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# The Role of Panoramic Radiographs in Determining The Preprosthetic Treatment During Denture Fabrication - A Case Report

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## *Abstract*

***Background:*** *The success of a removable denture can be determined by the good support of the mucosa and alveolar bone that underlies a denture. Visually and tactilely in the oral examination could not provide adequate information about the condition of the tissue under the submucosa. A panoramic radiograph can show anatomical considerations that influence the fabrication of a removable denture. Therefore, a panoramic radiograph of the patient can help reveal anomalous or pathological conditions in the patient's oral cavity.* ***Purpose:*** *To describe the importances of panoramic radiograph to identify lesions that are not clinically visible in the oral.* ***Case:*** *This article reports a patient with complaints of discomfort in the previous denture. On clinical examination found a prominance on the lower jaw in the left side of the mandible and it was pain on palpation. The patient was referred to radiology for a panoramic radiograph. From this panoramic radiograph, a suspected complex odontoma was found in the lower left posterior region. The patient was immediately referred to the Oral Surgery department for surgery.* ***Conclusion:*** *Panoramic radiographs play an important role in helping to establish a diagnosis of tissue that is not visible during clinical examination. This case demonstrates that with the aid of radiology, a preprosthetic treatment plan can be established to prepare the supporting tissue for removable dentures.*

***Keywords****: Removable denture; panoramic radiographs; Complex odontoma*

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## INTRODUCTION

A comprehensive evaluation of an oral condition can be obtained by clinical examination of the patient. Examination is a standard procedure that must be carried out in order to diagnose and plan a treatment in dentistry.[1,2] In addition to clinical examinations carried out in the dental unit, information about the oral conditions identified through radiographic investigations.[3]

Panoramic radiography is a technique that produces two dimensions images of the maxilla and mandible and their supporting structures.[4,3] Some of the advantages of panoramic radiographs are that it can assess and evaluate the general condition of the jaw and its anatomical structure with one photo, which is taken in a short period of time and with a low radiation dose.[5,6,7] The two-dimensional views of this radiograph sometimes gives a superimposed effect, but this type of photo provides a broad anatomical view of the maxillary and mandibular region so it is often used as an initial screening tool for diagnosis and treatment planning.[4]

Investigations in the form of radiographs panoramic images are most often used to assess the initial condition before denture treatment in fully edentulous patients.[8] In the case of tooth loss, it is very difficult to detect cases of impacted teeth or lesions embedded in bone. Several abnormal findings, both anomalous

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and pathological in the form of remaining tooth roots, cystic lesions, foreign bodies, fractures, residual periapical abscess, sialolithiasis, osteitis, and other findings such as unerupted teeth or other lesions can be seen on panoramic radiographs.[3,6] These conditions will have a direct effect on the removable denture fabrication process. The early finding and detection will help the operator to determine the preprosthetic treatment plan. Therefore, panoramic radiographs are recommended prior to treatment and fabrication of dentures.[6]

Odontomas are malformations of enamel, dentin, pulp and cementum that appear in an irregular shape.[9] Although WHO classifies odontomas as odontogenic tumors, many authors consider the lesion these are hamartomas compared to neoplasms, atypical tumor lesions because they do not develop and do not invade the surrounding tissue.[10] These lesions are rarely detected clinically so that a panoramic radiograph is required to assist in the diagnosis and interventional treatment needed.[9,11]

## CASE REPORT

A female patient 58 years came to RSGM wanting to have a new denture, because the previous denture was no longer comfortable. The patient complains of a prominences of the left side of lower jaw, and it was pain when chewing food with the dentures. According to the patient this prominance was not there before and only realized in the last few years. The patient's previous history of wearing acrylic removable dentures was made in 2017. From the clinical examination of the patient, there was a prominence on the lingual side of residual alveolaris ridge. The mucosa around the lesion was red and painful to palpation. The patient was referred to Radiology for a panoramic radiographic examination.

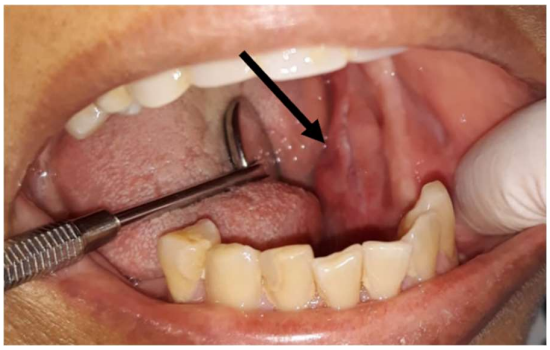

Figure 2. Clinical features of lesions in the oral cavity.

From the interpretation of the panoramic radiograph, several radiopaque images with diameters varying from 1 cm to 1.5 cm were obtained which were surrounded by radiolucent images around the mandibular left posterior tooth region with suspected complex odontoma. This lesion was confirmed to have been seen on the previous panoramic radiograph in 2016, but because it had not shown any signs and symptoms, the process of making the dentures continued. The difference between the two panoramic radiographs is seen in the height of the bone above the thinning lesion on the most recent panoramic radiograph.

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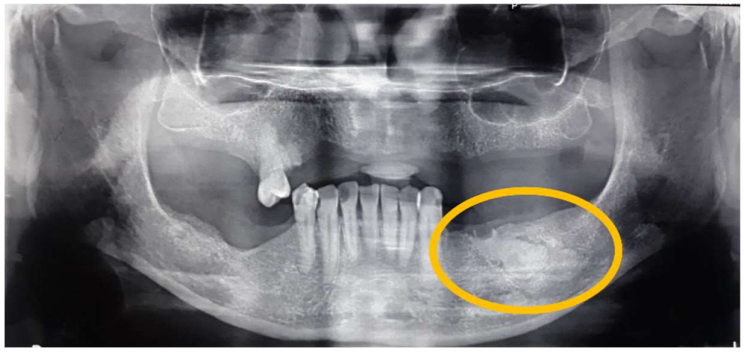

Figure 3. A panoramic view previously in 2016

Figure 4. A recent panoramic photo of the patient in 2022

Due the diagnosis lead to complex odontoma, the patient was referred to the department of Oral and Maxillofacial Surgery for to surgical removal. The removal precedures was recommended to excision the whole segement of the lesion. Removable partial dentures could be started after the surgical procedure has been performed and the tissues have healed.

## DISCUSSION

Odontomas are the most common odontogenic tumors, with an incidence of 67%-75.9%. The etiology of this lesion is unknown, but trauma and infection in the adjacent region are suspected to trigger odontoma. It is thought that these lesions formed due to increased proliferation of the residual dental lamina and hyperactivity of odontoblast cells. [9,11] Odontomas can be inherited through mutational disorders, appearing postnatally with genetic factors from tooth development. This lesion is also associated with several syndromes such as Gardner syndrome, Tangier disease, Herman disease, and odontoma-dysphagia syndrome.[9]

Based on the radiographic appearance, WHO classifies odontomas into 2 category; compound odontoma and complex odontoma. Compound odontomas have the characteristics of dental formations that have enamel, dentin, pulp and cementum structures and resemble teeth, whereas complex odontomas manifest as irregular masses.[10-13] Furthermore, WHO classifies these lesions based on their size in both buccolingual and mesiodostal dimensions, these lesions are grouped into 3; smaller than 10 mm, 11-19 mm and more than 20 mm Odontomas often appear solitary, although in some cases there may be multiple

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odontomas spread over all four regions of the jaw.[11] In this case, a panoramic radiograph of the patient showed the suspected multiple complex odontoma lesions in the left posterior region of the mandible.

The incidence of compound odontomas is almost twice that of complex odontomas. Compound odontomas are more common in the maxillary anterior, while complex odontomas are more common in the posterior mandible. A gender predilection has been observed where compound odontomas are more common in males, and complex odontomas are more common in females.[9] As was in the case, the patient with suspected complex odontoma occurred in a 58-year-old female patient in the posterior region of the mandible.

On panoramic radiographs, complex odontoma lesions show a radiopaque zone surrounded by a radiolucent halo and appear irregularly in the form of a mass that does not resemble tooth structure.[10,12] Radiological diagnosis of single or multiple odontoma lesions is based on its appearance is not too difficult, although it must take into account the possible differential diagnosis..[12] These lesions are rarely clinically detectable and are usually asymptomatic because of their slow growth and rarely exceeding tooth size. This causes these lesions to go undiagnosed and remain in the bone for years without causing any symptoms.[9]

This asymptomatic condition causes the patient to experience no symptoms or disturbances in the oral cavity. Most asymptomatic cases are usually detected by radiography.[14] From several findings related to impacted teeth, and other latent lesions, it can be assessed whether or not further action is needed such as surgery. No need for surgical removal may be recommended in cases where the tooth is completely buried, and there are no signs of pathological changes. Surgical removal is expected to result in unnecessary bone loss and affect the stability of the denture.[2]

In this case, it can be seen that at the beginning of the previous denture, the odontoma lesion was still in the alveolar bone and did not interfere with the process of making the denture. Complaints appeared several years later which was suspected because the alveolar bone resorption process above the lesion began to decrease and the lesion appeared to the surface. The patient begins to feel a bulge on the alveolar ridge and feels pain when eating because the protruding tissue is compressed by the denture base.

In most cases, surgical removal of the odontoma (enucleation) is the best option. The prognosis is variable, with minimal risk of recurrence.[12] In this case, the patient was referred to the Oral and Maxillofacial Surgery department for surgery as part of a preprosthetic treatment. The procedure for making dentures can be started once the healing process has occurred.

From the case above, it can be seen that the presence of panoramic radiographs plays an important role in identifying the presence of lesions in the alveolar bone of the mandible which are suspected of being complex odontomas. Panoramic radiograph or also known as orthopantomography, orthopantogram, panoramic tomography, or rotational radiography is a diagnostic instrument that shows images of the maxilla and mandible in one film with a relatively low radiation dose and in a fairly short time. [2,6] This panoramic radiograph is used as a screening tool in the initial examination to evaluate the preprosthetic condition in patients with tooth loss to help detect bony lesions that could or could not be seen during clinical examination either by inspection, palpation or percussion. [15]

Panoramic radiographs have been used for routine examinations in several institutions or clinics to assess the overall condition of the teeth, alveolar bone, temporomandibular joint, and surrounding anatomic

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structures. From this panoramic radiograph, the dentist can obtain information about the edentulous jaw in the form of remaining tooth roots, impacted teeth, remnants of the alveolar ridge, radiopaque or radiolucent lesions, position of the mental foramen, maxillary sinuses, soft tissue calcifications, foreign bodies and other important structures in the mandible.[6] A radiograph can identify many lesions embedded in the bone.[16] Several publications state that the prevalence of incidental findings has been investigated in a military entrance examination in the US and patients at British Dental School is quite large with the most cases being impacted teeth and radiolucent lesions.[16]

This incidental finding or positive finding on panoramic radiographs not only made the operator suspend the fabrication of removable dentures, but helped to plan surgical preprosthetic treatment in order to achieve a more comprehensive treatment. Cases with positive findings on these radiographs have been widely reported in patients undergoing prosthodontic treatment who are referred to radiology for a panoramic radiographic examination.[4, 2,3,17]

Several previous studies revealed the frequency of positive radiographic findings varied, which is 16-68% in edentulous patients.[5] In other studies, Masood et al (2007) found that of the examination of 327 patients, 42.5% showed positive radiographic findings, while Kratz et al (2016) found 60 %. The latest research from Ahmad et al stated that of 194 patients, 24 patients had positive radiographs and 11 of them required intervention before making removable dentures.[3] In addition, Sahin's research (2020) revealed that the positive radiographic findings in the fully edentulous patients he studied were 32-68%.[5] Yildirim also found that 66% of panoramic X-rays found positive findings, and from all the case with positive findings, 8.5% could affect the treatment at the time of denture fabrication. Yildirim et al stated that radiographic examinations need to be taken and evaluated prior to the fabrication of removable dentures.[17]

The difference in the range of positive findings in these studies may be due to the different definitions of these positive radiological findings. Several studies have defined these positive findings to be related to pathological conditions such as impacted teeth, bone sclerotics, and foreign bodies. Furthermore, other studies include stylohyoid ligament calcification, maxillary sinus abnormalities, and location of the mental foramen and mandibular canal. This relates to whether or not the intervention will be planned before making dentures.. [2,3,18,8]

Some of radiation dose controversies regarding the use of radiography as a routine examination performed prior to denture fabrication have been discussed in several studies. Given the concerns about the accumulated effects of radiological exposure, some observers consider the need for selection regarding the use of panoramic radiographs for examination. In the Radiographic Selection Criteria and Guidelines issued by the ADA, radiographic examination based on clinical signs and symptoms is recommended in adult patients who have recently lost teeth.[8] In addition, the Food and Drug Administration, Center for Device and Radiological Health recommends evaluation of panoramic radiographs as a support for intra-oral examination.[5] Patients who are recommended for any type of radiological examination should consider the ALARA principle (As Low As Reasonably Achievable). ALARA principle must be applied: there should be justification of the exposure to the patient so that the total potential diagnostic benefits are greater than the individual detriment radiation exposure might cause [4,16]

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## CONCLUSION

The use of panoramic radiographs as one of the supporting diagnoses until now is still used as a routine examination in patients who have lost teeth who will be treated with dentures. Although there are several opinions regarding the routine use of radiological examinations in dentistry, experts believe that the use of panoramic radiographs plays an important role in detecting abnormalities and abnormalities contained in the bone. With the high incidence of positive findings of panoramic radiographs in patients for whom dentures are to be made, it is necessary to consider recommending routine examination of panoramic radiographs to patients. Thus, the needs of preprosthetic treatment could be determined before the denture is made. Despite the limitations of panoramic radiographs, some researchers state that performing panoramic radiographs prior to denture fabrication is advantageous and should always be performed.

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