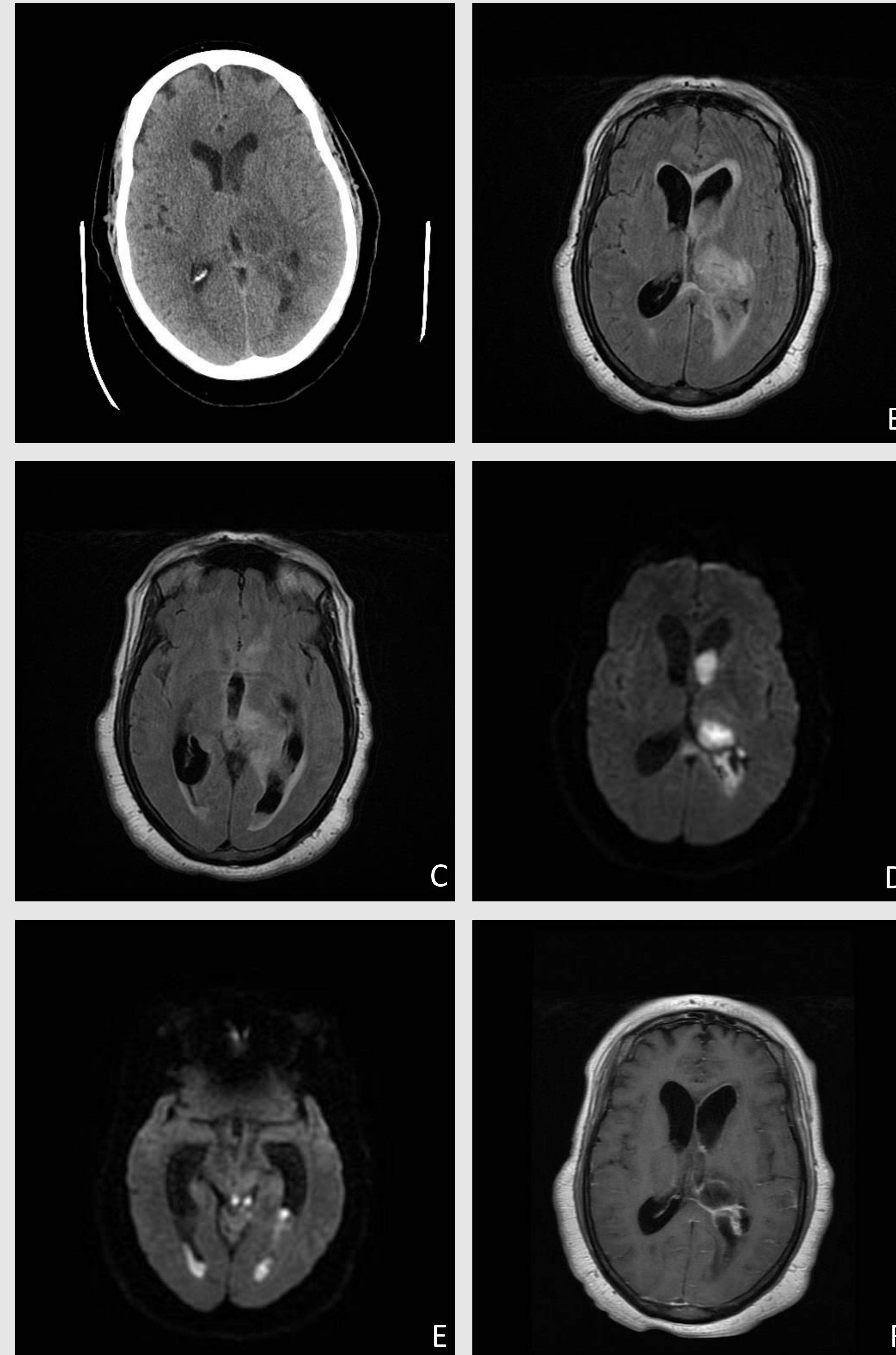


Introduction

Brain abscess and ventriculitis are uncommon types of central nervous system infection, and refer to encapsulated infection of the brain parenchyma and inflammation of the ependymal lining of the ventricles, respectively.¹ Focal parenchymal infection preceding formation of an abscess capsule is termed cerebritis. The causes of brain abscess include direct extension from paranasal sinusitis, otomastoiditis, and odontogenic infection, hematogenous spread of systemic infection and, less commonly, direct trauma or surgery.² The responsible organism depends on the infectious source and infections are often polymicrobial.³ Ventriculitis may be secondary to ventricular catheter placement, intraventricular rupture of brain abscess, meningitis, or hematogenous spread.⁴ The clinical presentation for brain abscess is nonspecific, with the most common symptoms including fever, headache, and change in mental status.³ Other symptoms include nausea/vomiting, focal neurologic deficit, and seizures.³ Cross-sectional imaging plays a critical role in diagnosis, monitoring for complications, and surgical planning. Treatment includes antimicrobial therapy and surgical drainage.⁵ In this presentation, a severe case of pyogenic brain abscess with suppurative ventriculitis is discussed, with special attention to the radiologic features.

Patient History and Presentation

The patient is a 52-year-old male with unknown medical history who presented after family became concerned that he “wasn’t making sense” over a period of at least three days. On presentation, the patient was noted to be disoriented, unable to follow commands, and speaking incoherently. There was questionable right upper extremity weakness. He was febrile to 38.1 C and initial laboratory workup was notable for leukocytosis of 28,900. A noncontrast CT scan of the head was performed and revealed a left thalamic lesion initially suspicious for a mass. Further evaluation with MRI demonstrated a left thalamic abscess with intraventricular spread of infection, and associated ventriculomegaly.

Imaging Findings

A: Noncontrast axial head CT shows a left thalamic hypodensity with a hyperdense capsule along the posterior margin and debris within the left lateral ventricle.

B-C: Axial T2-weighted images show increased signal involving the left thalamus and the ependymal lining of the lateral and third ventricles. The ventricles are enlarged. Isointense irregular debris is present in the left lateral ventricle.

D-E: Axial diffusion-weighted images reveal increased signal in the left thalamus and within the left lateral ventricle. These regions corresponded to signal dropout on the ADC images. Restricted diffusion in this case is secondary to purulent material.

F: Post-contrast axial T1-weighted image demonstrates a thin line of peripheral enhancement surrounding the left thalamic lesion. There is ependymal enhancement along the left lateral ventricle.

Hospital Course

The patient was admitted to the ICU and started on broad-spectrum antibiotics. An external ventricular drain was placed. Cultures from the ventriculostomy showed many white blood cells and ultimately resulted as streptococcus intermedius and peptostreptococcus. Blood cultures were negative. The patient’s respiratory status decompensated, requiring endotracheal intubation. On follow-up imaging, there was increasing hydrocephalus, vasogenic edema, and leptomeningeal enhancement. A drainage catheter was placed in the thalamic abscess using stereotactic technique and a second ventriculostomy catheter was placed on the contralateral side. At the time of transfer to LTAC, the patient condition was improved, but there continued to be persistent neurologic impairment.

Summary

Brain abscess and ventriculitis have characteristic imaging findings on brain MRI. The presence of restricted diffusion is highly suspicious for brain abscess, as most tumors do not demonstrate restricted diffusion.⁶ A large amount of surrounding edema is usually present, but this is nonspecific. Intraventricular debris on diffusion-weighted and FLAIR sequences are seen in 95% of patients with ventriculitis.^{4,7} Periventricular FLAIR hyperintensity and enhancement are seen in 85% and 60%, respectively, and are thought to represent periventricular inflammatory change.⁷ Similar periventricular abnormalities may be seen with transependymal flow of CSF, although a more circumferential pattern is typical and enhancement should be absent.⁶ Diagnosis of these infections is made in combination with clinical presentation and laboratory workup. Clinical signs are, however, nonspecific, and fever may be absent in up to 40% of cases of brain abscess.⁵ Intraventricular rupture of brain abscess is a poor prognostic event and is associated with a deep seated location, such as in this case.³ Despite advances in diagnosis and treatment, brain abscess remains a formidable entity, with many patients experiencing permanent neurologic deficits.³

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