CASE REPORT

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Calcifying epithelial odontogenic tumor or compound odontoma: a case report in the left maxilla of a child with panoramic and CBCT imaging

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ABSTRACT

Objectives: The aim of this case report is to describes the importance of advanced imaging such as CBCT 3D to make diagnosis rather than just a panoramic radiography.

Case Report: A 12-year-old girl patient came for the third time with her parents to the radiology installation after being referred from the oral surgery clinic at RSIGM SA due to complaints of swelling on the right side of the face that had not healed. The patient was initially diagnosed as a calcifying epithelial odontogenic tumor This is based on hematological and histopathological examinations. At the second visit patient had marsupialization and panoramic examination performed. The panoramic results show that the lesion is still developing as seen from the change in the distance between the lesion to the surrounding tissue**.** The image of the radiopaque lesion is surrounded by radiolucency in the maxillary region from the apical of teeth 53 to 17, the lesion is multiple, unilateral, and irregular with ill-defined boundaries so that the appropriate radiodiagnosis is Calcifying Epithelial Odontogenic Tumor before doing CBCT 3D imaging on third visit.

Conclusion: CBCT 3D was more accurate and reliable in diagnosing type of odontogenic tumor.

Keywords: *Calcifying epithelial odontogenic tumor, compound odontoma, panoramic, CBCT 3D*
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INTRODUCTION

Calcifying epithelial odontogenic tumor and compound odontoma are two distinct dental conditions that can affect the oral cavity.[1] Calcifying epithelial odontogenic tumor is a rare benign odontogenic neoplasm that arises from the odontogenic epithelium.[2] It is characterized by the presence of sheets of polyhedral epithelial cells, a homogeneous substance, and dystrophic calcification.[3] On the other hand, compound odontoma is a common odontogenic tumor that consists of multiple small tooth-like structures called denticles or tooth germs. [4] These denticles can vary in size and shape, and they are typically surrounded by a radiolucent halo on radiographic imaging.[5] Both conditions require proper diagnosis and management by a dental professional.[6] Correctly diagnosing and managing calcifying epithelial odontogenic tumor and compound odontoma is crucial in providing appropriate treatment for these dental conditions.[7] Furthermore, understanding the histological and radiological features of these tumors can aid in the differential diagnosis and appropriate classification.

Compound odontomas are about twice as common as the complex type. Although the compound variety forms equally between men and women, 60% of complex odontomas occur in women. In very rare circumstances, a compound odontoma may erupt into the mouth. The majority of compound odontomas (62%) occur in the anterior maxilla in association with the crown of an unerupted canine tooth. In contrast, 70% of complex odontomas are found in the mandibular first and second molar area. The contents of these lesions are heterogeneously radiopaque. Compound odontomas have a number of variably sized toothlike structures or denticles that have the appearance of deformed teeth. In some cases, enamel, dentin, and pulp spaces can be visualized, thereby contributing to the heterogeneous appearance. Complex odontomas contain an irregular, but somewhat more homogeneous mass of calcified tissue. The density of the mineralized matrix within these lesions may vary, reflecting differences in the amount and type of hard tissue that has been formed. A dilated odontoma has a single calcified structure with a more radiolucent central portion that has an overall form similar to a doughnut. The radiopaque component of odontomas is surrounded by a thin, radiolucent rim that has a similar appearance to the follicle surrounding a developing tooth crown. [8,9]

Panoramic radiographs give a wide field of view for seeing both jaws, making them view a case.

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Panoramic radiographs are utilized as a part of a standard radiographic examination to evaluate a case but the images obtained are lower resolution which does not provide the fine detail that CBCT, magnification across image is unequal, making linear measurements unreliable, image is superimposition of real, double, and ghost images and requires careful visualization to decipher anatomic and pathologic details. Meanwhile CBCT produces images in axial, coronal, and sagittal directions, enabling three-dimensional visualization of tooth structure that helps dental practitioners gain a wealth of information before determining an appropriate treatment plan. CBCT allows for the analysis of quantitative features such as size, density, and lesion volume, which can be useful in diagnosing odontogenic tumors. Qualitative features like border and detail shape can also be analyzed using CBCT as in this case.[9,10]

CASE REPORT

A 12-year-old girl patient came for the third time with her parents to the radiology installation after being referred from the oral surgery clinic at RSIGM SA due to complaints of swelling on the right side of the face that had not healed. The patient's initial clinical diagnosis was suspected to be a calcified epithelial odontogenic tumor because it was based on clinical examination and supporting hematological and histopathological examinations that had been carried out at the first visit.

The hematological examination (H.07.003) of the patient showed an increase in leukocytes of 12.1 (normal value = 4.0-11.0). These leukocytes are an important part of the immune system whose function is to produce antibodies that can fight viruses, fungi, bacteria and disease-causing parasites that enter the body. A high leukocyte count can be caused by infection or it can also indicate the presence of certain diseases that need to be watched out for, such as blood disorders, cancer or tumors.

Meanwhile, histopathology examination laboratory results on tissue taken microscopically showed fibrotic connective tissue in the form of sheets which are cyst walls lined with odontogenic epithelium with basal cell proliferation, squamous metaplasia and ghost cells and calcification. The conclusion given is a calcified epithelial odontogenic tumor.

At the second visit patient had marsupialization and panoramic examination performed. The panoramic results show that the lesion is still developing as seen from the change in the distance between the lesion to the surrounding tissue (Figure 1). The image of the radiopaque

Figure 1. Panoramic view of the lesion at the (A) first visit, (B) second visit, and (C) third visit. Lesion development can be seen from the distance of the lesion to the surrounding tissue, at the first visit there was a cortical wall around the lesion and the second visit it had disappeared after enucleation, but the lesion was still growing

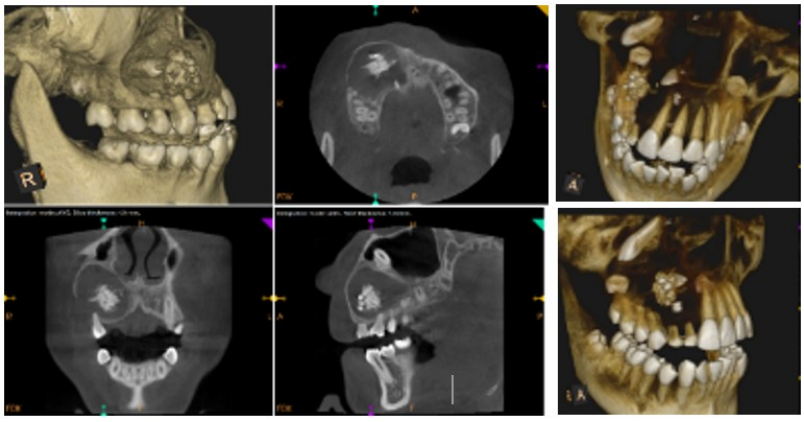

Figure 2. CBCT 3D view of lesion and showing the internal structure of the lesion

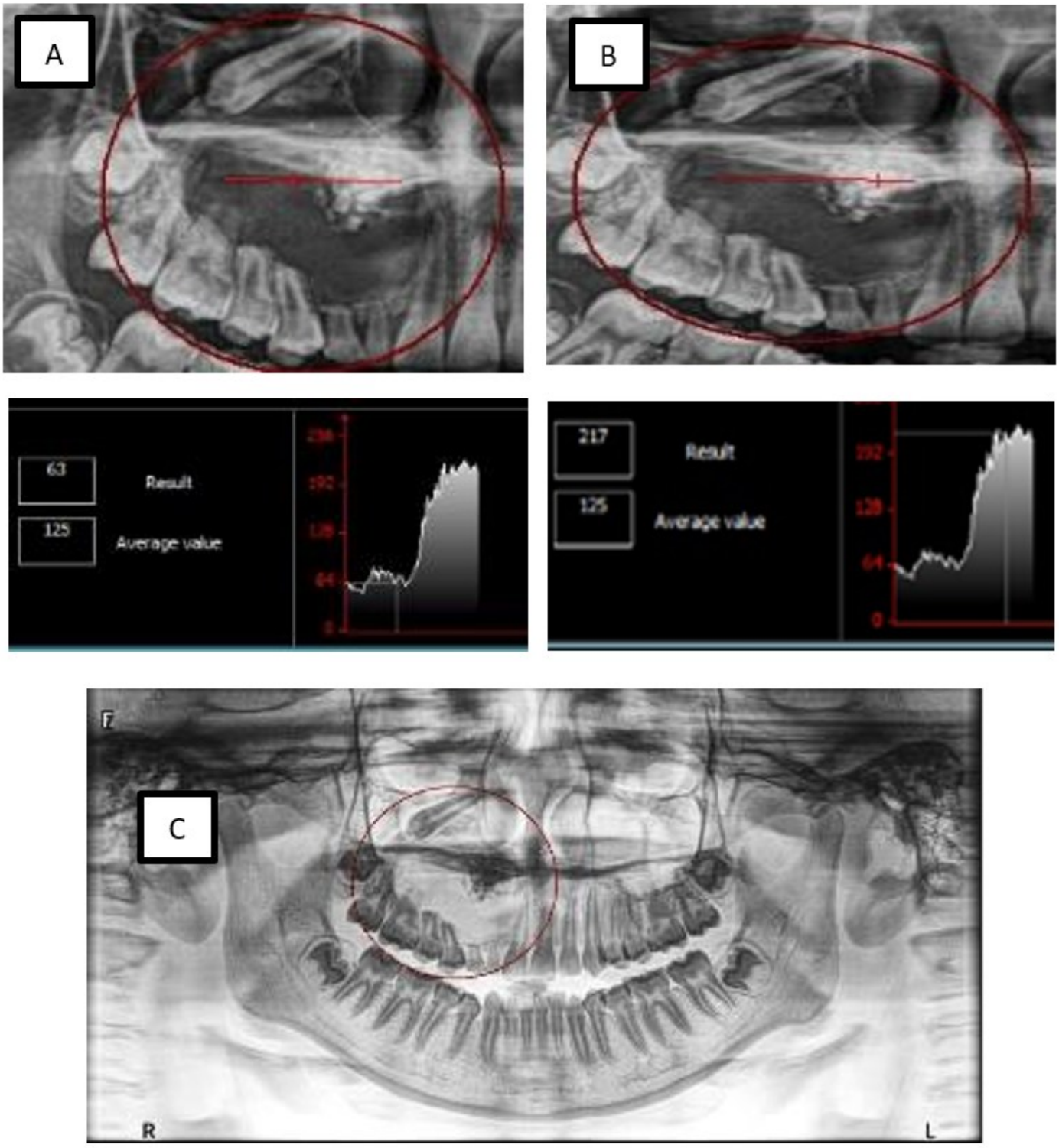

Figure 3. There is a difference in density (A) 63-125 (B) 126-217 in cropping of panoramic, an increase density indicates calcification. (C) inverse view confirms calcification

lesion is surrounded by radiolucency in the maxillary region from the apical of teeth 53 to 17, the lesion is multiple, unilateral, and irregular with well-defined boundaries so that the appropriate radiodiagnosis is calcifying epithelial odontogenic tumor.

The panoramic image showed that teeth 13 14 are impacted so it is necessary to carry out a follow-up CBCT examination to determine the epicenter, shape and size of the lesion acurately. The results of the CBCT examination showed there was a radiopaque lesion like denticle in the maxillary region of teeth 12 to 16, multiple, unilateral, well defined with a cortical border, so that the appropriate radiodiagnosis is Compound Odontoma (Figure 2).

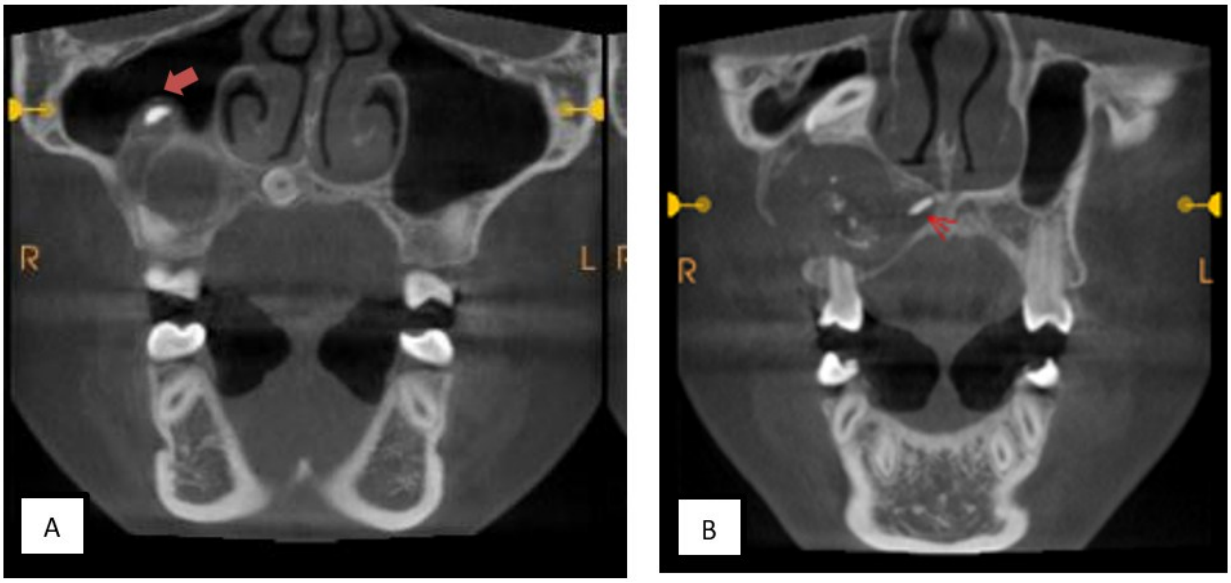

Figure 4. (A) The lesion has no correlation with impacted premolars (B) but originates from impacted canines

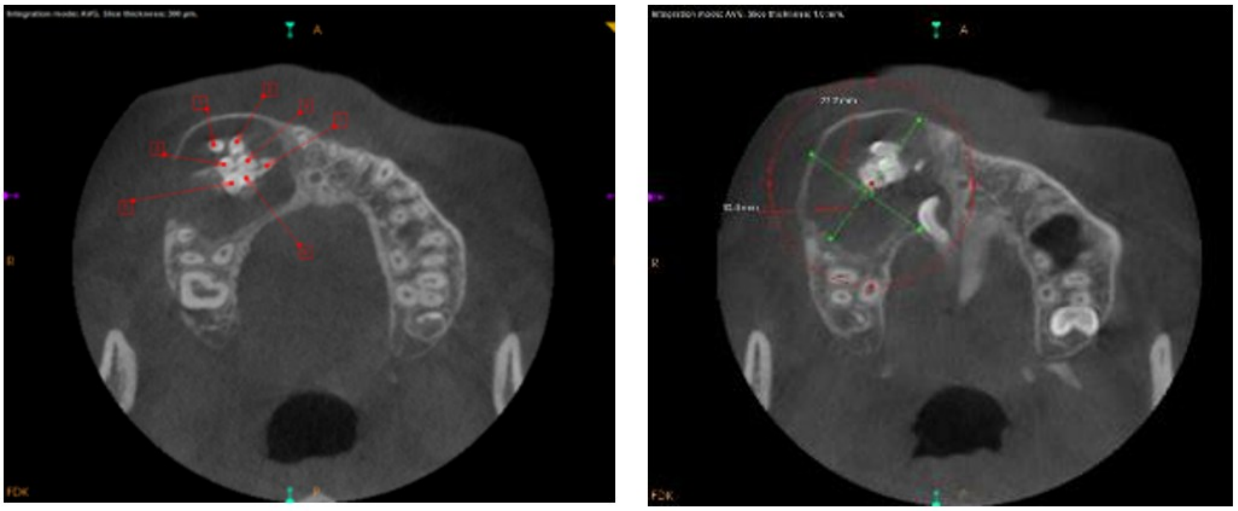

Figure 5. Axial view there is a radiopaque appearance such as seven denticles with varying sizes and size of lesion

DISCUSSION

Digital panoramic radiographic examination of this case revealed a radiodiagnosis of Calcifying Epithelial Odontogenic Tumor (CEOT). CEOT is a benign epithelial odontogenic neoplasm characterized by slow and aggressive growth, often attacking bone and adjacent soft tissue. The exact pathogenesis is unclear, but it is believed to arise from remnants of the odontogenic apparatus.[5] CEOT typically presents as a radiolucent lesion with a clear border, often accompanied by calcification within the lesion. It can occur in various parts of the jaw, but the mandible is more commonly affected. This lesion is unilocular with a well-defined border, and it may exhibit calcification ranging from tiny flecks to large masses. The most characteristic finding is the appearance of the radiopacities close to the crown of the unerupted or impacted tooth. CEOT is characterized by a lining of odontogenic epithelium with ameloblastomatous appearance, often containing eosinophilic ghost cells and areas of eosinophilic matrix material (dentinoid).[2]

The advantage of this digital panoramic examination is that it has in-depth analysis tools, but panoramic radiography is not able to show the location, shape, and the density of the lesion properly. In this case, the location of the lesion was not clearly visible whether it was related to an impacted canine or premolar, this was due to the limitations of the 2D panoramic. Density on panoramic examination cannot show the presence or absence of calcification, so inversion needs to be done to show the presence of calcification in the lesion (Figure 3).

The weakness in the panoramic examination means that further examinations must be carried out, one of which is using CBCT. CBCT can provide a

radiographic image that is close to the real. CBCT makes the epicenter of the lesion more accurate, in this case it can be seen that the lesion has no correlation with impacted premolars but originates from impacted canines (Figure 4).

CBCT is also able to show the shape, quantity and size of lesions acurately, and has a good density so that the radiographic image can be clearly seen that this lesion contains mass of calcified tissue with structures similar to denticles, amounting to seven (multiple) of varying sizes that look like deformed teeth, and unilateral.[11] The radiopaque component of the lesion is surrounded by a thin radiolucent rim that has a similar appearance to the follicle surrounding a developing tooth crown. The description of this lesion is certainly consistent with compound odontoma (Figure 5).

Compound odontoma is a type of odontoma characterized by the presence of multiple tooth-like structures within a cystic or solid lesion. Compound odontoma is believed to arise from the abnormal development of dental tissues, often in association with other odontogenic lesions.[4] Compound odontoma typically presents as a radiolucent lesion with multiple radiopaque locules within the lesion, often accompanied by tooth-like structures. The lesion is usually unilocular with a well-defined border, and it may exhibit calcification ranging from tiny flecks to large masses. Compound odontoma is characterized by the presence of multiple tooth-like structures, often with a demineralized dentin surrounding the pulpal tissue.[12]

The association of COC with compound odontoma is uncommon, but it has been reported in the literature. In such cases, the lesion typically presents as a large, well-demarcated unilocular radiolucency with multiple radiopaque locules within the lesion, often accompanied by tooth-like structures.[12] The histopathological features of COC associated with compound odontoma include a lining of odontogenic epithelium with ameloblastomatous appearance, eosinophilic ghost cells, and areas of eosinophilic matrix material (dentinoid), along with the presence of demineralized dentin surrounding the pulpal tissue.[13]

In summary, CEOT is a benign epithelial odontogenic neoplasm characterized by slow and aggressive growth, while compound odontoma is a type of odontoma characterized by the presence of multiple tooth-like structures within a cystic or solid lesion. The association of COC with compound odontoma is rare but has been reported in the literature, often presenting with distinct clinical, radiological, and histopathological features.[6]

Panoramic radiography and cone beam computed tomography (CBCT) are both used in the diagnosis and imaging analysis of odontogenic tumors.[14,15] CBCT allows for the analysis of quantitative features such as size, density, and lesion volume, which can be useful in diagnosing odontogenic tumors. Qualitative features like border and shape can also be analyzed using both panoramic radiographs and CBCT. CBCT can be considered a gold standard for analyzing odontogenic tumor, dentigerous cysts, ameloblastomas, and odontogenic keratocysts due to its ability to provide more detailed and accurate information about the lesions.[11]

The viewing conditions for radiographs can affect the accuracy of diagnosis. For example, different monitors can impact the interpretation of digital radiographs. These findings highlight the importance of both panoramic radiography and CBCT in the diagnosis and analysis of odontogenic tumors, with CBCT offering more detailed and accurate information.[9,10]

CONCLUSION

The panoramic examination may be less reliable if used as the primary examination because it can only be used for tumor screening but is less reliable to determine the type of tumor, so it requires further examination, such as CBCT, as this instance. CBCT may provide more detailed and accurate information for the diagnosis of an odontogenic tumor. Panoramic radiographs are utilized as a part of a standard radiographic examination to evaluate a case, but the images obtained are lower resolution, which does not provide the fine detail that CBCT does. Additionally, the image also could be a superimposition of real, double, and ghost images and requires careful visualization to decipher anatomic and pathologic details. Furthermore, panoramic radiography is not able to show the location, shape, and density of the lesion properly. In short, CBCT 3D was more accurate and reliable in diagnosing type of odontogenic tumor as shown as in this case report.

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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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