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Case Report

Intracranial chondrosarcoma located in the region of the posterior clinoid process: a case report ☆,☆☆,★

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ABSTRACT

Intracranial chondrosarcomas located in the region of the posterior clinoid process have not been focused on. Here, we report the case of a 29-year-old woman with a skull base tumor in that region. Seven years after the diagnosis, the tumor had grown and showed calcification and tumor stain; chondrosarcoma, posterior clinoid meningioma, and chordoma were suspected. The patient underwent subtotal tumor resection, and the histopathological study revealed that the tumor was a low-grade chondrosarcoma. Chondrosarcomas can be located in the region of the posterior clinoid process, and not only chordomas but also posterior clinoid meningiomas should be considered as a differential diagnosis of tumors located in that region, especially when the tumor has calcification or receives a vascular supply.

Introduction

Intracranial chondrosarcomas are rare, accounting for 0.16% of all intracranial tumors and 6.15% of all skull base tumors [1]. Chondrosarcomas arise in several skull base regions [1–6], but location in the region of the posterior clinoid process (PCP) is uncommon for them. Conversely, meningiomas and chordomas located around that region have been reported [7–10]. Here, we report a case of an intracranial chondrosarcoma located in the region of the PCP that was difficult to be precisely diagnosed using radiological findings. We also discuss the differences in radiological features among tumors located in that region.

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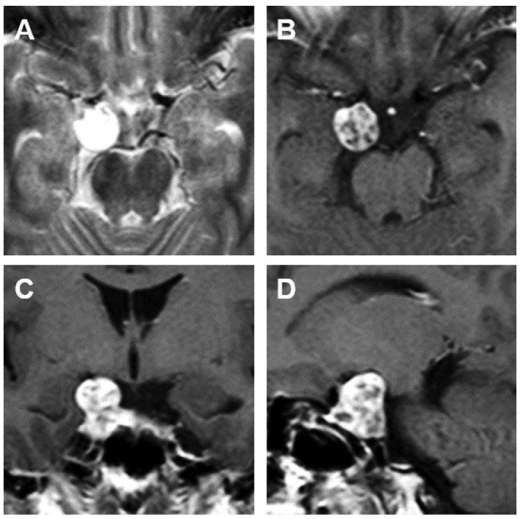

Fig. 1 – Initial magnetic resonance image of a 15 x 15 x 21 mm lesion in the region of the right posterior clinoid process showing hyperintensity on T2-weighted imaging (A; axial). Gadolinium-enhanced T1-weighted imaging shows heterogeneous enhancement of the lesion (B; axial, C; coronal, D; sagittal)

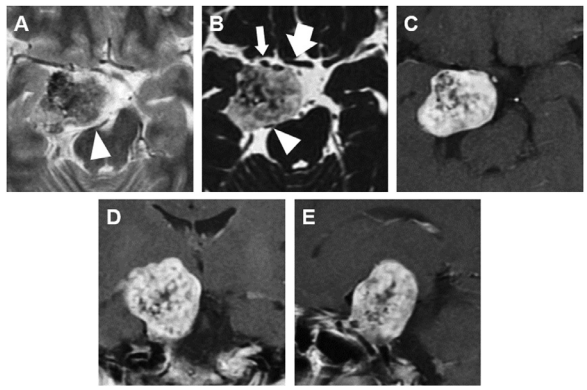

Fig. 2 – Magnetic resonance imaging performed 7 years after the initial study. T2-weighted (A; axial, B; axial thin slice) and gadolinium-enhanced T1-weighted images (C; axial, D; coronal, E; sagittal) show that the lesion had grown in size to 38 x 25 x 34 mm. The lesion shows iso- to hypointensity on T2-weighted imaging (A). The right posterior cerebral artery (A; arrowhead) and oculomotor nerve (B; arrowhead) were displaced posteriorly, whereas the right internal carotid artery (B; thin arrow) and optic chiasm (B; thick arrow) were displaced anteriorly

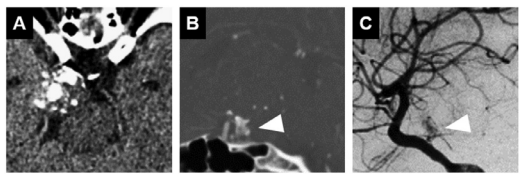

Fig. 3 – Preoperative radiological studies. Computed tomography shows a calcified lesion (A) and blistering of the right posterior clinoid process (B; arrowhead). Digital subtraction angiography shows a vascular supply from the right meningohypophyseal trunk (C; arrowhead)

Case report

A 29-year-old woman presented with transient diplopia. Magnetic resonance imaging (MRI) demonstrated a 15 × 15 × 21 mm well-defined lesion in the region of the right PCP that showed hyperintensity on T2-weighted imaging (Fig. 1A) and heterogeneous contrast enhancement (Fig. 1B–D). Although radiological follow-up was planned, the patient did not come to the next appointment. Seven years later, the patient presented with headaches. Neurological examination revealed no focal deficit, however, MRI revealed that the lesion had grown in size to 38 × 25 × 34 mm (Fig. 2). The lesion showed iso- to hypointensity on T2-weighted imaging (Fig. 2A); this change in the intensity might be associated with the calcification during the last 7 years. The right posterior cerebral artery and oculomotor nerve were displaced posteriorly, whereas the right internal carotid artery and optic chiasm were displaced anteriorly (Fig. 2A–B). Computed tomography (CT) showed a calcified lesion (Fig. 3A) and blistering of the right PCP (Fig. 3B). Digital subtraction angiography showed that the lesion received a vascular supply from the right meningohypophyseal trunk (Fig. 3C). Several types of tumors, such as chondrosarcoma, posterior clinoid meningioma, and chordoma, were suspected.

The lesion was resected through a right-sided pterional approach. Most of the lesion was elastic hard with calcification, and a piecemeal removal was performed including the part of the lesion adhering to the right PCP. Finally, the patient underwent subtotal extracavernous resection.

Histopathological examination revealed a lobulated architecture with sporadic proliferation of atypical chondrocytes of various sizes or double nuclei in abundant myxoid matrix (Fig. 4A–C). Immunohistochemistry showed positivity for S-100 protein (Fig. 4D) and SOX9 (Fig. 4E) but negativity for CAM 5.2 (Fig. 4F). These findings were compatible with low-grade chondrosarcoma.

Although the patient exhibited mild right-sided oculomotor palsy and left-sided hemiparesis after surgery, both signs disappeared in 3 months. MRI performed 5 months after surgery showed tiny remnants of the lesion in the cavernous sinus (Fig. 5), for which radiosurgical treatment was planned.

Discussion

In the present case, the right posterior cerebral artery and oculomotor nerve were displaced posteriorly, whereas the right internal carotid artery and optic chiasm were displaced anteriorly. Moreover, blistering of the right PCP was observed. Similar radiological findings were observed in the cases of poste-

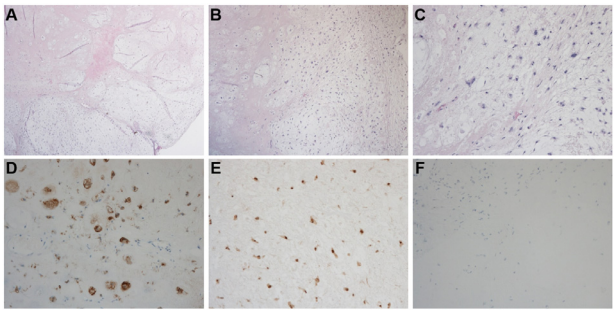

Fig. 4 – Histopathological examination. Hematoxylin and eosin staining reveals a lobulated architecture with sporadic proliferation of atypical chondrocytes of various sizes or double nuclei in abundant myxoid matrix (A, × 20, B, × 40, C, × 100). Immunohistochemical analysis shows positivity for S-100 protein (D, × 100) and SOX9 (E, × 100) but negativity for CAM 5.2 (F, × 100)

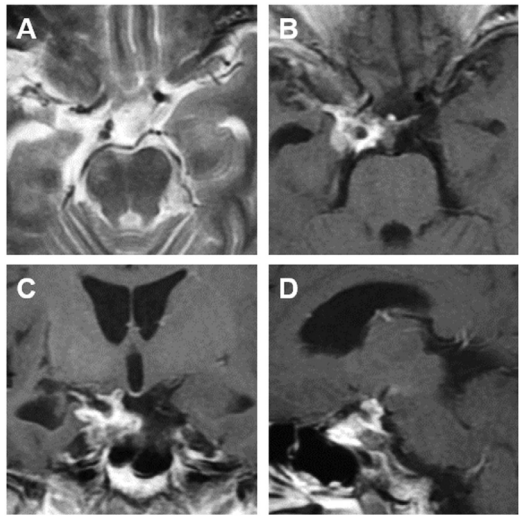

Fig. 5 – Magnetic resonance imaging performed 5 months after surgery. T2-weighted (A; axial) and gadolinium-enhanced T1-weighted images (B; axial, C; coronal, D; sagittal) show tiny remnants of the lesion in the cavernous sinus

rior clinoid meningioma [7,8]; therefore, those features support the notion that the lesion of the present case was located in the region of the PCP.

Chondrosarcomas located in the region of the PCP have not been well characterized (Table 1). In contrast, several cases of posterior clinoid meningioma have been reported. Posterior clinoid meningiomas usually show iso- to hyperintensity on T2-weighted imaging and homogenous enhancement [7–9]. However, meningiomas with calcification (observed in up to 20% of them) can reveal hypointensity on T2-weighted imaging or heterogeneous enhancement, similar to the present case [11,12]. Moreover, intracranial chondrosarcomas often reveal an avascular mass on digital subtraction angiography, which is different from the findings in the present case (Table 1). Conversely, most skull base meningiomas receive a vascular supply, although information on the tumor stain of posterior clinoid meningiomas is limited [7–9,13]. In the present case, the calcification and vascular supply made establishing an accurate preoperative diagnosis more difficult.

In addition, chordomas are difficult to distinguish from chondrosarcomas without pathological examination, although chordomas are generally located more centrally than chondrosarcomas [14]. Among cases of skull base chordoma, 80% of them show posterior clinoid involvement [10]. Furthermore, the features of chordomas on CT or MRI are similar to those of chondrosarcomas, such as calcification, bone destruction, hyperintensity

Table 1 – Summary of cases of skull base chondrosarcoma.

Authors	Age (year)/Sex	Location	Radiological features			
			Intensity on T2-weighted imaging	Enhancement	Calcification	Tumor stain
Charason et al. [2]	61/female	Petrous apex	NA	NA	NA	-
	58/female	Petrous apex	Hyper	NA	NA	-
Furuno et al. [3]	27/female	Paranasal sinus	NA	Heterogenous	+	-
	44/male	Middle fossa	NA	-	+	-
Mishima et al. [1]	20/male	Paranasal sinus	Hyper	Heterogenous	+	+
	13/female	Cavernous sinus	Hyper	Heterogenous	+	-
Miyamori et al. [4]	54/male	Middle fossa	-	+	+	-
Morimoto et al. [5]	25/male	Parasellar	NA	NA	+	-
	37/female	Posterior fossa	NA	NA	NA	-
	26/male	Parasellar	Hypo	-	+	-
	39/female	Temporal bone	Hyper	Heterogenous	NA	+
	21/female	Paranasal sinus	Hyper	Heterogenous	+	+
	31/male	Clivus	Hyper	Heterogenous	+	-
Watanabe et al. [6]	36/female	Middle fossa	Hyper	Heterogenous	-	-
Present case	29/female	Posterior clinoid process	Hyper → iso-hypo	Heterogenous	+	+

NA, not available.

on T2-weighted imaging, and rarity of the tumor stain [10,14,15].

Note that chondrosarcomas can be located in the region of the PCP, and distinguishing them from posterior clinoid meningiomas and chordomas would be difficult, especially when the tumor has calcification or receives a vascular supply.

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