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Radiographic aspects of metastatic tumors of the jaw

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Metastatic tumors of the oral cavity are uncommon and do not exhibit a pathognomonic radiographic appearance, although most lesions present as a lytic radiolucent lesion with ill-defined margins. Imaging exams of the jaws occasionally have an osteoblastic appearance, either as pure radiopaque or mixed radiopacity. We report two cases of distant metastases and its radiographic appearance. The diagnosis of a metastatic lesion in the oral region is challenging both in terms of recognition as a metastatic lesion and in determining the site of origin. In such cases, careful clinical and pathologic evaluations are necessary, with careful consideration of the inclusion of palliative treatment in the therapeutic management.

1. Introduction

Distant metastases of malignant neoplasm to the head and neck region are rare and comprise approximately 1% of all oral malignancies [1,2]. Oral metastatic lesions may affect any site in the oral cavity, however, in the jawbones, the mandible is more frequently involved than the maxilla, with the molar area being the most frequent site followed by the premolar area and then the angle-ramus [3].

An explanation for the mandibular predilection may be related to the larger amount of hematopoietic tissue having sinusoidal vascular spaces that provide easy access to tumor cells. Furthermore, the pattern of blood supply to mandible compared to maxilla might be responsible for mandibular predilection [4].

Pathogenesis of metastatic processes in jawbones is not completely understood, however these sites are considered susceptible to the deposition of neoplastic cells because of the presence of hematopoietic bone marrow, branching of the local blood vessels and a

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slow blood flow [3,5].

The primary tumor of the oral metastatic lesions differs between the sexes. For men, the most common primary sites are the lung, kidney, liver, and prostate, and for women the breast, genital organs, kidney, and colo-rectum. Prostatic cancer and breast cancer tend to choose the jawbone as their metastatic target [3].

We describe and discuss the radiographic and histopathological aspects, as well as the immunohistochemical findings, of 2 cases of distant metastases to the mandible.

2. Case report

2.1. Case 1

A 70-year-old male patient presented a 3 month-old painful swelling of the right mandible. The patient reported lower lip parenthesia and a history of prostate cancer 4 years earlier.

The clinical examination revealed a volumetric increase in the right mandibular body (Fig. 1a). The oral examination revealed a hard-painless lump covered by normal mucosa (Fig. 1b).

The panoramic radiograph demonstrated a single irregular radiolucency with an ill-defined cortical border (Fig. 1c). A periapical radiograph showed a divergent spiculated or sunburst periosteal reaction (Fig. 1d).

Microscopic examination revealed a neoplastic process characterized by cellular proliferation in a dense connective tissue stroma with blood vessels and bleeding areas. The neoplastic cells exhibited an infiltrative arrangement with trabecular bone involvement, intense osteoblastic activity and an osteoid deposition.

Immunohistochemical staining showed that the neoplastic cells were positive for AE1/AE3 and negative for Vimentin. The neoplastic cells also showed positivity for prostate-specific antigen (PSA) and were focally positive for P504S/α-methylacyl coenzyme A racemase (AMACR), confirming the diagnosis of metastases of prostate cancer.

The patient was started on subcutaneous goserelin acetate 10.8 mg 3-monthly and bicalutamide 50 mg daily. The patient did not report any pain or paresthesia at the time. However, clinically the bone expansion was still apparent.

2.2. Case 2

A 26-year-old woman presented a painless lump in the right alveolar ridge. The patient reported that the lesion had been present for 4 months. Her medical history showed that the patient had bilateral breast cancer, which had been treated by surgical removal, chemo and radiotherapy in 2008.

An intraoral physical examination revealed a nodular lesion, measuring approximately 3 cm (Fig. 2a). The mucosal lining presented a normal texture and color. Clinical examination revealed a volumetric increase in the right mandibular body. The patient reported that at the initial appearance of the lesion she had some pain, but now it was painless with mild paresthesia.

Panoramic radiographic images revealed a mixed lesion in the mandibular body with ill-defined cortical borders (Fig. 2b). The occlusal radiograph showed a radiopacity with a sunburst pattern (Fig. 2c).

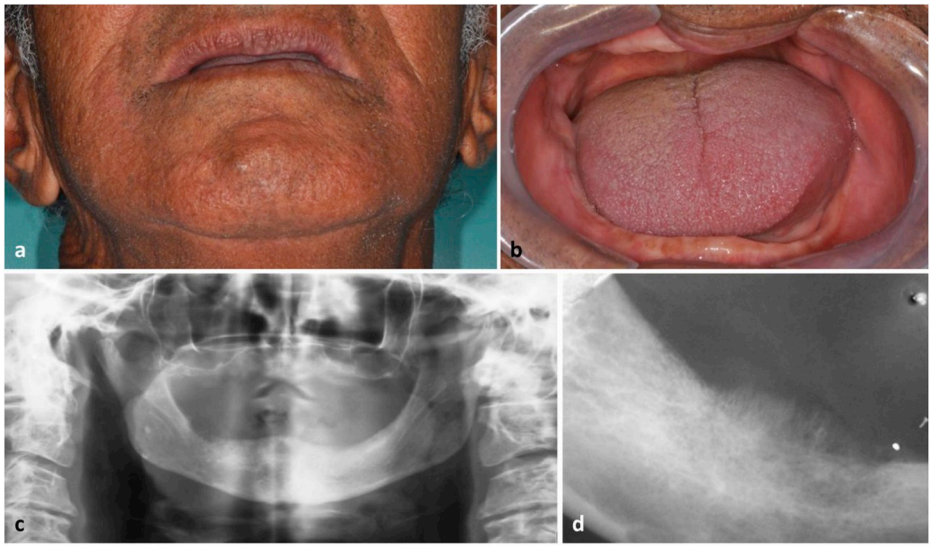

Fig. 1. Jaw metastasis developed in a 70-year-old man (case 1): a) discrete swelling on the right side of the face. The skin was whole and colorless, b) volumetric increase in lower posterior alveolar ridge on right side, c) radiolucent lesion of poorly demarcated margins on right mandibular body, d) periapical radiography exhibiting radiopacity similar to sunburst.

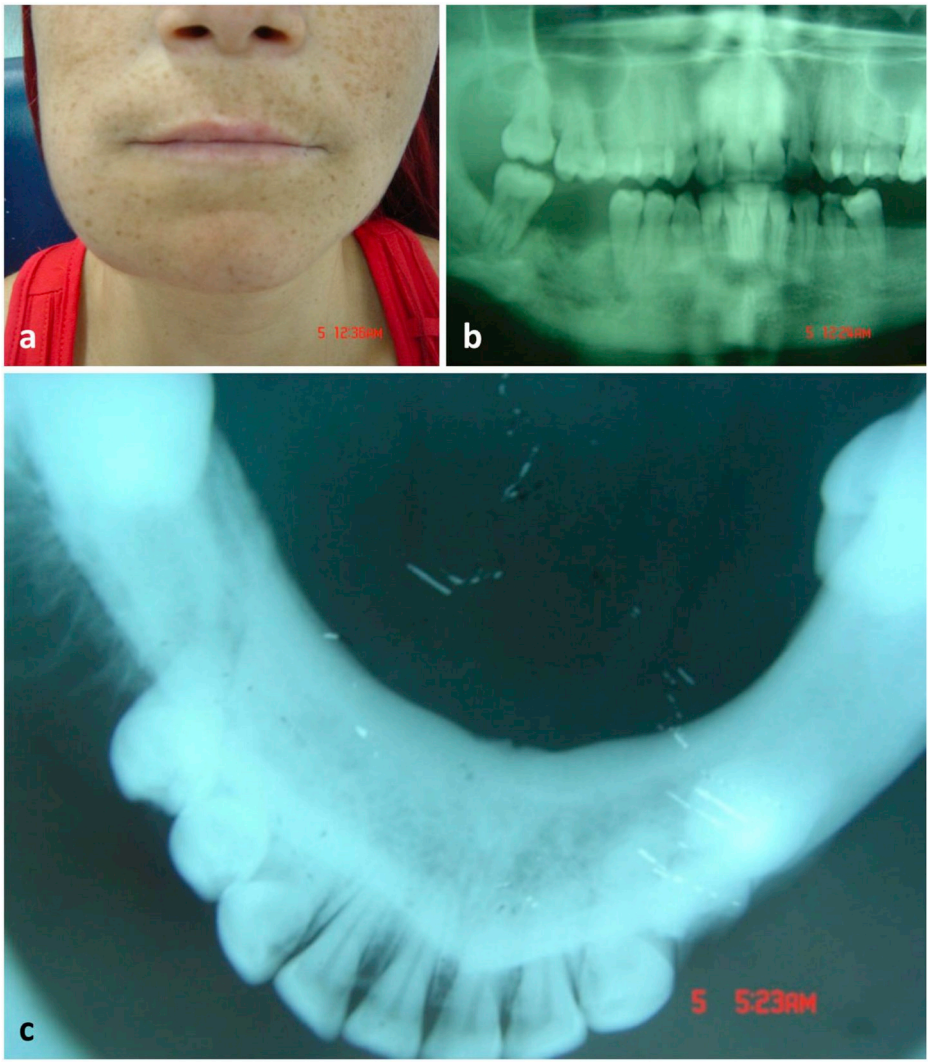

Fig. 2. a) The clinical presentation of jaw metastasis lesion in a 33-year-old female patient (case 2) who had bilateral breast cancer, b) mixed lesion in the mandibular body with ill-defined cortical border, c) Occlusal radiograph showing a radiopacity with a sunburst pattern.

Histological sections showed fragments of malignant neoplasm characterized by proliferation of epithelial cells arranged in islands and a few cells with eosinophilic granular cytoplasm, hyperchromatic and rounded nuclei among a dense connective tissue stroma. Neoplastic epithelial cells exhibited mild cellular/nuclear atypia. Multiple tumor emboli could be observed in the blood vessels.

Immunohistochemical staining showed that the neoplastic cells were positive for Estrogen Receptor Alpha (alpha ER), negative for Progesterone Receptor Alpha (alpha PR) and were focally positive for Rev-Erbα.

The patient was referred for medical treatment but follow-up was lost.

3. Discussion

The primary imaging diagnostic approach for a patient with an oral lesion is the intraoral radiographs. Despite the easy clinical access to perform an intraoral radiographic, the efficacy of this technique is often constrained by limitations in imaging details. Added to this, metastatic lesions do not possess a pathognomonic radiographic appearance. In specific cases, where the clinical presentation is atypical and unusual, radiographic imaging is of value in detecting and evaluating jawbone abnormalities.[13]

Radiographically, metastatic disease usually presents as destructive irregular “moth-eaten” radiolucency. Mixed osteolytic-osteoblastic and pure osteoblastic metastasis are uncommon [4,6,7].

Certain tumors may induce reactive new bone formation and produce a mixed radiopaque (osteoblastic metastasis) and radiolucent lesion that can be mistaken for a fibro-osseous lesion. This pattern is characteristically seen with metastatic breast and prostate carcinomas [7].

The clinical features described matches those reported in previous series, showing a sunburst periosteal reaction. In the sunburst

subtype of periosteal reaction, the spicules of new bone radiate in a divergent pattern instead of being perpendicular (hair-on-end) to the cortex [8,9].

A periosteal reaction is determined by the intensity, aggressiveness, and duration of the underlying pathology. In slow-growing processes, the periosteum has enough time to respond to the disease process and solid continuous periosteal reactions occur. In rapidly growing bone pathology the periosteum cannot produce new bone as fast as the growing lesion. Therefore, a discontinuous rather than a solid pattern of bone formation is seen [10].

Rapid growth of pathologic processes prevents confluent maturation of cell elements in the sub-periosteal space in the bone matrix. The matrix deposits along Sharpey's fibers, which supports the periosteum and maintains the relationship with the host bone cortex along the periosteal vessels [11].

Osteosarcoma, Metastasis (especially from sigmoid colon and rectum), Ewing's sarcoma, Haemangioma, Meningioma, Tuberculosis, Tropical ulcer and rarely Fibrous dysplasia are the differential diagnoses of a sunburst periosteal reaction [12].

Although periosteal reaction results from the response of cortical bone to a variety of insults, its imaging recognition is facilitated by a combination of patterns of bone formation that can be identified in intraoral radiographs. In doubtful cases, the evaluation of morphological aspects with CT is extremely helpful in conducting the diagnosis.

Diagnosing metastatic lesions accurately has important therapeutic implications to allow adequate and safe treatment planning.

Conflicts of interest

Fernanda Mombrini Pigatti, Maria Carolina Martins Mussi, Bruno Tavares Sedassari, Priscila Lie Tobouti and Décio dos Santos Pinto Junior declare that they have no conflict of interest.

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