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Case report

Intracranial, intra-axial metastatic giant cell tumor of bone: Case report and review of literature

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1. Introduction

Giant cell tumor of the bone (GCTB) is a rare benign tumor that represents 3–5% of all primary bone tumors. It typically occurs at the epiphyses of long bones with the tibia and femur being the most frequent sites of disease. Histopathologically, GCTB is characterized by distinctive, multinucleated, osteoclast-like cells. While malignant degeneration is possible, it occurs in only 1–3% of patients. Despite its benign description, the natural history of GCTB can be variable with high rates of local recurrence and invasion. Metastatic disease is found in approximately 1–9% of patients. Pulmonary metastases are the most common, though other sites have been reported, including skin, skull, breast, mediastinum, spinal cord, and regional lymph nodes. There has been a single report of a patient with cutaneous metastases who later died from "widespread metastases" that included the lung, spine, and brain, though there was no confirmation of the histopathology in this case [1]. To the best of our knowledge, intra-axial metastasis to the brain with pathology confirmation has not been previously reported.

2. Case report

A 51-year-old female was diagnosed in 1985 with GCTB of the left proximal tibia by biopsy and curettage. Local recurrences at the tibia developed subsequently at 8 and 18 months, which were treated with curettage and local resection, respectively, without adjuvant therapy. She later developed a metastatic lung lesion, resected in 1997, which demonstrated identical histopathology. In December 2012, she presented to the emergency room after a fall, and several weeks of headaches and confusion. A pre- and post-, thin-cut, contrast-enhanced computed tomography (CT) scan of the head demonstrated bilateral well-circumscribed, hyperdense lesions, with enhancement in the parietal lobes (Fig. 1). The patient was unable to obtain magnetic resonance imaging (MRI) due to the presence of a cochlear implant. On physical examination, she had mild bilateral upper extremity weakness with mild pronator drift. The rest of the examination was unremarkable. Additional diagnostic workup revealed a right lower lobe lung nodule that was 4.7 cm × 5.2 cm in size. Given her history of GCTB, it was thought that her pulmonary nodule could likely be another metastatic GCTB lesion. However, the brain lesions suggested the possibility of a primary lung tumor with brain metastases. Using intraoperative neuronavigation, the patient underwent bilateral craniotomies for resection of the two lesions. Intraoperatively, both lesions were noted to be subcortical and well circumscribed. Post-operatively, the patient had resolution of headaches though continued to have mild upper extremity weakness. Post-operative contrast-enhanced CT scan demonstrated gross total resection (Fig. 2). While various

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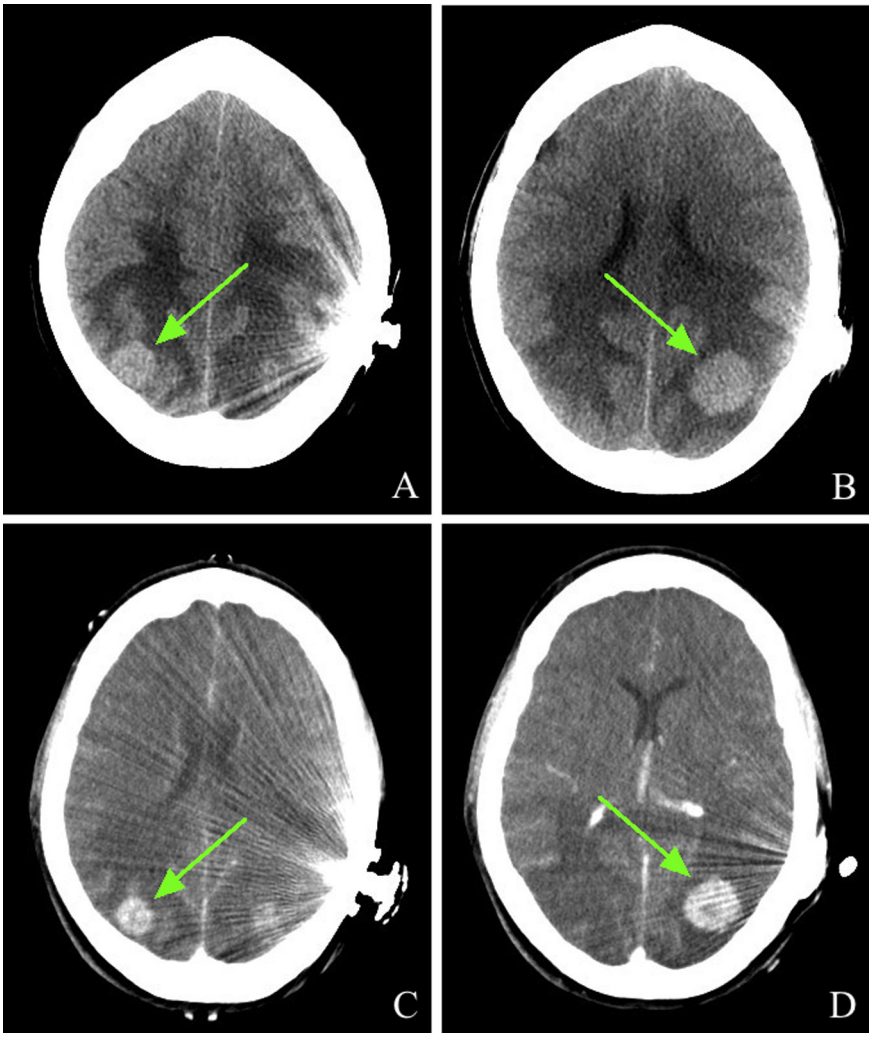

Fig. 1. Axial, non-enhanced, thin-cut head CT (A) and (B) and contrast-enhanced head CT (C) and (D) demonstrating bilateral enhancing parietal lesions (arrows).

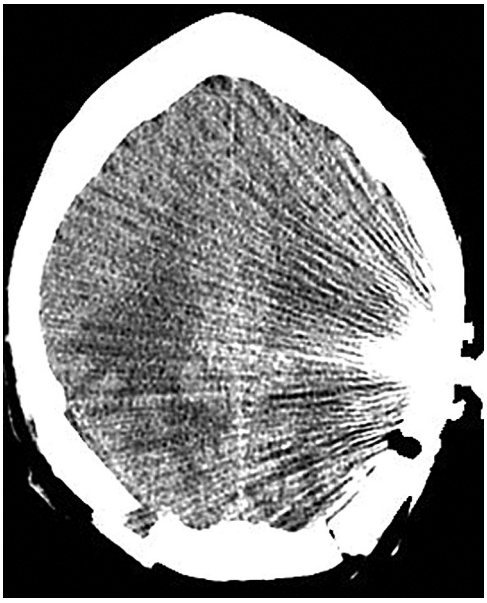

Fig. 2. Axial, contrast-enhanced head CT demonstrating post-operative gross total resection.

adjuvant treatments were considered, she was initiated on denosumab with plans to closely monitor her lung nodule and brain for progression.

2.1. Post-operative course

The patient underwent four months of denosumab chemotherapy. Follow-up imaging obtained of her head demonstrated no tumor recurrence at 9 months. Her pulmonary nodule, however, demonstrated increase in size to 6.6 cm × 6.8 cm and surgical resection was performed.

2.2. Pathological findings

Histological sections from the right and left parietal lobe lesions, and the recently resected right lower lung lobectomy (2013) demonstrated identical pathological findings consistent with metastatic giant cell tumor of the bone. Most areas showed multinucleated osteoclastic giant cells admixed with round and spindle mononuclear cells. Focal osteoid matrix formation was noted in the brain lesions (Fig. 3A–D). The Ki-67 proliferative index was 2%. The differential diagnosis included osteosarcoma, but this was excluded due to lack of anaplasia in the mononuclear cells and the absence of necrosis, atypical mitosis and high Ki-67 index. In addition, the histology of the metastatic lesion was identical to that