Radiology Case Reports

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Brown tumor of the mandible: Magnetic susceptibility demonstrated by MRI

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We present a case of a 75-year-old woman with right mandible cystic lesion and primary hyperparathyroidism. The MRI demonstrated marked loss of signal intensity on T2 gradient-echo images, suggesting intralesional hemossiderin. After an open biopsy, histology was consistent with "brown tumor." The finding of susceptibility on T2 gradient-echo images in a mandible lesion adds considerable specificity to the differential diagnosis.

Case report

A 75-year-old woman was referred to us because of a cystic lesion within the angle and body of the right mandible, found incidentally on a panoramic radiograph obtained for planning of tooth extraction. A CT scan (Fig. 1) showed a well-circumscribed and expansive lytic lesion. MRI demonstrated low signal intensity on T1- and T2-weighted images (Fig. 2), heterogeneous contrast enhancement (Fig. 3), and marked loss of signal intensity on T2 gradient-echo images (blooming effect) consistent with magnetic susceptibility (Fig. 4).

Based on the MRI findings, the possibility of intralesional hemosiderin was raised. Laboratory evaluation showed increased parathyroid hormone level (442.9 pg/ml; reference range from 14 to 72 pg/ml), and increased serum calcium (14.4 mg/dl; reference range from 8.8 to 10.1 mg/dl). These findings were consistent with primary hyperparathyroidism (HPT); therefore, the diagnosis of mandible brown tumor was suggested. Neck ultrasonography (US) demonstrated enlargement of the left parathyroid gland due to a parathyroid adenoma, which underwent surgical resection. Subsequently, after an open biopsy of the mandible lesion, histology revealed giant-cell granuloma and hemosiderin deposition (Fig. 5), consistent with mandible "brown tumor."

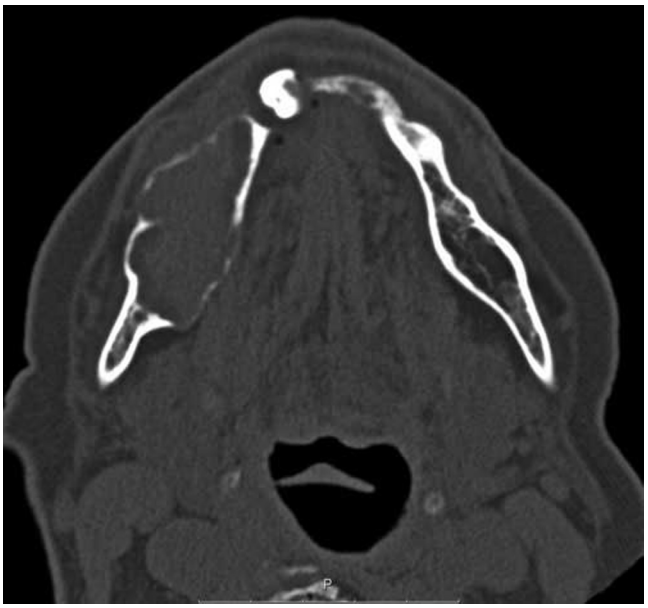

Figure 1. 75-year-old woman with right mandible cystic lesion and primary hyperparathyroidism. Axial unenhanced CT image shows a well-circumscribed, expansive lytic lesion within the right angle and body of the mandible, with cortical expansion and incomplete internal septa but without internal osteoid or calcified matrix.

The mandible is more commonly affected by brown tumor in primary HPT rather than secondary HPT (1). The

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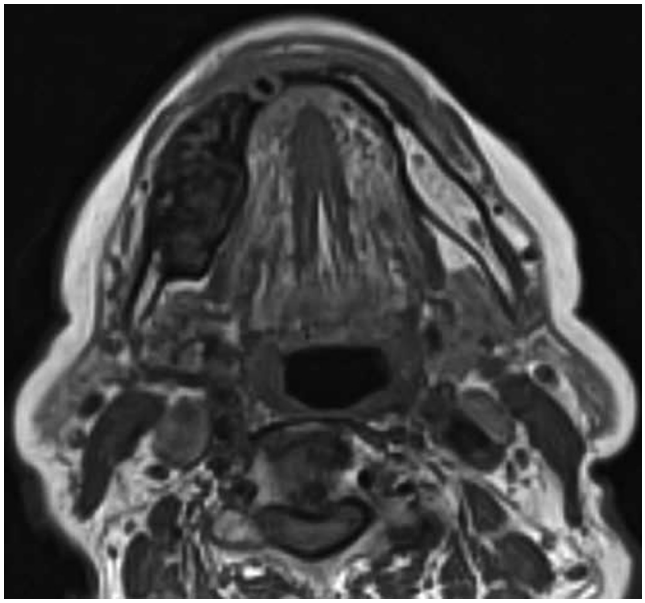

Figure 2. 75-year-old woman with right mandible cystic lesion and primary hyperparathyroidism. MR imaging (1.5T scanners, Symphony and Avanto; Siemens, Erlangen, Germany) confirms a well-defined expansive lesion with homogeneously low signal intensity on T2-weighted turbo spin-echo images without fat saturation (TR/TE _ 521/10 msec).

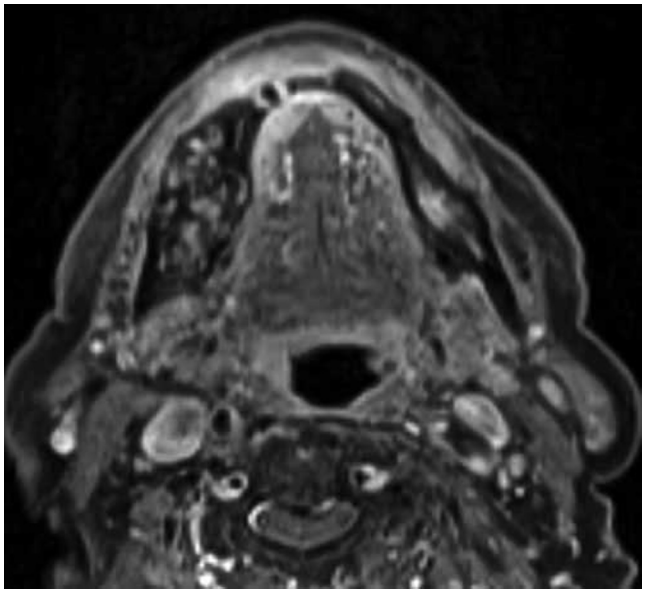

Figure 3. 75-year-old woman with right mandible cystic lesion and primary hyperparathyroidism. Axial T1-weighted turbo spin-echo fat-suppressed image post gadolinium (TR/TE _ 759/10 msec) shows heterogeneous enhancement of the lesion.

CT appearance of brown tumors is as a well-defined expansive lytic lesion that can encircle the teeth roots, making it hard to differentiate from other expansive lesions that can present with a similar imaging. The differential diagnosis includes benign conditions such as odontogenic keratocyst, other odontogenic cysts (radicular cyst, lateral periodontal

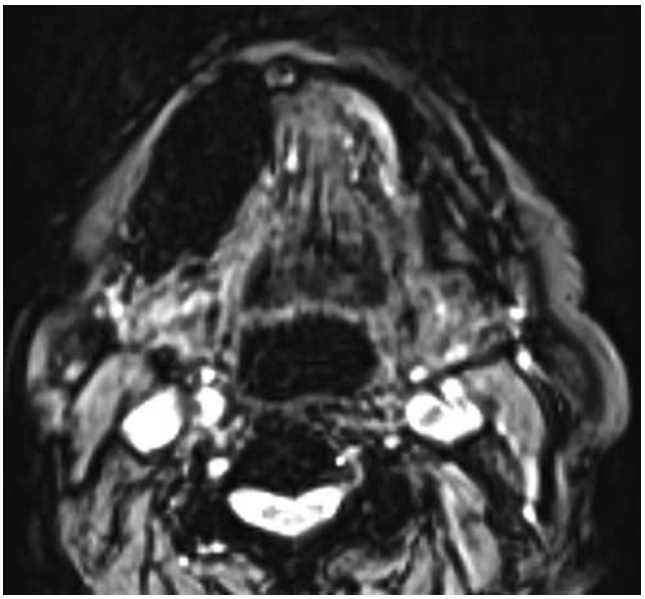

Figure 4. 75-year-old woman with right mandible cystic lesion and primary hyperparathyroidism. The lesion has decreased signal intensity on T2-weighted gradient-echo sequence (TR/TE _ 890/26 msec). Magnetic susceptibility with significantly low signal intensity is caused by hemosiderin deposition.

cyst, and medial mandibular cyst) and simple bone cyst; neoplastic conditions, mainly ameloblastoma, metastasis, primary plasmacytoma; infectious diseases (bone abscess, localized osteomielitis); eosinophilic granulomas; and giant-cell lesions (2).

The term "brown tumor" arises from its grossly brownish colour on biopsy, which is due to the rich vascularity, hemorrhage, and deposits of hemosiderin (1). Pathologically, it is characterized by hypervascular fibroblastic stroma, foci of hemorrhage, and accumulation of osteoclastic multinucleated giant cells (2, 3).

It is difficult to distinguish brown tumors from other giant-cell lesions (giant-cell reparative granuloma and giant-cell tumor), both pathologically and radiologically. Therefore, a clinical diagnosis is based on the association with HPT and the study of the parathyroid glands (3).

Discussion

On MR imaging, a loss of signal intensity on gradient-echom T2*-weighted imaging can be due to T2 effects or to T2* effects (image with longer TE). The T2* effects are

evident when there is marked loss of signal, with relatively small changes in TE. Magnetic susceptibility effects in a tumor could be due to osteoid or calcified matrix, hemosiderin, or air within the tissues (4). In our case, CT excluded osteoid or calcified matrix, or intralesional gas.

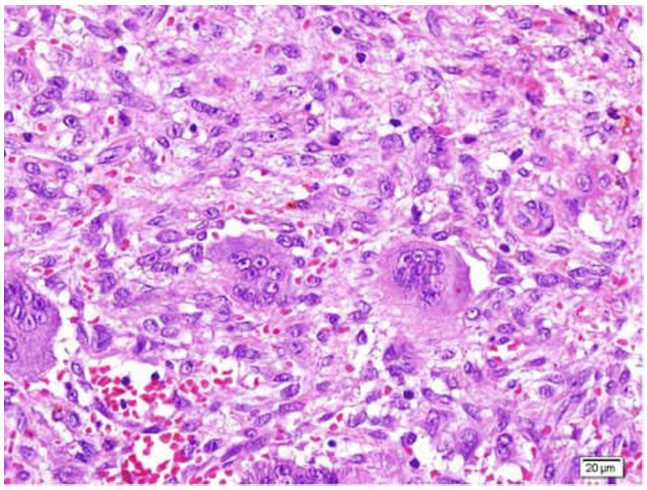

Figure 5. 75-year-old woman with right mandible cystic lesion and primary hyperparathyroidism. H&E staining shows multinucleated giant cells and abundant hemosiderin deposition.

To our knowledge, one case of a vertebral brown tumor showing magnetic susceptibility effects on gradient-echo images has been described (4). In the mandible, the correlation between an imaging finding (loss of signal intensity on gradient echo T2*-weighted imaging) and a histological characteristic of tissue (hemossiderin deposition) adds considerable specificity to the differential diagnosis of mandible lytic lesions.

References

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