

Chondroma of the Falx Cerebri with Central Cystic Degeneration and Hemorrhage: A Case Report

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
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Patient: Male, 44
Final Diagnosis: Falx cerberi chondroma
Symptoms: Headache
Medication: —
Clinical Procedure: Resection of the tumor
Specialty: Neurosurgery

Objective: Challenging differential diagnosis





Background: Intracranial chondroma is a rare benign tumor that more commonly arises from the skull base. Chondroma arising from the falx cerebri is very rare, with only 19 cases previously reported in the literature. The imaging characteristics of intracranial chondroma and meningioma can be similar. Surgical excision and histology are required for the diagnosis. This report is of a case of intracranial chondroma that includes the imaging findings. The methods of diagnosis, management, and prognosis are discussed.

Case Report: A 44-year-old man presented with episodes of severe headache. Magnetic resonance imaging (MRI) showed a well-defined, extra-axial, parafalcine lesion in the right frontal region. An interhemispheric craniotomy was performed. A right frontal solid and calcified tumor attached to the falx cerebri was identified and removed. Histology confirmed the diagnosis of a benign chondroma containing areas of hemorrhage and cystic degeneration.

Conclusions: Chondroma arising in the falx cerebri is a rare intracranial tumor that may mimic meningiomas on imaging. Awareness of the varied imaging characteristics of these benign tumors is essential for planning the most appropriate treatment.

MeSH Keywords: Brain Neoplasms • Chondroma • Hemorrhage

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Background

Intracranial chondroma is a rare benign tumor with an estimated incidence of 0.2–0.5% of all primary intracranial tumors [1–3]. In 1851, Hirschfield et al. reported the first case of intracranial chondroma [4]. Chondroma most commonly arises from cartilage associated with the synchondrosis of the skull base, most commonly in the sphenothmoidal region [5,6]. In rare instances, intracranial chondroma may arise from the falx cerebri, the dura, the choroid plexus, and or the brain parenchyma [1,7,8]. This report is of a case of intracranial chondroma that includes the imaging findings. The methods of diagnosis and the distinction from parafalcine meningioma, the management, and prognosis are discussed.

Case Report

A 44-year-old man patient presented with a one-month history of episodes of severe headache that were resistant to analgesics. He also complained of anxiety, increased somnolence, and nausea. He had a history of hypertension and ischemic heart disease. The patient denied any history of vomiting, seizures, loss of consciousness, or trauma. General and neurological physical examinations were unremarkable.

Magnetic resonance imaging (MRI) of the brain was performed, which showed a well-defined, extra-axial, parafalcine lesion in the right frontal region. On T1-weighted imaging, the mass had an isointense thick rim with a hypointense center. On T2-weighted imaging, the thick rim of the mass appeared hypointense and the center was hyperintense. On susceptibility-weighted imaging (SWI), there were foci of low signal intensity representing either calcification or hemorrhage. No enhancement was found on contrast-enhanced imaging. The mass caused a mild compression effect on the underlying brain parenchyma. However, there was no edema. Magnetic resonance angiography (MRA) showed left-sided displacement of the right anterior cerebral artery, which remained patent. Cerebral angiography showed no feeding vessels. A brain computed tomography (CT) scan was not performed. The differential diagnosis, based on the imaging findings, were suggestive of meningioma (Figure 1). Surgical excision was planned to allow histological diagnosis of the mass.

An interhemispheric craniotomy was performed and showed a solid right frontal calcified lesion attached to the falx cerebri with a feeder artery possibly from the tentorial artery (Figure 2). The lesion was well-circumscribed and easily separated from neighboring brain tissue. En-bloc resection of the tumor and involved falx cerebri was achieved (Figure 2).

Gross inspection showed a well-circumscribed, lobulated, firm, white mass measuring 3.0×2.0×1.5 cm. Serial sectioning showed white cut surfaces with a cystic focus measuring 0.9×0.8×0.8 cm. Histological examination showed lobules of mature and moderately cellular cartilage. The chondrocytes appear benign with no evidence of atypia, necrosis, or mitotic activity in keeping with a diagnosis of benign chondroma (Figure 2).

Discussion

Intracranial chondroma is a rare benign intracranial tumor that usually arises from the sphenothmoidal basal synchondroses, but sphenoclival, and petroclival regions may also be involved [5,6]. Intracranial chondroma can occur sporadically or may be associated with systemic enchondromatosis, such as Ollier's disease [9] and Maffucci's syndrome [10]. However, chondroma of the falx cerebri is rare, with only about 19 cases previously reported in the literature [1,3,7,11–27].

Previously published case reports have shown that the age at presentation of chondroma of the falx cerebri ranges from 14 years to 57 years, with a peak in the third decade of life. Although a slight male prevalence has been reported, there was no gender predominance [21,28]. Chondroma of the falx cerebri tend to grow in the frontal region in 50% of cases, but other sites of origin on the falx include the frontoparietal, parietal, and parieto-temporal regions.

Intracranial chondroma usually has a slow growth pattern and usually presents late as a large mass [5]. As with other space-occupying lesions, the clinical presentation of chondroma of the falx cerebri is nonspecific and depends on the anatomical location. Based on previously published case reports, the most frequent symptom is a constant headache. Other symptoms and signs associated with intracranial chondroma include epilepsy, vomiting, seizures, increased intracranial pressure, and cerebral compression that results in focal neurological deficits [23]. This patient presented with episodes of severe headache resistant to analgesics and with anxiety, increased somnolence, and nausea.

The imaging findings supported the histological diagnosis of benign chondroma. On imaging, the thick rim represents the chondroid matrix, and the hypointense and hyperintense center seen on T1-weighted and T2-weighted magnetic resonance (MRI) images represented cystic degeneration. Foci of hemorrhage were seen as a low signal on susceptibility-weighted imaging (SWI). According to the imaging findings of parafalcine chondroma reported in a systematic review and meta-analysis by Sullivan et al., the imaging characteristics found in this patient were unusual [29]. Sullivan et al. showed that only 3.1% of the cases had an isointense thick



Figure 1. Magnetic resonance imaging (MRI) of the head in the axial plane. (A) T1-weighted magnetic resonance imaging (MRI) of the brain shows a thick isointense rim of the mass in the falx cerebri with a hypointense center. (B) T2-weighted MRI shows a thick isointense rim of the mass in the falx cerebri with a hypointense center. (C) MRI following injection of intravenous contrast shows lack of enhancement. (D) The cerebral angiogram shows no feeding vessels to the mass in the falx cerebri.

rim on T1-weighted MRI, and only 6.9% of the cases had hypointense imaging findings on T2-weighted imaging [29]. Lack of enhancement on MRI was seen in only 6.3% of the cases [29]. Intracranial chondroma rarely showed features of hemorrhage or cystic degeneration [29]. Also, hemorrhage was

found in 3.2% of cases of intracranial chondroma, and cystic change occurred in 23% [29]. In previously reported cases, cystic changes were reported in only five cases of chondroma of the falx cerebri [2,3,13,20,26]. Radiologically, meningioma is the most common differential diagnosis for chondroma of the

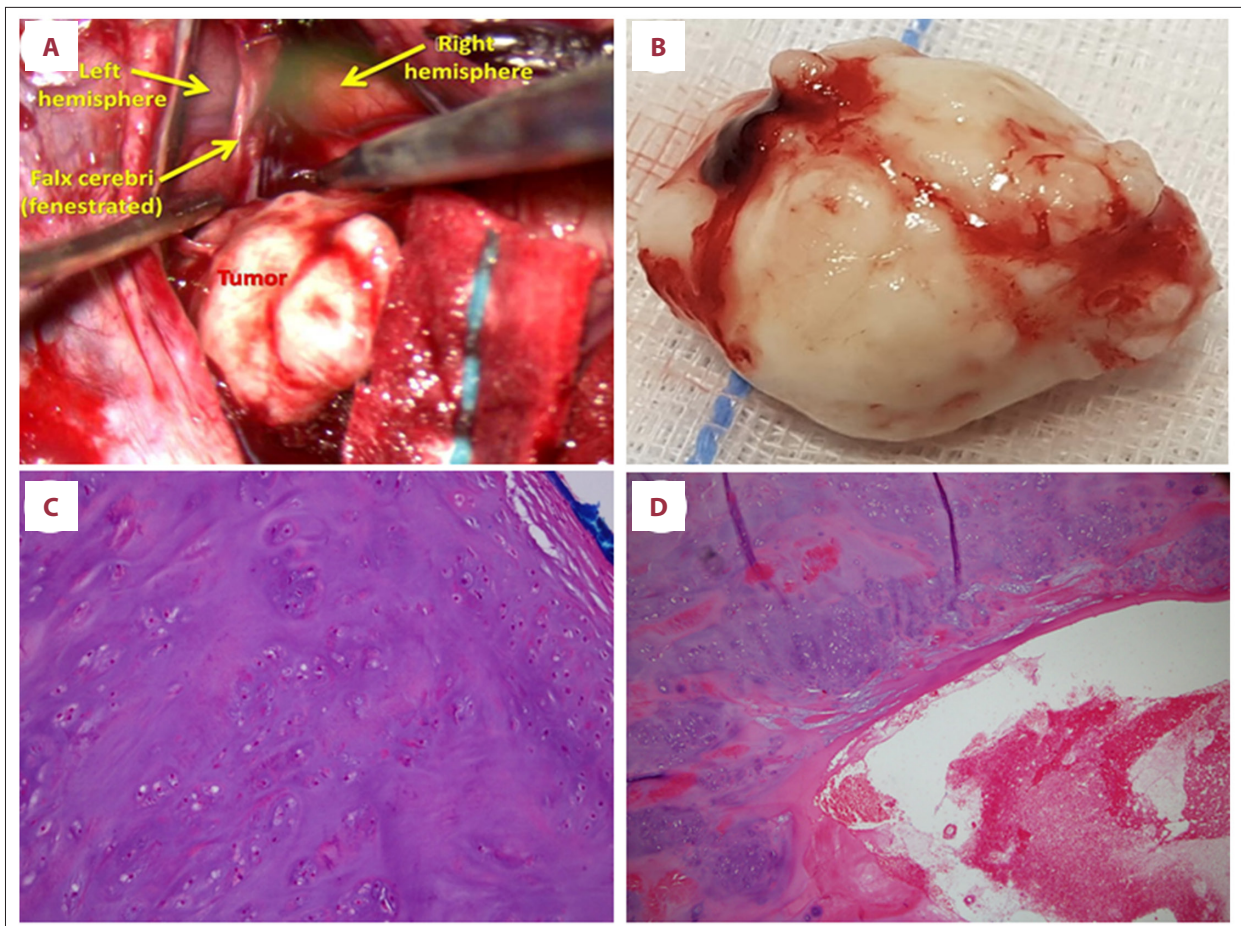


Figure 2. (A) An intraoperative view of a well-circumscribed chondroma appearing in the right frontal region and attached to the falx cerebri. (B) Gross image of the tumor after resection shows a white soft to hard mass measuring 3.0×2.0×1.5 cm. (C) Photomicrograph of the histology of the tumor from the falx cerebri shows lobules of chondrocytes lacking atypia. Hematoxylin and eosin (H&E). Magnification ×200. (D) Photomicrograph of the histology of the tumor from the falx cerebri shows a central area of cystic degeneration with hemorrhage. Hematoxylin and eosin (H&E). Magnification ×100.

falx cerebri. However, meningiomas arising in the falx cerebri can show a late capillary tumor blush from the meningeal arteries associated with a dural tail on contrast-enhanced MRI, which is in contrast to chondroma of the falx cerebri, which usually lack a dural tail sign.

The histogenesis of chondroma arising from the skull base is believed to be from residual embryonic chondrocytes that exist in the synchondroses [17,30]. However, there is no consensus on the etiology of falx and dural chondroma, but it is possible that their origin is from heterotopic chondrocytes or from metaplasia of perivascular mesenchymal cells or meningeal fibroblasts, cellular migration by trauma or following inflammation [31–34].

Complete surgical resection of chondroma of the falx cerebri with the underlying falx is the treatment of choice as these benign tumors are well demarcated and do not involve the

surrounding brain structures [27]. Radiation therapy is not advised because cartilaginous tumours are usually radioresistant and may undergo future malignant transformation if irradiated [7,33,35].

The long-term prognosis following complete resection is good, and recurrence is rare [5]. Any future recurrence of the tumor should raise concerns for malignant change to chondrosarcoma, which has rarely been reported [17]. Although the imaging and histological distinction between chondroma and chondrosarcoma can be difficult, chondrosarcoma tends to have heterogeneous but intense contrast-enhancement on neuroimaging without perifocal edema [23]. Therefore, it is important to plan for long-term follow-up of patients with excised chondroma of the falx cerebri to detect and manage recurrences in their early stages.

Conclusions

A case of chondroma of the falx cerebri in a 44-year-old man is reported with rare imaging and histology findings in the form of cystic change and hemorrhage. Appropriate imaging techniques are essential for the detection of chondroma of the falx cerebri despite having few pathognomonic findings. Surgical resection is usually associated with good outcome and

minimal sequelae, but any future recurrence should raise suspicion of malignant change to chondrosarcoma, even though this is rarely reported for benign intracerebral chondroma.

Conflict of interest

None.

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