



## Radiographic Diagnosis of Ameloblastoma : A Panoramic Approach

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### ABSTRACT

**Background:** Ameloblastoma is a tumor with a relatively high incidence in the jaws. Based on biological behavior, ameloblastomas may be benign or malignant, while radiographic findings further classify them as unicystic or multicystic.

**Objective:** This case report was conducted to identify the similarities and differences between unicystic and multicystic ameloblastoma, focusing on their clinical, radiographic, and histopathological aspects.

**Case:** This report presents two cases involving male patients who were referred to the dental hospital (RSGM) for panoramic radiographic evaluation. Both individuals reported persistent cheek swelling, with Case 1 describing a 19-year-old male who experienced swelling on the right side of the cheek for nearly one year, and Case 2 involving a 43-year-old male with left cheek swelling that had been present for approximately 1.5 years. These cases are included to demonstrate the clinical and radiographic features of the lesions.

**Discussion:** On radiographic evaluation, unicystic and multicystic ameloblastomas shared a radiolucent appearance and jaw involvement; however, they differed in internal structural patterns, locularity, and the definition and cortication of lesion margins.

**Conclusion:** The two cases involved male patients with slowly enlarging, long-standing cheek swelling. Radiographically, both lesions appeared radiolucent, affected the mandibular ramus extending to the temporomandibular joint, and exhibited well-defined, corticated borders with associated cortical destruction, consistent with ameloblastoma. Unicystic ameloblastoma appears as a radiolucent lesion without internal septa and presents with a smoother, well-defined border. In contrast, multicystic ameloblastoma shows internal septa and has a smooth yet less well-defined border.

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## **INTRODUCTION**

Ameloblastoma was first described in 1930 by Ivey and Churchill and continued by Robinson in 1937, where ameloblastoma has aggressive clinical features and anatomically is a benign lesion that grows from Hertwig's epithelial root sheath. Currently, ameloblastoma is described as a benign odontogenic tumor with aggressive growth capacity so it has a high risk of turning into a malignant tumor.<sup>1</sup> Ameloblastoma originates from epithelial tissue and tooth tissue with excessive growth that can reach a fairly large size, causing facial asymmetry. This condition often causes shifting of the location of the teeth, causing malocclusion and increasing the risk of tooth fractures. Treatment for this case is generally surgical.<sup>1,2</sup> Ameloblastoma has a prevalence of between 10% to 15% of cases of total odontogenic tumors. Ameloblastoma occurs more in adults than in children with a peak age in the 2 to 5 decades. This case is also more common in women than in men with a ratio of 1.75:1. However, in Asia, this case is more common in men with a ratio of 1.5:1. Meanwhile, based on its location, the mandible is the highest finding location, reaching more than 70% of the total ameloblastoma cases.<sup>3</sup> Then around 15% are found in the maxillary area. The third molar area is the location where ameloblastoma is most often found in both the upper and lower jaws.<sup>3,4</sup>

Ameloblastoma can be classified into several types, according to the World Health Organization edition 4, the classification is divided into 4, namely, conventional or multicystic, extraosseous or peripheral, metastasizing, and unicystic. Ameloblastoma is a benign odontogenic tumor that is often asymptomatic in its early stages and is frequently detected incidentally during routine radiographic examinations. Despite its benign histological nature, the tumor demonstrates slow but locally aggressive growth, which often results in delayed clinical presentation until the lesion reaches a considerable size. In establishing the diagnosis of ameloblastoma cases, several supporting examinations can be carried out such as radiography and histopathology. The most common clinical manifestation of ameloblastoma is a painless swelling of the jaw. The swelling typically progresses gradually and may lead to facial asymmetry, particularly in lesions involving the posterior mandible. On palpation, the swelling is generally firm or bony hard due to expansion of the cortical plates.<sup>4,7</sup>

The most commonly used radiographic examination is panoramic. Panoramic radiography is frequently used as an initial screening tool in the diagnosis of odontogenic lesions because it can demonstrate important characteristics such as lesion location, margins, shape, size, internal structure, and effects on surrounding tissues, including tooth displacement and root resorption. The picture that will be seen on panoramic radiography is multilocular

radiolucent with cortical boundaries, has clear margins, and is irregularly scalloped or soap-bubble shaped and tumour tends to make excessive root resorption. Tooth displacement is also a frequent condition and occurs in the apical direction. Almost 70% of cases have this picture. While 20% to 30% have a picture of a single radiolucent lesion with clear boundaries.<sup>3-7</sup>

Radiological examination in ameloblastoma cases has been reported previously, but there are still dentists who do not clearly understand the importance of this radiographic examination, so this case report will discuss the use of panoramic radiology as an examination in establishing a diagnosis, determining a treatment plan, and evaluating the results of treatment of ameloblastoma cases and is expected to help dentists understand better.

This case study discussed the similarities and differences between two types of ameloblastoma, namely unicystic and multicystic ameloblastoma, by analyzing various radiographic characteristics of each lesion, which facilitated identification and radiographic diagnosis.

## **CASE REPORT**

### **Case 1**

A 19-year-old male patient came to the Dental and Oral Hospital installation in Bandung City with a referral for a panoramic examination in connection with complaints of swelling in the right cheek area since 1 year ago. The patient admitted that the swelling that occurred was initially small but over time the condition became larger. The patient underwent extra-oral and intra-oral examinations. Extra-oral examination showed swelling with a superior limit in the temporomandibular joint (TMJ) area interior of the middle ramus of the mandible. Enlargement was found in the right cheek area. This condition is not painful. There was no change observed during follow-up in the color of the mucosa in the surrounding area. Intra-oral examination found difficulty in opening the mouth, where the patient experienced a limited mouth opening of only 3mm.

This study was designed as a descriptive case report. Panoramic radiographs of patients diagnosed with ameloblastoma were evaluated to identify and compare radiographic characteristics of unicystic and multicystic ameloblastoma. Radiographic assessment focused on lesion location, size, border definition, internal structure, and effects on surrounding anatomical structures. The diagnosis was established based on radiographic findings and supported by histopathological examination obtained from patients' medical records. Ethical

approval was obtained from the appropriate institutional review board, and informed consent was secured prior to data collection.

The supporting examination performed was panoramic radiography (Figure 1). The radiographic findings revealed a radiolucent lesion measuring approximately 5 × 5 cm, with an irregular unilocular appearance, well-defined and corticated margins, and the presence of scalloping. The lesion was associated with bone destruction involving the right mandibular ramus, extending to the condylar process, accompanied by thinning of both the medial and lateral cortical plates of the right mandibular ramus. Based on these radiographic features, the lesion was suggestive of ameloblastoma involving the right mandibular ramus extending to the condylar process. The differential diagnoses included odontogenic keratocyst, Fibroma and giant cell granuloma.



**Figure 1.** Panoramic radiographic examination showed a suspected ameloblastoma involving the right mandibular ramus with extension to the condylar process.

After the radiological examination was completed, the patient was referred back to the Oral and Maxillofacial Surgery department for further treatment, which consisted of a mandibular resection (mandibulectomy). However, the patient refused the proposed treatment.

## **Case 2**

A 43-year-old male patient presented to the Dental and Oral Hospital (RSGM) in Bandung with a referral for panoramic radiographic examination. The patient reported swelling on the left cheek that had been present for approximately 1.5 years. The swelling was not painful, but the patient currently complained of numbness in the left facial region. According

to the patient, the swelling initially appeared small but gradually increased in size. Extraoral, intraoral, and panoramic radiographic examinations were then performed.

Extraoral examination revealed swelling on the left side of the face with a color similar to the surrounding tissue. On palpation, the swelling was firm and non-fluctuant. Palpation of the mandibular corpus, particularly in the temporomandibular joint (TMJ) region, also revealed a firm consistency. Intraoral examination showed swelling of the left buccal mucosa.

The supporting examination performed was panoramic radiography (Figure 2). The panoramic findings revealed an irregular, multilocular radiolucent lesion with a soap-bubble appearance involving the left mandibular ramus and extending to the condylar process, with superior expansion from the alveolar crest and extension beyond the inferior border of the left mandibular ramus. The lesion measured approximately 5 × 5 cm and exhibited well-defined, corticated margins with a scalloped outline. The lesion demonstrated aggressive features, indicated by resorption of the alveolar bone crest of the left mandibular ramus extending to the condylar process. This condition resulted in cortical bone expansion with associated thinning of the mandibular cortical plates. The overall impression of this examination was a pathological lesion involving the left mandibular ramus extending to the condylar process. The differential diagnoses included odontogenic keratocyst, Fibroma and giant cell granuloma.



**Figure 2.** Radiographic findings of the ameloblastoma case.

The diagnosis for this case is multilocular ameloblastoma, presenting with a soap-bubble appearance in the left mandibular ramus extending to the TMJ. The differential diagnoses include odontogenic keratocyst and giant cell granuloma. The patient was planned to undergo a left mandibular resection (mandibulectomy).

## **DISCUSSION**

Ameloblastomas typically exhibit well-defined borders and are often described as having a corticated outline. In this case, the border appears curved, well defined, and similar to that of a cystic lesion. The internal structure of ameloblastoma varies from completely radiolucent to a mixed appearance, containing bony septa that create internal compartments. These septa may appear straight, but more commonly they are coarse and curved, representing normal bone trapped within the tumor. This occurs especially when the tumor contains internal cystic components, causing the septa to become distorted into curved shapes, producing a honeycomb-like pattern with multiple small loculations. Another classic appearance is the “soap-bubble” pattern. Typically, the loculations tend to be larger in the posterior mandible and smaller in the anterior region. In the desmoplastic variant, the internal structure may show irregular sclerotic bone resembling fibrous dysplasia or bone-forming tumors.<sup>4,7</sup>

Ameloblastoma is classified as a benign tumor with significant potential for malignant transformation. Radiological examination plays a major role in establishing the diagnosis. Panoramic radiographs, CT scans, and MRI are among the imaging modalities that can be used. According to Worth’s radiographic description, ameloblastomas are multilocular lesions characterized by soap-bubble, honeycomb, or spider-like patterns. In both case reports presented here, a soap-bubble appearance was observed, supporting the diagnosis of ameloblastoma.<sup>4,9,10</sup>

According to Ranchod et al. (2018), approximately 51% of cases show purely radiolucent lesions, while 47.9% present a combination of radiolucent and radiopaque features. Similarly, in this report, the first case demonstrated a radiolucent lesion with a corticated radiopaque border, whereas the second case showed a mixed radiolucent–radiopaque appearance. These findings indicate that ameloblastomas may present with different radiographic patterns depending on the extent of destruction and structural involvement.<sup>4,9</sup>

Based on the lesion location, both cases are consistent with previous literature stating that ameloblastoma most commonly affects the mandibular ramus region. Studies by Fedhila et al., Ranchod et al., and Merbold et al. report that the highest prevalence of ameloblastoma occurs in the mandibular ramus and the third molar region.<sup>10–12</sup>

Ameloblastoma is a benign odontogenic neoplasm that arises from residual odontogenic epithelial tissues, including the dental lamina, enamel organ, or the epithelial lining of odontogenic cysts. Its pathogenesis involves disruption of normal odontogenic processes driven

by aberrant activation of molecular signaling pathways, most notably the MAPK pathway, which is commonly associated with BRAF V600E mutations. These genetic alterations promote excessive epithelial cell proliferation, suppress programmed cell death, and enhance local invasiveness. Furthermore, ameloblastoma demonstrates pronounced osteolytic behavior through upregulation of matrix metalloproteinases and stimulation of osteoclast activity via the RANK/RANKL signaling pathway, leading to significant bone destruction and accounting for its locally aggressive nature and high rate of recurrence despite its benign histopathological classification.<sup>13</sup>

The extent of an ameloblastoma lesion plays a crucial role in determining the intensity of treatment. En bloc resection remains the primary therapeutic approach. Surgical management must consider the tumor's propensity to breach surrounding bone margins and invade adjacent soft tissues. Lesions involving the maxilla generally require a more aggressive approach due to their tendency to spread toward nearby vital anatomical structures. In cases where surgical intervention is not feasible, radiotherapy has been employed, particularly for tumors located in the posterior maxilla.<sup>7</sup>

Ameloblastoma demonstrated an overall recurrence rate of 13.29%, with 10.76% of patients experiencing recurrence within the initial five-year period. Multiple recurrences were documented in 2.53% of cases. Significant variations in recurrence rates were observed in relation to treatment approach, impacted tooth involvement, and the presence of root resorption. In addition, histopathological characteristics may play a contributory role in ameloblastoma recurrence.<sup>14</sup> Ameloblastoma demonstrates a high potential for local recurrence, particularly following conservative surgical approaches, whereas radical resection with adequate margins has been shown to significantly reduce the likelihood of recurrence and improve long-term disease control.<sup>15,16,17</sup> However, limitations in the availability of histological subtype data precluded further analysis in this study, indicating the need for future investigations to better elucidate the association between histopathological patterns and recurrence of ameloblastoma.

Panoramic radiography provides a broad overview of maxillofacial structures with low radiation exposure; however, its two-dimensional nature, image distortion, and limited spatial resolution restrict its ability to accurately assess lesion extent and involvement of adjacent anatomical structures.<sup>7</sup>

Case 1 demonstrated a unilocular radiolucent lesion with well-defined and corticated margins, without internal septa, radiologically suggestive of unicystic ameloblastoma. The

lesion appeared relatively homogeneous and mimicked the appearance of an odontogenic cyst. In contrast, Case 2 exhibited a multilocular radiolucent lesion with a characteristic soap-bubble pattern, accompanied by true internal septa, more extensive cortical expansion, and aggressive features such as alveolar bone resorption and cortical thinning. These radiographic findings are characteristic of multicystic (conventional) ameloblastoma.

## **CONCLUSION**

Ameloblastoma is a benign tumor with significant malignant potential. Radiological examination is one of the key diagnostic tools, with panoramic radiographs being particularly useful for identifying classic features such as the "soap-bubble" pattern and scalloped borders. From the two case reports presented, it can be concluded that despite variations in clinical and radiographic presentation, both cases demonstrate the typical characteristics of ameloblastoma commonly found in the mandibular ramus region. It is essential for dental practitioners to recognize these features to ensure accurate diagnosis and appropriate treatment planning.

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