CASE REPORT

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Radiographic finding of sunray appearance as a sign of malignant mandibular lesion: a case report

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ABSTRACT

Objectives: To report the "sunray" appearance on panoramic radiography as a sign of malignancy lesions of the mandible.

Case Report: A 40 year old female patient came to the Hasanuddin University Dental Hospital with the main complaint of facial swelling which causes an asymmetrical appearance and hard consistency on palpation. Mucosa around the second right premolar to the third right molar is reddish with an irregular border. The patient was referred to the radiology department for panoramic radiography and MRI. The panoramic radiograph revealed a mixed radiolucent-radiopaque lesion in tooth 35 involving ramus to the coronoid process. PDL space was irregular widening at 36, 37, and 38. The "sunray" appearance was seen from the ramus extending to the coronoid process. On the MRI, a mass on the submandibular gland pushed and narrowed the sublingual, parapharyngeal, and masticator space, destroying the mandible on the left side. These radiologic findings strongly suggest a malignancy involving the jawbone.

Conclusion: The findings of a mandibular malignancy in the form of a "sunray" appearance on panoramic radiography need to be confirmed with an MRI examination to determine the consistency and extent of the lesion to the surrounding tissue. A comprehensive examination is necessary to properly diagnose mandibular malignant lesions so that the most suitable treatment plan can be determined.

Keywords: *Sunray appearance, periosteal reaction, panoramic radiography, MRI examination*
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INTRODUCTION

Malignant lesions of the mandible are rare and are recognized when they have developed progressively. Malignancy is characterized by uncontrolled tissue growth, is more locally invasive, has a greater degree of cellular anaplasticity, and can metastasize regionally to lymph nodes or areas surrounding tissues.[1] In contrast, benign neoplasms do not have that trait. In addition, clinical signs and symptoms suggest malignancy, such as tooth loss, short-term mobile teeth, ulceration, lymphadenopathy, weight loss, dysgeusia, dysphagia, dysphonia, bleeding, pain or swelling without teeth involved.[1–3]

To achieve successful treatment, a practitioner must carry out a thorough examination to determine the diagnosis of a jaw lesion. Several other tests are needed to support a certain diagnosis. Radiographic examination is still one of the first and most important types of investigations to be carried out in investigating a jaw lesion. Appropriate radiological evaluation of the lesion significantly impacts the diagnosis and subsequent treatment of the patient.[1,4,5]

Examination of oral tumours and cancers generally begins with a conventional radiographic examination, especially in superficial soft tissue masses. The most widely used conventional radiography for imaging oral tumours and cancers are intraoral and panoramic radiography (orthopantomography/OPG). Although conventional radiographs are superimposed with the surrounding anatomic structures, panoramic and intraoral (periapical or occlusal) radiographs are effective enough to confirm relatively small cancer invasion of the jawbone. Conventional radiography is not ideal for confirming the expansion of large tumours accompanied by the surrounding soft tissue's involvement, so examining tumours and cancers involving the oral mucosa requires a multimodality imaging approach. MRI radiographs are superior in imaging soft tissue lesions, such as distinguishing malignant tissue from surrounding tissues that are still healthy.[4–6]

Some unique markers and characteristics that can be observed, specifically in radiographs of a jaw lesion, such as border formation and new bone formation reaction (periosteal reaction), can assist in diagnosing and narrowing the differential diagnosis. Periosteal reactions can assess how large, and aggressive a jaw lesion is in destroying the

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cortical tissue in the bone.[4,7]

The periosteal reaction refers to the formation of new bone tissue on the surface of the periosteum, which is the outermost layer of cortical bone. This reaction is a response to trauma, infection, or inflammation of the bone that separates the periosteum from the cortical bone. A lesion that leads to malignancy also generally results in cortical destruction as indicated by irregular loss of cortical bone or can form a Codman's triangle, sunburst and sunray appearance. While benign lesions often only cause expansion or pressure on the cortical bone.[4,7,8]

This article discusses the "sunray" appearance on panoramic radiography as a sign of a mandibular malignancy lesion, which is expected to assist practitioners in determining the nature of a lesion more accurately.

CASE REPORT

A 40-year-old female patient came to Hasanuddin University Oral and Dental Hospital with a referral letter for panoramic radiographic and MRI examinations. On extraoral examination, the patient showed facial asymmetry and swelling on the left cheek that extends to the submandible. Enlargement with a size of ± 14 cm x 11 cm x 2 cm with a firm consistency, no tenderness, the same color as the surrounding tissue, and a warmer temperature than the surrounding tissue. On intraoral examination, a lump with a size of ± 3 cm × 5 cm x 2.5 cm appeared on the buccal mucosa in the second premolar to the third molar area with irregular borders, red in color, bleeds easily and has a rubbery consistency. There was calculus and stains, no caries, and no tooth mobility.

The results of the panoramic radiographic examination showed a mixed radiolucent-radiopaque lesion on tooth 35 which extended to the mandibular body, mandibular angle to the coronoid process with ill-defined border lesions. There was an irregular widening of the PDL space on teeth 36, 37 and 38. There was a periosteal reaction with a "sunray" appearance on the inferior border of the left mandible to the coronoid process.

On MRI examination found an isointense mass of muscle on T1WI, heterogeneous predominantly hyperintense on T2WI and FLAIR with a cystic component, well-defined, lobulated edges, with a size of ± 7.5 cm x 7.2 cm x 6.4 cm originating from the left submandibular gland which is urgent and narrows sublingual, parapharyngeal, and left masticator space, which destroys the left mandible. No hypointense or hyperintense lesions were seen on TIWI/T2WI and intracranial FLAIR. Incisional biopsy followed by chemotherapy has been suggested to patients but has not been carried out due to many considerations.

DISCUSSION

Several types of benign and malignant lesions can occur in the mandible. Approximately 99% of malignant lesions of the oral cavity originate from the oral mucosa and jawbone; the remaining 1% result from metastases from primary tumours located elsewhere in the body.[9,10] Several clinical signs often accompany malignancy, including pain, tooth mobility, and bleeding pain or rapid swelling without any teeth being involved.[1–3] In this case, it happened to the mandible; the patient's face was asymmetrical due to swelling, bleeding easily, and the process was very fast.

Appropriate radiological evaluation of a lesion can significantly impact the process of diagnosis and proper treatment for patients. This allows the dentist to identify many conditions that may go undetected and to spot conditions that cannot be seen clinically.[10] Radiographic evaluation of the character of the lesion, including location, margins, cortical integrity, density, relationship to the tooth, effect on surrounding structures, and knowledge of clinical data, can assist in narrowing the differential diagnosis.[10,11]

In this case, the results of panoramic radiography showed a mixed radiolucent-radiopaque lesion on tooth 35, which extended

Figure 1. Clinical features of the patient

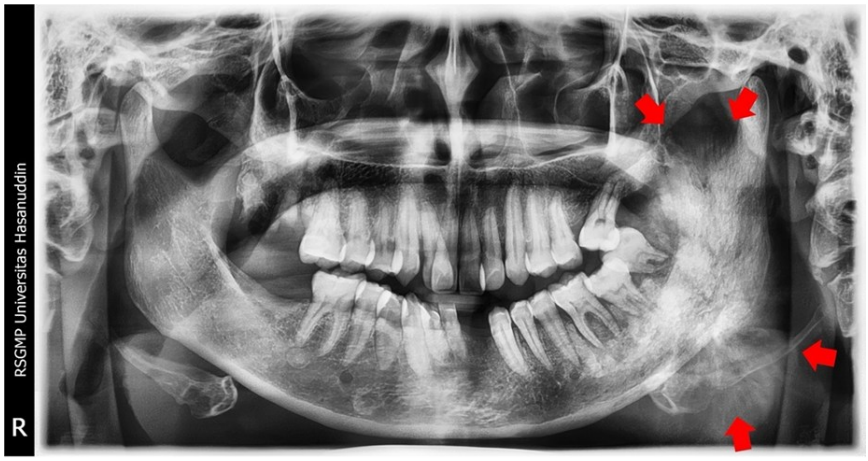

Figure 2. Panoramic radiograph: the sunray appearance are showed in the red arrow

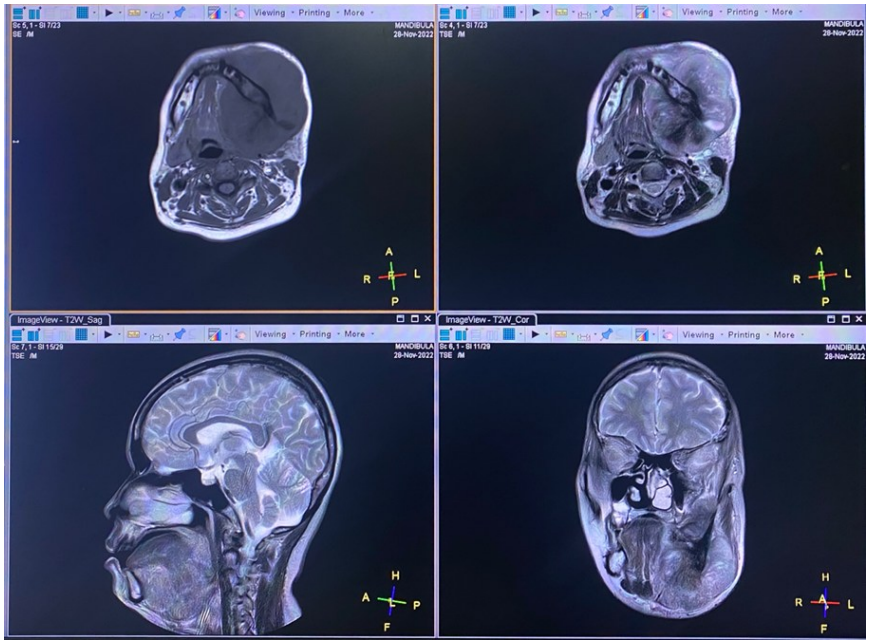

Figure 3. MRI of the patient

from the mandibular ramus to the coronoid process with ill-defined border lesions. There is an irregular widening of the PDL space of teeth 36, 37, and 38. A "sunray" appearance on the mandibular ramus extends to the coronoid process. This "sunray" appearance represents a periosteal reaction and is the hallmark of a malignant lesion on radiographs.[4]

This radiographic sign is significant as it is often associated with aggressive, malignant lesions, particularly in the context of jaw tumors. The presence of the "sunray" or "sunburst" appearance, characterized by radiating lines of new bone formation, suggests a periosteal reaction that is typically seen in conditions such as osteosarcoma or other aggressive bone lesions.[12,13] This finding emphasizes the need for practitioners to be vigilant in recognizing such signs during radiographic evaluations, as they can be pivotal in differentiating between benign and malignant processes.

A periosteal reaction is caused by anything that irritates the bone that separates the periosteum from the bone cortex. The form depends on the patient's age, the cause, the intensity of the lesion, etc. Periosteal reactions can be divided into aggressive and non-aggressive types. Radiographs can show the aggressiveness of a lesion. Non-aggressive lesions are generally not malignancies, characterized by sharp (well-defined) unilocular and multilocular borders. If the growth becomes more malignant and aggressive or grows fast, the border will become unclear (ill-defined). Forms of aggressive periosteal reactions are: (1) spiculated, which consists of hair-on-end, which is characterized by the formation of new bone perpendicular to the periosteal surface; and (2) sunbursts or sun rays, which are more irregular and spread out, diverging in various directions. This appearance is formed due to the formation of spicules from new bone that grows along the blood vessels and bands of connective tissue (Sharpey's fibers), which are also recently formed. As a result of the rapidly pressing lesion, the periosteum does not have enough time to respond with new bone formation, so Sharpey's fibers connecting the

periosteum to the bone are pulled and stretched outward perpendicular to the bone and then undergo a process of ossification..[4,6–8,14,15]

To integrate the results of panoramic radiographs, a more sensitive magnetic resonance imaging (MRI) examination is performed for initial visualization. The periosteum cannot be seen by conventional radiology in normal bone. Only when irritated by some pathological process and when there is a periosteal reaction can it be observed, and it takes ten days for it to occur. MRI is superior for detecting processes in the soft tissue and periosteum.[14]

The MRI findings in this case, which revealed a well-defined mass with lobulated edges and significant involvement of surrounding structures, underscore the necessity of advanced imaging techniques for accurately assessing the nature and extent of mandibular lesions. This multimodal approach not only aids in diagnosis but also plays a crucial role in treatment planning, particularly in determining the surgical margins and the need for adjunctive therapies. After evaluating the clinical and radiographic findings, the diagnosis was mucoepidermoid carcinoma (MEC).

MEC is the most common malignant tumor of the salivary glands. It is most commonly seen in the parotid glands, followed by the minor salivary glands of the palate, submandibular glands, and sublingual glands, respectively. A very rare MEC location is the jawbone. In the posterior region of the mandible, it is more common.16,17 These tumors show varying degrees of clinical presentation, including pain, tooth movement, swelling, an altered sensation of the inferior alveolar nerve for long-standing lesions, and destruction of surrounding tissue.18,19 In this case, panoramic and MRI examinations confirmed that the tumor mass had destroyed the left mandible. These tumors are frequently misdiagnosed clinically and radiographically as benign odontogenic tumors or cysts. Thus, it is essential to perform histopathology and look for signs of malignancy to confirm the diagnosis of MEC.[19]

The findings from the clinical examination, radiographic imaging, and MRI collectively suggested a malignant process, leading to the recommendation for an incisional biopsy followed by chemotherapy. However, in this case, the biopsy had not been performed due to various considerations, highlighting the complexities involved in managing such cases.

CONCLUSION

The finding of mandibular malignancy in the form of a "sunray" image on panoramic radiography needs to be confirmed with an MRI examination to determine the consistency and extent of the lesion to the surrounding tissue. A comprehensive examination is necessary to correctly diagnose mandibular malignant lesions to determine the most suitable treatment plan.

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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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