence to:
Waode Anita Wulanduri Uke
alundalu@gmail.com

Received on: January 2024
Revised on: June 2024
Accepted on: June 2024

Ameloblastoma can be diagnosed based on the presence of a honeycomb-like lesion structure and predominant labial/buccal expansion with cortical erosions on CBCT images, as well as general tooth root displacement. [6]

The percentage of difficulty in diagnosing ameloblastoma refers to the difficulties healthcare practitioners encounter when successfully identifying this specific form of odontogenic tumor using conventional 2D radiography techniques compared to more sophisticated 3D imaging modalities such as Cone Beam Computed Tomography (CBCT). Conventional 2D radiographic methods, including panoramic radiography, offer a two-dimensional depiction of anatomical components. Although these images are beneficial for initial screening and identifying anomalies, they may not provide the level of intricacy and comprehensiveness required for precise diagnosis of intricate disorders such as ameloblastoma. Determining the precise dimensions, position, and scope of the tumor in respect to other structures can pose difficulties when relying solely on two-dimensional imaging. This constraint might give rise to challenges in devising treatment strategies and may lead to inadequate or erroneous diagnosis.

On the other hand, 3D CBCT provides high-quality, three-dimensional pictures that deliver precise anatomical information without significant distortion. This sophisticated imaging technique enables medical professionals to observe ameloblastomas in three dimensions, which aids in conducting a thorough evaluation of the tumor's dimensions, form, boundaries, and its proximity to other structures like teeth, nerves, and bone. CBCT can assist in preoperative planning by allowing clinicians to precisely locate and quantify the tumor, evaluate its interaction with other tissues, and anticipate any surgical difficulties that may arise.

Based on the previous statment above, the aim of this recent research is to to provide an overview of 3D CBCT in determining the diagnosis of ameloblastoma based on review article published 2013-2023.

REVIEW

The World Health Organization (WHO) classifies ameloblastoma as ameloblastoma, unicystic type, extraosseous/peripheral type ameloblastoma, and metastatic (malignant) ameloblastoma. Radiologically, unicystic ameloblastoma has a less aggressive unilocular aspect than the solid type, but it has the potential to recur. [7]

According to other journals, ameloblastoma is divided into two major categories: extraosseous, also known as peripheral, and intraosseous, also known as central. As its name suggests, peripheral ameloblastoma is a slow-growing mass confined predominantly to the gingiva or alveolar mucosa without involving the underlying bone tissue. The solid variant of intraosseous ameloblastoma of the mandible is subdivided into unicystic, mixed cystic, and multicystic subtypes.[8]

Ameloblastoma is typically discovered incidentally in patients with asymptomatic swellings or during routine radiographic examinations. Preoperatively and postoperatively, ameloblastoma patients must undergo a multimodal radiographic examination. If the lesion involves soft tissue, MRI and ultrasonography are required. 3D CBCT is highly accurate for exposing hard tissue. Several studies have demonstrated that computed tomography depicts calcifications more accurately. Histopathological findings are consistent with the calcification of ameloblastoma on panoramic radiography and 3D CBCT. [3,9,10]

Ameloblastoma is a benign tumor that can be locally aggressive. It presents diagnostic and therapy issues because it has different clinical presentations and radiographic appearances. In addition to accidental detection through symptomless enlargements or regular radiography screenings, the diagnosis and treatment of ameloblastoma require a thorough strategy that combines different imaging techniques and histological evaluation.

It is crucial to do radiographic evaluation before and after surgery in order to determine the size of the lesion, evaluate the involvement of nearby structures, and arrange the most suitable surgical procedure. Multimodal radiographic exams, such as panoramic radiography, computed tomography (CT), and cone beam computed tomography (CBCT), provide vital information about the shape and structure of the tumor, as well as its anatomical connections.

The radiographic characteristics of ameloblastoma include multilocularity and a propensity to cause cortical expansion and perforation. CT is frequently utilized to predict the internal pattern of lesions and the three-dimensional structure of cortical bone. CT also permits the identification of the lesion's anatomical extension and soft tissue invasion. CBCT is more advantageous than CT because it requires less radiation and less space. The CBCT images demonstrate a multilocular, extensive lesion. [3]

DISCUSSION

Cases of ameloblastoma are often diagnosed in differential with other cysts in the oral cavity. Therefore, more accurate supporting examinations are needed in making the diagnosis. CBCT provides high-resolution three-dimensional (3D) images, offering superior visualization of bony structures and soft tissues in the maxillofacial region. This review aims to provide an overview of the utility of 3D CBCT in the diagnosis of ameloblastoma. Some examples of ameloblastoma cases are as follows.

A 24-year-old male patient with pain and edema in the lower right posterior tooth for two weeks. The swelling has increased gradually over the past six months, accompanied by a localized, persistent onset of mild discomfort. Utilizing medications frequently without consulting a

Table 1. Characteristics of CBCT

Advantages of CBCT	- Visualization of mandibular borders and alveolar canal proximity. - 3D reconstruction reveals detailed structures not visible on other radiographs. - Better image definition and relationship evaluation with neighboring structures. - Postoperative monitoring. Aid in treatment planning and patient rehabilitation. - Significant potential for orthodontic and surgical diagnosis and treatment.	4,11,12,13,14
Diagnostic Superiority of 3D CBCT	- High-quality diagnostic tool providing three-dimensional morphological and anatomical perspectives. - Increased sensitivity and specificity compared to orthopantomogram. - Optimal for benign lesions due to reduced radiation dose. - Indispensable for diagnosis and differentiation of benign radiolucent lesions in the maxilla. - Spatial resolution for precise diagnosis and treatment planning. - Demonstrates buccal and lingual expansion.	15,16,17,18
Applications of 3D CBCT	- Improves surgical planning and predicts likelihood of treatment for facial injury. - Detects peri-implant bone defects and aids in postoperative implant diagnosis. - Beneficial for assessing intracyst volume reduction and bone apposition observation.	2,19
Limitations of 3D CBCT	- Dependence on software algorithm, spatial resolution, and operator's expertise. - Opportunities for advancement in 4D radiography. - 4D CBCT provides patient-optimized doses and superior image quality for moving targets, but with longer irradiation duration and potential patient discomfort.	20,21

physician. On extraoral examination, a diffuse enlargement measuring 4 cm x 3 cm extending anteroposteriorly from the corner of the mouth to the angle of the mandible and superior-inferiorly from the ala-tragus line to the inferior border of the mandible was found to be associated with significant facial asymmetry. In the right vestibular sulcus, an intraoral examination revealed an indistinct, 2-centimeter-wide enlargement. The patient was then directed to undergo a CBCT examination following Figure 1 and was diagnosed with unicystic ameloblastoma.[17]

A 47-year-old male nonsmoker with an asymptomatic lesion on the buccal gingiva of the right mandibular canine premolar-molar region. The lesion has been growing slowly for about one year without changing dimensions over the past eight months. Well-demarcated lesion measuring 1 x 1 x 0.5 cm, sessile and firm in consistency with ulceration on the wound surface. Intraoral

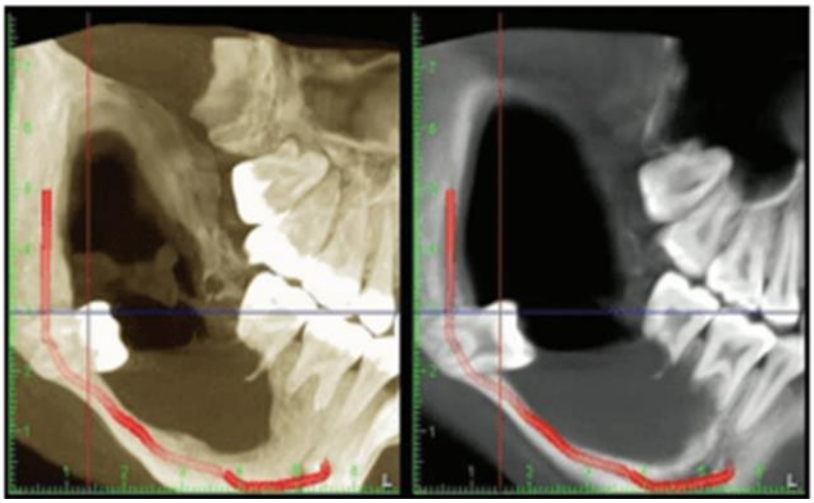

Figure 1. CBCT images showing buccal and lingual expansion in a case of unicistic ameloblastoma from a 24-year-old male patient with clinical symptoms of swelling in the left lower back region for 6 months. (Source: Journal of Oral Research and Review)[17]

Jurnal Radiologi Dentomaksilofasial Indonesia 2024; 8(2); 89-96 | DOI: 10.32793/jrdi.v8i2.1273

periapical radiography showed resorption of interdental bone in the area of teeth 27 and 28. After a 3D CBCT examination, the doctor diagnosed it as peripheral ameloblastoma (see Figure 2).[22]

A 51-year-old male, without comorbidities complaining of a volumetric increase in the right submandibular area associated with enlargement of the intraoral bone, was discovered after five months during a radiological examination for dental implant placement. On palpation, strong swelling approx. 3.5 cm, significant facial asymmetry. During intraoral examination, the mandibular mucosa was erythematous, and local tooth displacement was seen. Radiographic and tomographic examination in Figure 3 revealed a radiolucent multilocular lesion in the mandible extending from the right mandibular ramus to the left mandibular parasymphysis, and then ameloblastoma was diagnosed.[19]

A 55-year-old female patient with the main complaint of slow-growing edema in the lower right face for 8 months. Accompanied by a history of pain in the lower right posterior tooth area for three months intermittently. At first, it was severe and gradually subsided by itself. On extra-oral examination, facial asymmetry of the right mandibular body was seen with hard consistency from anterior to posterior. Oval in shape, measuring 5 cm × 4 cm, extending from the corner of the mouth to the canine area and supero-inferiorly from the corner of the mouth to the inferior border of the mandible without local temperature rise. After the CBCT examination shown in Figure 4, the patient was then diagnosed with unicystic ameloblastoma.[13]

A 9-year-and-2-month-old girl with the primary complaint of edema in the left mandibular premolar region. The extraoral examination revealed facial symmetry, and the intraoral examination revealed mixed dentition and unerupted lower left first and second premolars. A panoramic radiographic examination revealed a well-defined, unilocular radiolucency in the left lower premolar region, extending from the canine area distal to the mesial root area of the first molar, with the erupted first and second premolars positioned lower than those on the right side. The roots of the first and second lower left molars resorb to the tooth stem.

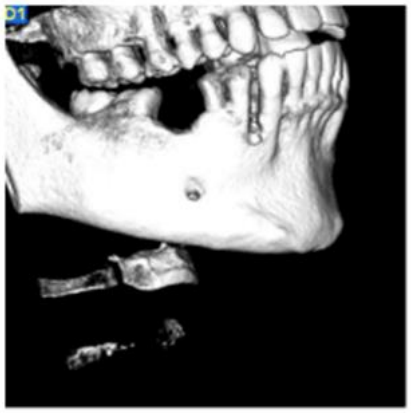

Figure 2. 3D CBCT image showing missing buccal cortical plate in the same area in a 47-year-old male with peripheral ameloblastoma. (Source: International Journal of Current Research)[22]

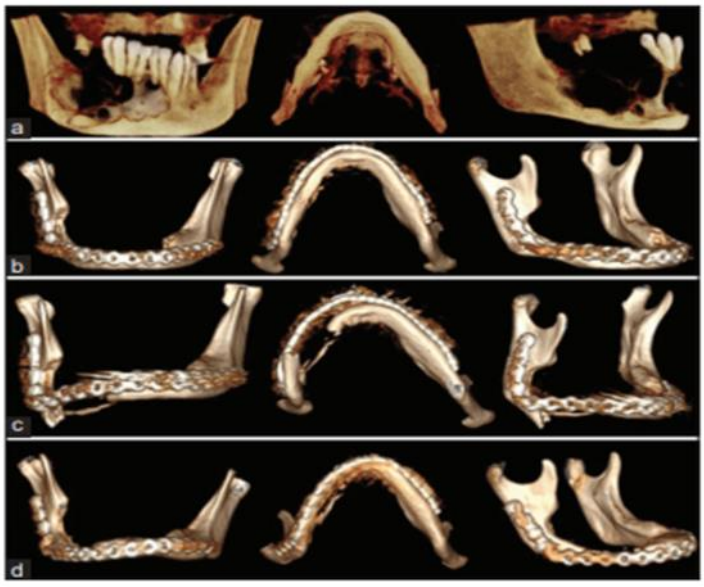

Figure 3. a. 3D CBCT image of a 51-year-old male patient in a case of ameloblastoma with bone expansion. b. 3D CBCT image posts mandibular marginal resection. c. CBCT 3D image of facial trauma with bone loss. d. 3D CBCT images eight months post-intervention and waiting for opportunities for rehabilitation with dental implants. (Source: Annals of Maxillofacial Surgery)[19]

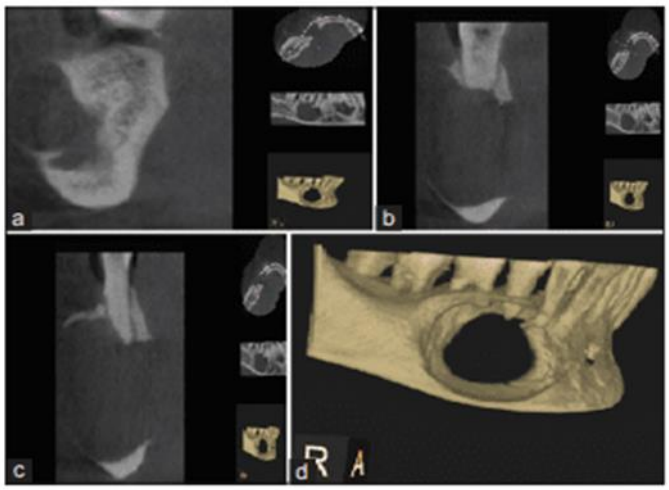

Figure 4. CBCT images show displacement of the inferior alveolar nerve, buccal and lingual cortical perforations, resorption of the roots of teeth 45 and 46 due to tumor growth, and two lesion margins with the destruction of the buccal bone. (Source: Universal Research Journal of Dentistry)[13]

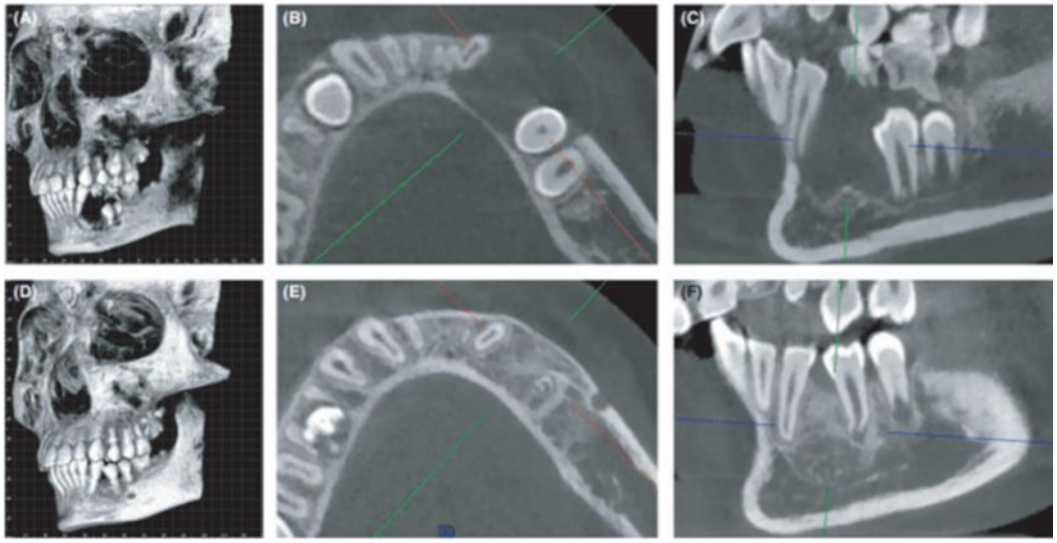

Figure 5. CBCT image on the initial visit. (A) 3D CBCT reconstruction demonstrating low bone density surrounding the unerupted first and second lower left premolars. (B) Axial CBCT image of the mandible demonstrating expansion of the buccal and lingual cortex. (C) Coronal CBCT view of the mandible. Images were captured at the age of 9 years and 2 months. CBCT obtained ten months after the marsupialization procedure. (D) 3D CBCT reconstruction demonstrating bone regeneration around the first and second premolars on the lower left side. (E) Axial CBCT image of the mandible displaying normal trabeculae replacing areas of low density. (F) Coronal CBCT view of the mandible. (Source: Clin Case Rep)[23]

Indicating a case of unicystic ameloblastoma, a CBCT examination was conducted to confirm the location of the lesion and its relationship to adjacent anatomical structures. According to the marsupialization after ten months (age: 10 years), the radiolucent area had completely disappeared after ten years.[23]

For two years, a 47-year-old female patient has complained of facial tenderness and swelling on the left side. There was a swelling on the left side of the jaw that began small and progressively grew to its present size. As shown in Figure 6, a 3D CBCT examination reveals "soap bubbles" that are characteristic of ameloblastoma. [14]

On examination and palpation, the right mandible of a 22-year-old female presented with a firm, asymptomatic enlargement. On intraoral examination, the enlarged right mandibular lesion was covered with normal-appearing mucosa, and the involved right mandibular premolars and molars did not respond to mobility tests and percussion. The intraoral swelling of the right mandible was firm and mildly tender upon palpation. Since five months ago, there has been swelling, which has progressively grown in size. Dental CBCT images depict calcifications of varying sizes within the lesion from multiple angles. On a variety of three-dimensional (3D) images, calcification in cavity lesions can be seen distinctly. The differential diagnosis includes ameloblastoma and odontogenic keratocist (OKC). Histopathologically, it appears that there is some central squamous differentiation, and the ameloblastic cells are more dense, as shown in Figure 10 below. [10]

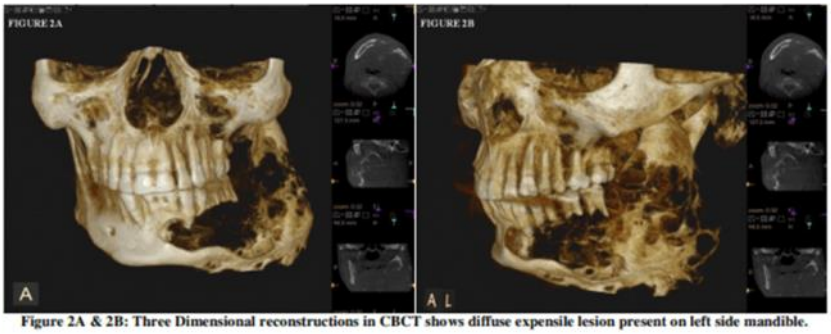

Figure 2A & 2B: Three Dimensional reconstructions in CBCT shows diffuse expensile lesion present on left side mandible.

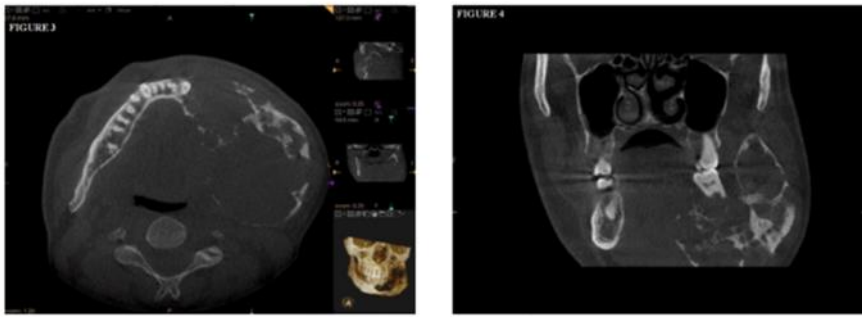

Figure 6. The 3D CBCT image reveals that the lesion has spread to the left side of the mandible. An axial view of the buccolingual cortical plate reveals expansion and perforation on the same side. The coronal section reveals diffuse, multilocular lesions with a soap-bubble-like appearance. Additionally, buccolingual expansion is noted. (Source: International Journal of Research & Review)[14]

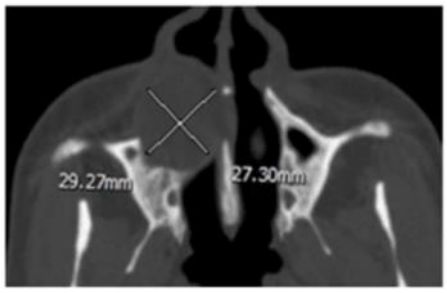

Figure 7. The axial section of the right maxilla reveals a circular ameloblastoma measuring 29.77 mm in length and 27.30 mm in width. (Source: Dentomaxillofacial Radiology)[18]

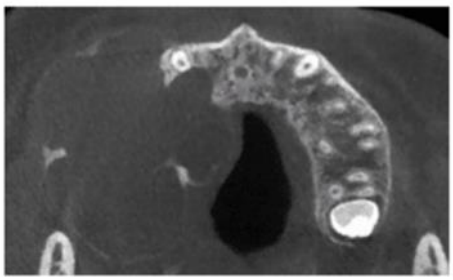

Figure 8. Axial CBCT section shows lobular-circular maxillary ameloblastoma. (Source :Dentomaxillofacial Radiology)[18]

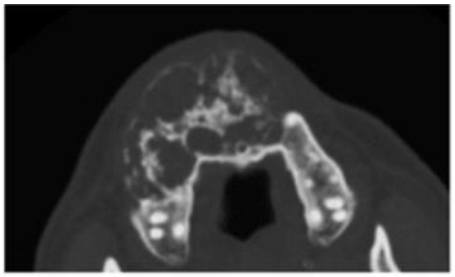

Figure 9. Axial section shows lobular-circular desmoplastic ameloblastoma. A mixed radiolust and radiopaque appearance suggest a fibro-osseous lesion. (Source : Dentomaxillofacial Radiology)[18]

For three months, the main complaint of a male patient aged 18 was edema in the right lower posterior. Initially, the swelling was the size of a small pea, but it progressively grew over 3–4 days. Extra oral examination reveals a 3 x 2.5 cm solitary, diffuse swelling on the lower 1/3 of the right side of the face, extending superiorly to inferiorly from 1 cm below the ala tragus line to the base of the mandible and anteriorly to posteriorly from 2 cm posterior to the corner of the mouth to 1.5 cm anterior to the ear pinna. On palpation, the swelling has a consistency ranging from tender to firm, with

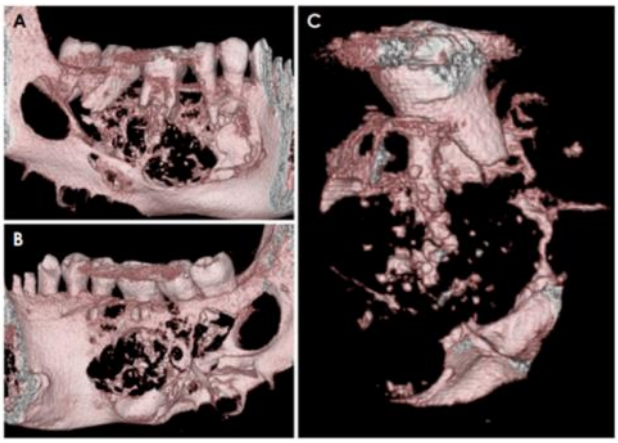

Figure 10. A. 3D buccal view demonstrating numerous discrete calcifications of varying diameters dispersed throughout the multilocular cavity of the right mandible. B. Lingual vision C. View through the right mandibular first molar showing calcifications of varying diameters with buccal and lingual cortical boundaries. (source: Imaging Science in Dentistry)[10]

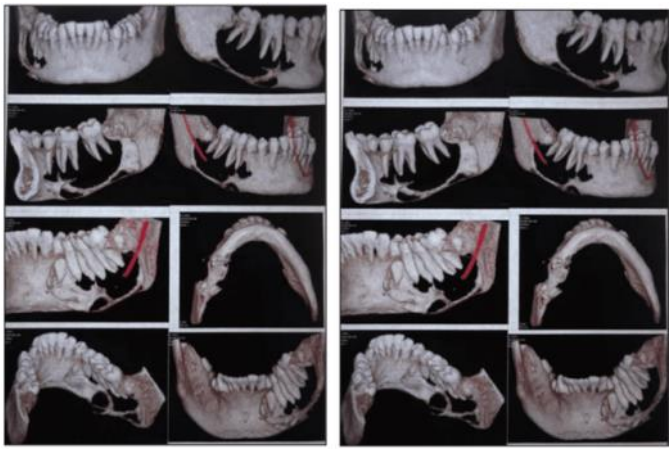

Figure 11. Pre-op CBCT 3D view showing lesion expansion and post-op healing (Source: International Journal of Oral Health and Medical Research)[11]

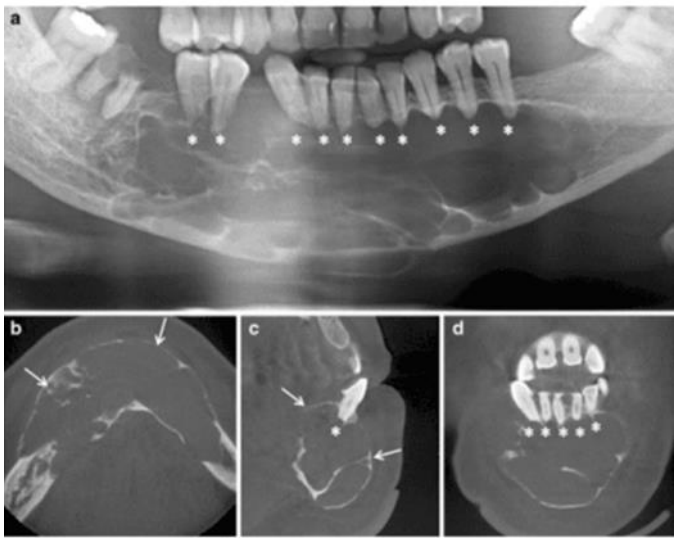

Figure 12. A large ameloblastoma in the mandible of a 55-year-old female, (a) panoramic view, (b) CBCT axial view, (c) sagittal view, (d) coronal view demonstrating a lesion with dentate margins and multilocular appearance. (source: Oral Radiology)[12]

no change in the skin's surface and no increase in local temperature. In regions 45, 46, and 47, the cortical plate expanded, and there was degree 2 mobility. The results of vitality experiments on electric pulp were 45, 46, and 47 non-vital. Figure 11 depicts the absence of third molars. A provisional diagnosis of an aneurysmal bone lesion with ameloblastoma as a differential diagnosis.[11]

Based on the previous discussion, ameloblastoma cases have multiple differential diagnoses. Exams such as conventional radiography, panoramic radiography, orthopantomography, cone

beam computed tomography (CBCT), and laboratory histopathology are crucial and mutually supportive for establishing the correct diagnosis. An accurate diagnosis will determine the efficacy of the following treatment.

CONCLUSION

The review of literature spanning from 2013 to 2023 underscores the critical role of 3D CBCT in diagnosing ameloblastoma, a locally aggressive odontogenic epithelial tumor. With its ability to provide high-resolution, three-dimensional images, 3D CBCT offers significant advantages over conventional radiography, enabling more accurate visualization of bony structures and soft tissues in the maxillofacial region. This advanced imaging modality is particularly valuable for differentiating ameloblastoma from other cysts and benign tumors that share similar radiographic features, thereby facilitating precise diagnosis and appropriate treatment planning. The comprehensive search of English articles conducted for this review highlights the growing recognition of 3D CBCT as an indispensable tool in the management of ameloblastoma cases. By offering enhanced visualization and spatial resolution, 3D CBCT aids clinicians and radiologists in assessing the extent of tumor involvement, evaluating its relationship with adjacent structures, and predicting surgical challenges. Additionally, its lower radiation dose and reduced space requirements make it a preferred imaging option for patients requiring frequent radiographic evaluations.

ACKNOWLEDGMENTS

None.

FOOTNOTES

All authors have no potential conflict of interest to declare for this article.

REFERENCES

1. Tenorio JR, Velasco SK, Nunes SD, Cavalcanti MGP. Radiographic imaging pattern of ossifying fibroma mimicking ameloblastoma: a case report. Clin Lab Res Den 2019:1-5.
2. Riachi F, Khairallah CM, Ghosn N, Berberi AN. Cyst volume changes measured with a 3D reconstruction after decompression of a mandibular dentigerous cyst with an impacted third molar. Clin Pract. 2019;9(1):1132.
3. Kişa HC , Coşgunarslan A , Canger EM, Etöz M , Deniz K. Management of Ameloblastoma with Different Imaging Modalities. Turkiye Klinikleri J Case Rep. 2020;28(3):145-55.
4. Madiyal A, Babu SG, Castelino R, Ajila V, Bhat S, Achalli S, Madi M, Rao K. Use of cone beam computed tomography in the diagnosis and treatment planning of follicular ameloblastoma: A case report with review of literature. J Turgut Ozal Med Cent . 2017;24(3):333-7.
5. Siregar M, Sitam S, Lita YA, Hadikrishna I. Analysis Of Dentigerous Cyst, Ameloblastoma, And Odontogenic Keratocyst Panoramic Radiograph And CBCT: A Scoping Review. Odonto Dental Journal. 2022;9(1):115-30.
6. Luo J, You M, Zheng G, Xu L. Cone beam computed tomography signs of desmoplastic ameloblastoma: review of 7 cases. Oral Surg Oral Med Oral Pathol Oral Radiol. 2014;118 (4):e126-33.
7. Sharma A, Nair S, Shah A; Kumar. Amelobastoma of the Mandible in a Pediatric Patient : A Case Report with Review of Literature. Clove Dental Journal Of Clinical Dentistry. 2015;1 (1):34-40.
8. Liaquat A, Baig MA, Mehmood A, Saeed T. Solid Ameloblastoma: A Case Report. Archives of Surgical Research. 2020;1(4):41-4.
9. Rezaei MM, Bagherpour A, Mahmoudi P. Ameloblastoma ex calcifying odontogenic cyst in the mandible: report of a rare case. Cumhuriyet Dent J. 2014;17:84-91.
10. Kang BC, Lee JS, Yoon SJ, Kim Y. Ameloblastoma with dystrophic calcification: A case report with 3-dimensional cone-beam computed tomographic images of calcification. Imaging Sci Dent. 2020;50(4):373-6.
11. Krishnamoorthy B, Sharma H, Suma GN, Kukreja R. Report of Unicystic Ameloblastoma of Mandible in a Young Adult – A Radiological Perspective. Int J Oral Health Med Res. 2015;2:63 -6.
12. Kitisubkanchana J, Reduwan NH, Poomsawat S, Pornprasertsuk-Damrongsri S, Wongchuensoontorn C. Odontogenic keratocyst and ameloblastoma: radiographic evaluation. Oral Radiol. 2021;37(1):55-65.
13. Kumar A, Venkatesh E, Srikanth MDM, Fatima N. An Unusual Case Report of a Unicystic Ameloblastoma in the Body of Mandible Masquerading as Radicular Cyst and its Evaluation with Cone Beam Computed Tomography. Universal Research Journal of Dentistry. 2013;3(1):41-3.
14. Pagare J, Johaley S. Cone Beam Computed Tomography- A Boon in Diagnosis of Expansile Follicular Ameloblastoma of Mandible - A Case Report. International Journal of Research and Review. 2019;6(8):198-202.
15. Nagarajan N, Sadaksharam J. Current Concepts in Imaging and Management of Ameloblastoma. Medical Reports and Case Studies. 2021;06(2):001-2.
16. Alves DBM, Tuji FM, Alves FA, Rocha AC, Santos-Silva ARD, Vargas PA, Lopes MA. Evaluation of mandibular odontogenic keratocyst and ameloblastoma by panoramic radiograph and computed tomography. Dentomaxillofac Radiol. 2018;47 (7):20170288.
17. Mathew J, Akhil S, Thomas J, Ali F. Ravaged mandibular ramus: Two rare case presentations of unicystic ameloblastoma with a view on management. Journal of Oral Research and Review. 2022;14(2):145-9.
18. Meng Y, Zhao YN, Zhang YQ, Liu DG, Gao Y. Three-dimensional radiographic features of ameloblastoma and cystic lesions in the maxilla. Dentomaxillofac Radiol. 2019;48(6):20190066.
19. Candido IR, da Silva CSV, Dos Santos Garcia E, da Silva ALF, Fernandes Poleti TMF, Gialain IO, Borba AM. The Usefulness of a Facial Digital Biobank for Ameloblastoma Resection and Fracture Fixation - A Case Report. Ann Maxillofac Surg. 2021;11(2):325-8.
20. Brown AA, Scarfe WC, Scheetz JP, Silveira AM, Farman AG. Linear accuracy of cone beam CT derived 3D images. Angle Orthod. 2009;79(1):150-7.
21. Thengumpallil S, Smith K, Monnin P, Bourhis J, Bochud F, Moeckli R. Difference in performance between 3D and 4D CBCT for lung imaging: a dose and image quality analysis. J Appl Clin Med Phys. 2016;17(6):97-106.
22. Raj Subash C, Das Surya N, Patnaik K, Panda Subhasree M, Praharaj K. Peripheral Ameloblastoma With Interdental Bone Loss: A Rare Case Report. International Journal of Current Research. 2017;9(07);54966-8.
23. Guo T, Zhang C, Zhou J. Unicystic ameloblastoma in a 9-year-old child treated with a combination of conservative surgery and orthodontic treatment: A case report. Clin Case Rep. 2022;10(1):e05241.