Delayed Postcontrast CT and MR Imaging of Chondroid Chordoma

—Case Report—

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Abstract

A rare case of intracranial primary chondroid chordoma is reported with special reference to neuroradiological findings. A precontrast computed tomographic (CT) scan revealed an isodense mass with multiple flecks in the right cerebellopontine region. A postcontrast CT scan showed slight ring enhancement. A delayed postcontrast CT scan demonstrated marked homogeneous enhancement extending from the middle cranial fossa to the cerebellopontine region on the right. Magnetic resonance (MR) imaging demonstrated a well-defined lesion as a high-intensity mass on T₂-weighted image and a low-intensity mass on T₁-weighted image. A MR image 5 minutes after gadolinium-diethylenetriaminepenta-acetic acid administration showed heterogeneous enhancement. A MR image 30 minutes after the contrast administration showed more marked, homogeneous enhancement. Such delayed postcontrast CT and MR imaging are useful in the differentiation of chondroid chordoma from classical chordoma.

Key words: chondroid chordoma, computed tomography, magnetic resonance imaging, delayed enhancement

Introduction

Intracranial primary chordoma occurs rarely. Ribbert's autopsy series⁽¹⁾ showed the incidence of notochordal ectopia in the clivus to be approximately 2.0%. Chordoma is histologically benign and slow-growing, so the poor prognosis may result from the critical location, local aggressive behavior, and high recurrence rate. In contrast, chondroid chordoma has a better prognosis, and is extremely rare.⁽⁵⁾ Only 35 cases have been reported previously, with 21 occurring in females.^(1,3-6,8,10,12,14,15) Chondroid chordoma is frequently located in the spheno-occipital region. The mean age at onset of symptoms was 39.5 years. Heffelfinger's series⁽⁵⁾ showed that the average survival for chondroid chordoma was 15.8 years compared with 4.1 years for classical chordoma. However, the clinical signs and duration of symp-

toms were similar.

Here, we report a case of chondroid chordoma and discuss the usefulness of delayed postcontrast computed tomographic (CT) scanning and magnetic resonance (MR) imaging in diagnosing intracranial chondroid chordoma.

Case Report

This 71-year-old male complained of double vision after suffering from dysphagia for 3 years. His history included left abducens nerve impairment caused by head injury at 48 years of age. On admission, neurological examination revealed bilateral abducens nerve pareses and absence of gag reflex. Plain x-rays and polytomograms of the skull base found no abnormal lesions, such as osteolysis.

A precontrast CT scan showed an isodense mass

Received March 25, 1991; Accepted May 28, 1991

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Fig. 1 Preoperative CT scans. *left*: Precontrast scan, showing an isodense mass with multiple calcifications in the right cerebellopontine region. *center*: Postcontrast scan, showing slight ring enhancement. *right*: Delayed scan (60 min after contrast administration), showing marked homogeneous enhancement extending from the right middle cranial fossa to the right cerebellopontine region.

Fig. 2 Preoperative MR images. *left*: T₂-weighted image, showing a high-intensity mass. *right*: T₁-weighted image, showing a low-intensity mass.

with multiple calcification spots in the right cerebellopontine region (Fig. 1 *left*). A postcontrast CT scan showed slight ring enhancement at the lesion site (Fig. 1 *center*). A CT scan taken 60 minutes postcontrast demonstrated considerable homogeneous enhancement extending from the middle cranial fossa to the cerebellopontine region on the right (Fig. 1 *right*). Cerebral angiograms showed displacement of the right internal carotid artery (C₃–C₅ portion) and the basilar artery. No feeding vessels or tumor stains were seen. Axial and sagittal MR images demonstrated a well-defined lesion as a high-intensity mass on the T₂-weighted image and a low-intensity mass on the T₁-weighted image (Fig. 2).

A right lateral suboccipital craniectomy demonstrated the tumor in the right cerebellopontine region with a defect in the dura mater adjacent to the right 7th and 8th cranial nerves. The tumor appeared

grayish to white with a thin membrane capsule. The contents were easily removed with suction. The tumor mass in the posterior fossa was subtotally removed. The pars petrosa of the temporal bone had been almost destroyed. The residual tumor mass in the middle cranial fossa was left for reoperation *via* a subtemporal approach. Histological examination of the tumor specimen showed a mixture of vacuolated cells, mucinous matrix, and chondroid elements (Fig. 3).

The postoperative course was uneventful. A postoperative MR image 5 minutes after gadolinium-diethylenetriaminepenta-acetic acid (Gd-DTPA) administration showed heterogeneous enhancement of residual mass, suggesting the lesion contained various structures. A MR image 30 minutes later showed more marked, homogeneous enhancement (Fig. 4). The dysphagia improved and the gag reflex returned within 1 month. The bilateral abducens nerve pareses persisted for 3 months.

Discussion

Precontrast CT scanning generally demonstrates a classical chordoma as an isodense or sometimes hypodense mass, associated with necrosis or mucoid collections, with skull base destruction accompanied by scattered bony sclerosis. Postcontrast CT scanning shows ring-like and/or homogeneous, slight to moderate enhancement. In contrast, precontrast CT scanning frequently shows chondroid chordoma as an isodense mass with calcification³⁾ and/or bony erosion,^{1,6,8,15)} as in our case. Postcontrast CT scanning shows slight enhancement.^{1,16)} Among previous cases, one had homogeneous enhancement⁸⁾ and

Fig. 3 Photomicrographs of the tumor surgical specimen. A: Mixture of vacuolated cells, mucinous matrix, and chondroid elements. HE stain, $\times 4$. B: Vacuolated cells with mucinous matrix. HE stain, $\times 40$. C: Chondroid elements. HE stain, $\times 10$.

Fig. 4 Postoperative MR images. *left*: T_1 -weighted image, showing a low-intensity residual mass in the right middle fossa. *center*: T_1 -weighted image 5 minutes after Gd-DTPA administration, showing heterogeneous enhancement with multiple flecks. *right*: T_1 -weighted image 30 minutes after Gd-DTPA administration, showing more marked, homogeneous enhancement.

another heterogeneous enhancement.⁶⁾ However, no delayed postcontrast CT scanning of chondroid chordoma has been reported. In our case, the CT enhancement of chondroid chordoma was clear and more homogeneous on the delayed than the immediate scans (Fig. 1).

MR findings of classical chordoma has been described,^{2,7,9,13,16)} but not that of chondroid chordoma. MR imaging of classical chordoma generally shows prominent early enhancement.²⁾ In our case, the T_1 - and T_2 -weighted MR images of the tumor showed low- and high-signal intensities, respectively. The

MR image 5 minutes after Gd-DTPA administration showed heterogeneous enhancement, and the MR image 30 minutes after Gd-DTPA administration showed more marked, homogeneous enhancement.

Chondroid chordoma clearly demonstrates greater enhancement on delayed CT scans and MR images. The tumor has a large extracellular matrix, mainly consisting of mature hyaline cartilage. Therefore, the marked delayed contrast enhancement may be due to a prolonged high concentration of contrast medium in the tumor tissue, caused by continuous extravasation and delayed washout of contrast medium

from the large tumoral extracellular spaces.

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