

# Differential Diagnosis of Corpus Callosum Lesions: Beyond the Typical Butterfly Pattern

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The corpus callosum is the largest white matter tract connecting the cerebral hemispheres. Glioblastoma and primary central nervous system lymphoma are the most familiar lesions that appear with a butterfly pattern at axial imaging and involve the corpus callosum with extensions into the bilateral cerebral hemispheres. However, corpus callosum lesions have a wide range of causes, and this presentation aims to familiarize radiologists with usual and unusual conditions affecting the corpus callosum.

Causes of corpus callosum lesions are presented as a series of cases that follow an adapted VINDICATE mnemonic. These pathologic conditions are described as follows: *vascular* (vascular malformation and arterial infarction); *infectious* (abscess, HIV encephalitis, progressive multifocal leukoencephalopathy, tuberculosis, and ventriculitis); *neoplastic* (low-grade astrocytoma, glioblastoma, and lymphoma); *demyelinating* (tumefactive demyelination, acute hemorrhagic encephalomyelitis, neuromyelitis optica, and wallerian degeneration); *idiopathic* (transient splenial lesion and postshunt decompression); *congenital or genetic* (agenesis of the corpus callosum, adrenoleukodystrophy, metachromatic leukodystrophy, and mucopolysaccharidosis); *autoimmune* (Susac syndrome); *traumatic or toxic* (traumatic axonal injury, traumatic contusion, and toxic leukoencephalopathy); and *emboli* (fat emboli). Our cases highlight key imaging features of various pathologic conditions of the corpus callosum by using a multimodality imaging approach. Pertinent clinical history and key imaging features are emphasized to assist with narrowing the differential diagnosis, which helps direct patient treatment.

For example, abscess would be the primary consideration in a patient presenting with fever and altered mental status, with MRI demonstrating a ring-enhancing lesion with a T2-hypointense rim and central diffusion restriction (Fig 1). The necrotic core of an abscess has homogeneously reduced diffusion at diffusion-weighted imaging, unlike a glioblastoma, in which diffusion restriction is heterogeneous and typically in the solid portion of the lesion rather than in the necrotic center. The ability to distinguish between an abscess and a glioblastoma is crucial, as an abscess is treated with emergent drainage and antibiotics whereas a glioblastoma is typically treated with surgical resection.

In an immunocompromised patient with worsening confusion, white matter lesions at MRI that are diffuse and symmetric and spare the subcortical U-fibers would favor a diagnosis of HIV encephalitis over progressive multifocal leukoencephalopathy (PML). In PML, the white matter lesions are patchy, asymmetric, and involve the subcortical U-fibers. In a patient with the clinical triad of encephalopathy, hearing loss, and retinal artery occlusion, with MRI demonstrating microinfarcts in the corpus callosum, one should consider Susac syndrome (Fig 2).

## TEACHING POINTS

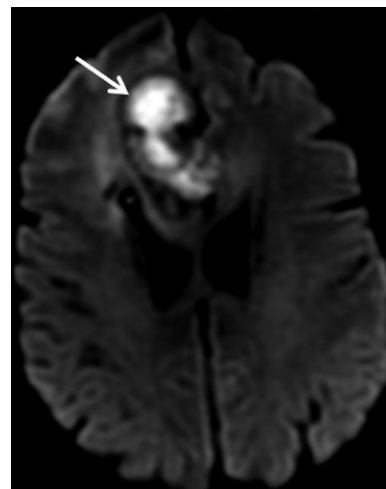
- Discuss the embryology and anatomy of the corpus callosum.
- Describe a wide range of unusual conditions affecting the corpus callosum, beyond the typical butterfly lesions.
- Identify distinguishing imaging features of various pathologic conditions that involve the corpus callosum by using a multi-modality imaging approach.

Corpus callosum lesions have a wide range of causes. The online presentation includes more than 27 cases of pathologic conditions that affect the corpus callosum. Integration of the patient's clinical history with key imaging findings is crucial to selection of the correct treatment.

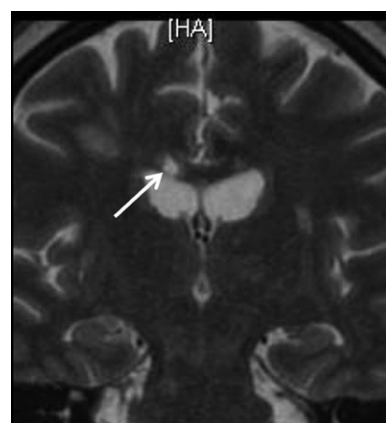
**Disclosures of Conflicts of Interest.**—**Y.Y.** Activities related to the present article: employed by HCA Healthcare and/or an HCA Healthcare-affiliated entity. Activities not related to the present article: disclosed no relevant relationships. Other activities: disclosed no relevant relationships. **A.C.** Activities related to the present article: employed by HCA Healthcare and/or an HCA Healthcare-affiliated entity. Activities not related to the present article: disclosed no relevant relationships. Other activities: disclosed no relevant relationships. The views expressed in this article represent those of the authors and do not necessarily represent the official views of HCA Healthcare or any of its affiliated entities.

## Suggested Readings

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**Figure 1.** Axial diffusion-weighted MR image in an immunocompromised patient who presented with fever and confusion resulting from an intracranial abscess shows homogeneous diffusion restriction (arrow) within the center of a rounded mass lesion that extends to the genu of the corpus callosum and right frontal lobe.



**Figure 2.** Coronal T2-weighted MR image in a patient with vision and hearing loss and altered mental status demonstrates a focus of microinfarct (arrow) within the body of the corpus callosum. The patient was diagnosed with Susac syndrome.