CASE REPORT

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Radiographic features of oral manifestations of secondary hyperparathyroidism with cranial involvement: a rare case report

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ABSTRACT

Objectives: This case report aims to present a rare case of radiographic oral manifestations of secondary hyperparathyroidism associated with chronic kidney disease.

Case Report: A 32-year-old female patient came to Universitas Indonesia Hospital with a chief complaint of gradual swelling in her oral cavity for approximately 1 year. Clinical examination revealed swelling in the gum and palate of the upper jaw, the swelling increasing in size, causing difficulty in speaking and eating. There is also face deformity along with the increasing size of the swelling. The panoramic radiograph and MDCT showed thinning of cortical bone, absence of lamina dura, and ground-glass appearance in the dentomaxillofacial area, including several parts of the skull, which is consistent with characteristics of oral manifestations of secondary hyperparathyroidism (HPT).

Conclusion: A rare case of secondary HPT associated with chronic renal illness that manifests with panoramic radiograph, MDCT, and oral characteristics is presented.

Keywords: *Secondary hyperparathyroidism, oral manifestation, ground-glass appearance, panoramic radiograph, MDCT*
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INTRODUCTION

Orofacial pain and swelling are common complaints in the dental and maxillofacial area that can be caused by various factors such as infection, benign and malignant neoplasia, and metabolic diseases.[1] Although orofacial pain and swelling are mostly caused by local processes, ruling out systemic causes is imperative.[1,2] One possible systemic reason is endocrinological.[3]

Dentists are essential to help detect hyperparathyroidism because an undiagnosed condition can lead to systemic and alveolar bone resorption, which eventually leads to osteopenia, osteoporosis, pathological fractures, and jaw lesions like brown tumors.[21] It can also lead to dental effects such as tooth loss, exacerbation of periodontitis, and increased tooth mobility.[21] Misdiagnosis is common in hyperparathyroidism because its presentation can resemble jaw tumors, metabolic bone diseases, or ordinary periodontitis.[22] Therefore, knowledge of the various presentations of hyperparathyroidism is needed.

Endocrine condition known as hyperparathyroidism (HPT) is characterized by abnormally elevated parathyroid hormone (PTH) activity from one or more parathyroid glands.[4] Hyperparathyroid (HPT) can be of primary, secondary, tertiary, or quaternary types.[3,5,6] Among these conditions, secondary hyperparathyroidism is associated with chronic kidney disease; it is a condition whose incidence and prevalence are on the rise, with over 10% of the general population suffering.[7,8,13]

Secondary hyperparathyroidism is caused by overactive parathyroid glands brought on by gradually declining serum calcium levels or rising phosphate levels in advanced stages of chronic kidney disease.[8,9] Bone abnormalities, mineral metabolism, and cardiovascular systems are all impacted by the complicated disarray that occurs as kidney function declines.[2,3,8] Another report showed that early jawbone loss in dialysis patients might lead to mandibular and maxillary fractures.[20]

Changes in the jawbone are extremely uncommon in secondary HPT.[2] Changes in the jawbones include osteopenia, a generalized loss of lamina dura, and a blurring of the typical trabecular pattern, which gives the ground glass appearance.[2,10] This article presents and discusses a case of secondary HPT associated with bone alterations, especially in the dentomaxillofacial area. It adds to the limited body of literature, emphasizes the necessity of interdisciplinary cooperation between dental and medical professionals, and may help to enhance early diagnosis techniques and treatment planning.

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CASE REPORT

A 32-year-old female patient was referred from a local clinic to Universitas Indonesia Hospital with a chief complaint of gradual swelling and intermittent pain for approximately 1 year. During clinical examination, massive swelling in the gums and palate was observed. Due to limited facilities at the clinic, the patient was referred to Universitas Indonesia Hospital for further diagnosis and management.

The patient has a history of swelling on her palate and left cheek since 2024, but she has ignored her condition. Months later, the patient began to feel the swelling increasing in size with complaints of difficulty speaking and eating. About 2 months ago, a deformity in the patient's face was noticed, and at that time, the swelling on her palate had increased in size. There was a history of weight loss due to difficulty eating.

Extra oral examination showed facial asymmetry, swelling on the right and left maxilla with clear boundaries, no discoloration, and no pus or blood discharge was observed. Bilateral mandibular and submental lymph nodes were palpable but painless.

Intraoral examination revealed that the patient had poor oral hygiene. Swelling on the right and left maxillary vestibular area extending to the palate with a size of 9x7x3 cm. The massive swelling was also observed at the anterior mandibular alveolar region, teeth #34-44, with a size of 6x2x2 cm. The swelling was well-defined with the same color as the surrounding tissue, fixed, and solid palpation. There are roots of teeth #26, #36, and #48. The second degree of tooth mobility was also observed in all the other remaining teeth.

The patient revealed a history of treated heart and pulmonary disease, hypertension, chronic kidney disease, and a history of knee surgery. The present condition of the patient is on CAPD (Continuous Ambulatory Peritoneal Dialysis) and has been undergoing since 2018. The patient is also taking the medicine of $CaCO_3$, sodium bicarbonate, and folic acid, together with Amlodipine 10 mg and Bisoprolol 2,5 mg for her heart condition.

Figure 1. Oral Panoramic Radiograph taken from the patient

The panoramic view showed that the maxillary and mandibular teeth are normal. There is no tooth loss. There is a supernumerary parapremolar between teeth #45 and 46. There are radices of teeth 26, 36, 46, and 48, and teeth 36 and 48 present with irregular periapical radiolucency with an ill-defined border, consistent with a periapical lesion, and all these teeth's conditions are assumed to be the cause of the intermittent pain. There was a bone loss consistent with periodontitis, particularly in the left maxillary region.

The most characteristic imaging feature of this case report is the thinning of the cortical bone, including the inferior border of the mandible, mandibular canal wall, and walls of the maxillary sinus, accompanied by a decrease in alveolar bone density in the upper and lower jaws. Another specific characteristic of this case is overall changes in the trabecular bone pattern, which showed a ground-glass appearance with the absence of lamina dura in the remaining tooth (Figure 1).

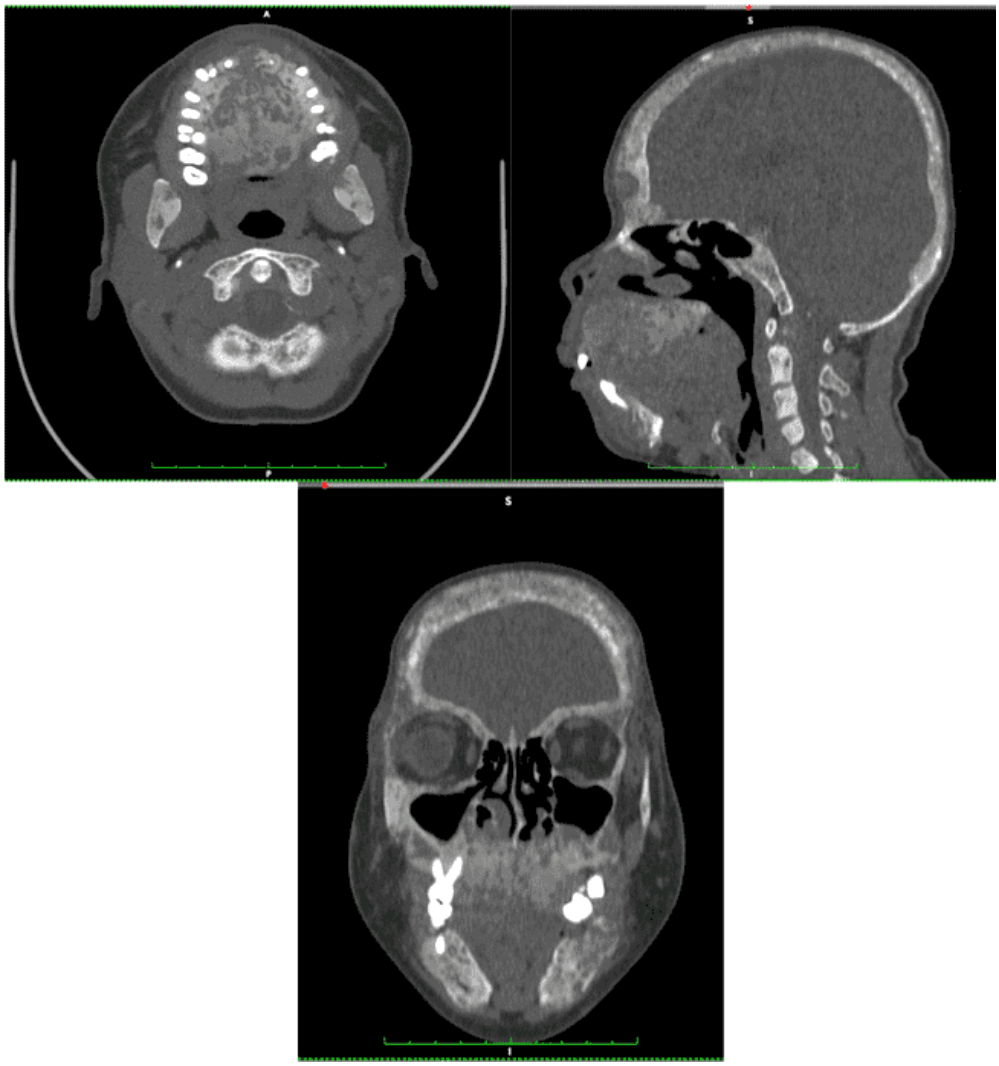

Figure 2. MDCT of axial, sagittal, and coronal views of the patient

The MDCT was performed and revealed mixed hyperdense and hypodense lesions, impressing a ground-glass matrix on the bilateral frontal, parietal, temporal, occipital, sphenoid wing, nasal, clivus, zygomatic, maxillary, palatum durum, mandibular, and vertebral bone. Cortical thinning and overall absence of lamina dura were present. A decrease in the trabecular pattern was notably recognized in all images. There were also noticeable supero-inferior and bucco-palatal expansion of almost all involved bones (Figure 2).

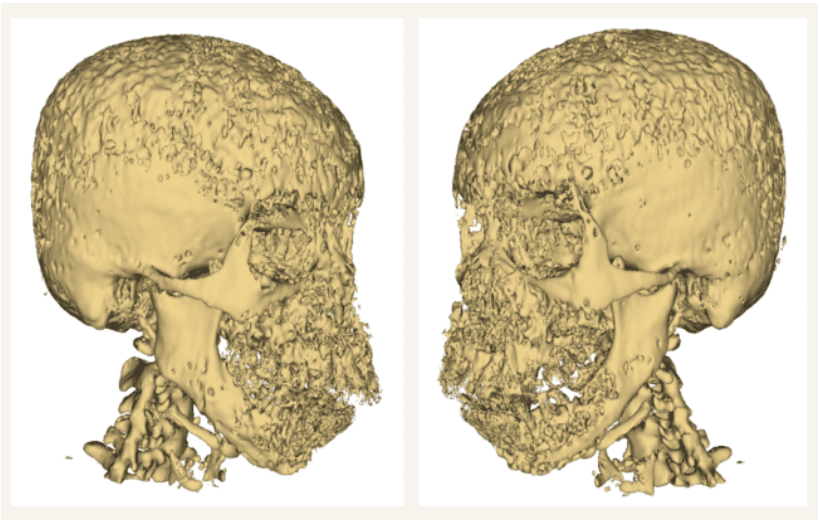

Figure 3. 3D CT rendering showed porotic bone involving almost the whole skull, including maxilla and mandible, however, leaving relatively more intact right and left ramus

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Extensive cortical bone loss was present, extending to a large portion of the skull. Varying lowered bone density caused porotic bone appearance in the 3D rendering image (Figure 3). Some areas of the maxilla, which normally have a thinner bone structure and lower density compared to other regions, resulted in an appearance resembling bone loss due to bone destruction from a pathological origin.

DISCUSSION

The systemic symptoms of hyperparathyroidism were first recognized in 1891.[1] A study on the mandibular oral manifestations of hyperparathyroidism was published in 1945.[1] With a general male: female ratio of 1:1.7, hyperparathyroidism is more common in women.[17] Parathyroid hormones (PTH) promote osteoclastic bone resorption, which regulates serum calcium levels. Overproduction of hormones results in hyperparathyroidism.[14]

HPT can be classified as primary, secondary, tertiary, or quaternary types.[2,6] Primary hyperparathyroidism is caused by parathyroid adenoma (80–90% of cases), parathyroid hyperplasia, or parathyroid carcinoma. Secondary hyperparathyroidism is caused by vitamin D deficiency, chronic kidney disease, rickets, and, in some cases, osteomalacia. Tertiary hyperparathyroidism is secondary hyperparathyroidism that causes parathyroid hyperplasia.[2] And quaternary hyperparathyroidism was hyperparathyroidism that followed a primary hyperparathyroidism, in which the removal of the adenoma of the parathyroid did not lead to a reduction in the progression of the disease.[6]

Life can be significantly impacted by secondary hyperparathyroidism because of problems including cardiovascular issues and abnormalities of the bones and minerals.[11] Symptoms include bone and muscular pain and discomfort, in severe cases, fractures, and, in this case, difficulty speaking and eating can affect a person's quality of living. A possible sign of secondary hyperparathyroidism is the "ground-glass appearance," which is characterized by poorly defined mixed areas with weak corticomedullary differentiation.[12,16] According to Pontes et al.[15], these lesions might affect the mandible or maxilla separately or both at once, frequently diffusely. Osteitis fibrosa/renal osteodystrophy is the typical description of the diagnosis in this situation. It resembles fibrous dysplasia in both microscopic and radiologic aspects.[11]

Our patient's main complaints were discomfort and swelling that came on gradually. According to a recent comprehensive review, 14.0% of patients with hyperparathyroidism experienced mouth pain.[1] Facial asymmetry or swelling (78.0%), however, is the most frequently reported symptom of hyperparathyroidism, followed by oral pain and systemic symptoms (11.7%).[17] Brown tumors can occur with or without bone expansion.[16,18] Although it is also present in secondary and less frequently in tertiary hyperparathyroidism, a brown tumor is frequently seen in primary hyperparathyroidism, particularly in the mandible of female patients.[18] Brown tumors are indicative of the latter stage of secondary hyperparathyroidism's bone mineral problem.[11] In our patient, a sign of Brown tumor was not present.

Neuropathy, periodontitis, postextraction problems, and tooth mobility are additional oral manifestations.[17,20] Although hyperparathyroidism may not be the cause of periodontitis, it may worsen it.[18] Patients with HPT had a higher chance of having periodontitis, which may grow to a severe stage. Loss of bone density was associated with both an increase in PTH and a decrease in 25OH VIT-D19. Loss of the lamina dura is the most often documented radiologic feature of hyperparathyroidism, occurring in 7%–46% of cases.[1] Reduced cortical thickness at the mandibular angle, cortical destruction, tooth displacement, root resorption, mandibular canal obliteration, and dystrophic calcifications are other radiographic features that have been documented.[17,20]

Various therapeutic approaches are available, contingent on the kind of hyperparathyroidism. The sole effective treatment for primary hyperparathyroidism is parathyroidectomy.[1,11] Treatment for secondary hyperparathyroidism includes lowering dietary phosphorus intake and managing PTH levels with vitamin D metabolites and calcimimetics.[2,8] Only when the pharmacotherapeutic treatment is ineffective will a parathyroidectomy be carried out.[1] Treatment options for tertiary hyperparathyroidism include parathyroidectomy and medications like cinacalcet, although the latter has a lower success rate.[11]

CONCLUSION

For the diagnosis and treatment of hyperparathyroidism, a multidisciplinary approach is necessary. Dentomaxillofacial radiologists play a crucial role in diagnosing possible systemic disturbances in dentomaxillofacial conditions. Clinicians must also be able to suspect and look into a more complex systemic illness because jaw lesions are frequently the initial clinical symptom of hyperparathyroidism. A rare Case of secondary HPT linked to chronic renal illness that manifests with traditional radiologic and oral characteristics is presented.

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FOOTNOTES

All authors declare that there is no conflict of interest. The authors certify that they have obtained all appropriate patient consent forms.

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