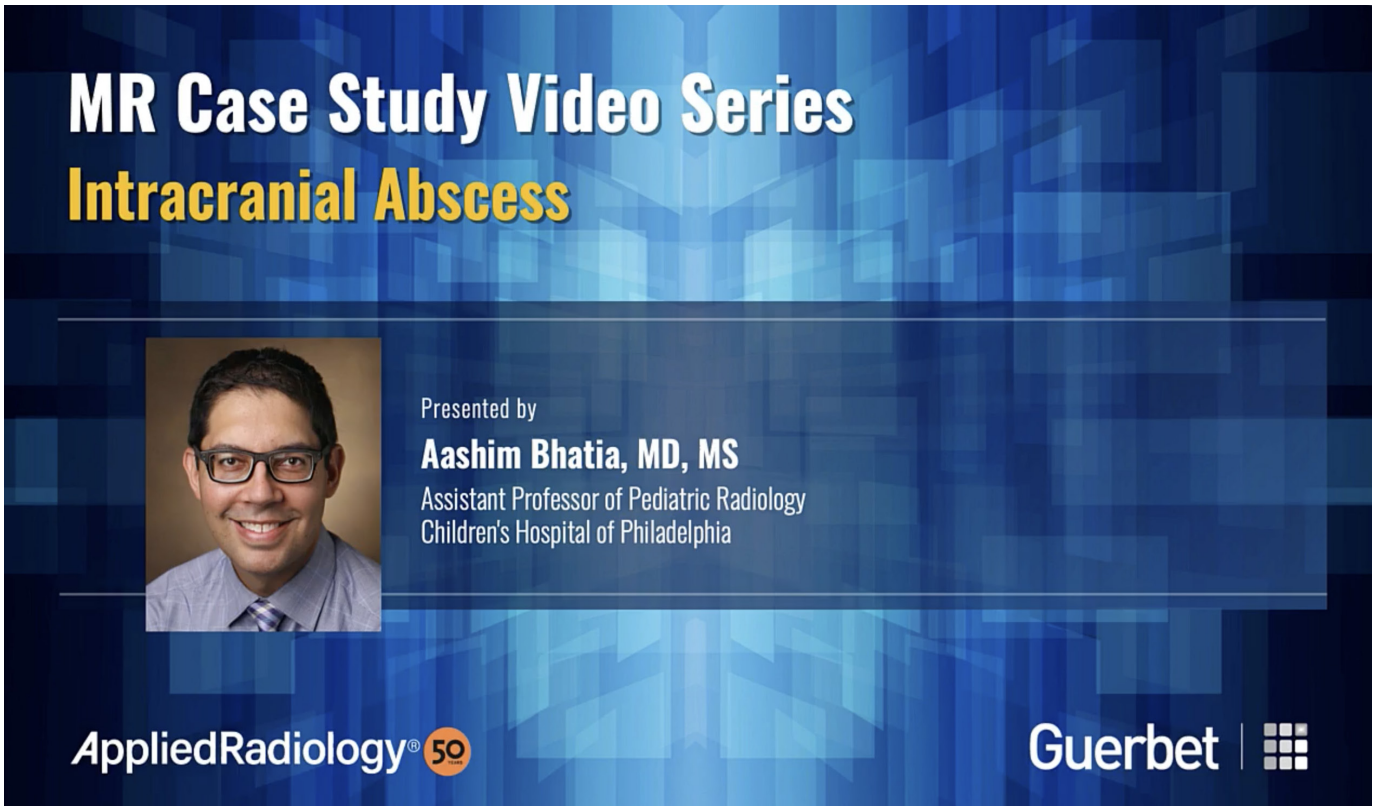

Intracranial Epidural Abscess

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Case Summary

An otherwise healthy child presented to the emergency department with headache and fever. Non-contrast and contrast-enhanced magnetic resonance imaging (MRI) studies of the head were performed.

Imaging Findings

MRI demonstrated almost complete opacification of the maxillary sinuses, right sphenoid sinus, ethmoid air cells, and frontal sinuses. The paranasal sinuses on MRI were primarily T2 hyperintense and heterogeneous.

There was a large T2 hypertense lesion in the left anterior cranial fossa extra-axial space, containing a T2 hypointense component, also displacing the anterior aspect of the patent superior sagittal sinus. The paranasal sinus opacification was hyperintense on diffusion weighted imaging (DWI) and hypointense on apparent diffusion coefficient (ADC), indicating water-molecule restriction within the paranasal sinuses, concerning for purulence.

The left frontal collection was also hyperintense on DWI, indicating restricted diffusion and representing an epidural abscess.

Diagnosis

Intracranial epidural abscess

Discussion

Diffusion weighted imaging and T1 postcontrast sequences are important in identifying abscesses within the parenchyma, extra-axial, and extracranial compartments. Water-molecule restriction is visualized on DWI as hyperintense signal; confirming this is truly restricted diffusion with ADC can substantiate the suspicion of purulent material and diagnosis of abscess. Postcontrast T1 magnetization prepared-rapid gradient echo (MP-RAGE) sequences are also beneficial to assess for potential complications, such as venous sinus thrombosis. Normal enhancement of the dural venous sinuses confirms patency.

Fungal involvement of the central nervous system is more commonly seen in immunocompromised children; MRI of a fungal abscess may include heterogeneously reduced diffusion or ringlike reduced diffusion with thin areas of peripheral contrast enhancement.[1] Bacterial abscesses tend to have more homogeneously reduced diffusion centrally.[2]

In children with extensive paranasal sinus infection, close attention should be paid to the intracranial contents to ensure there is no intracranial extension of the infection.[3]

Differential diagnoses include lymphoma or metastatic disease. Gadolinium-based contrast agents (GBCA) should be used to further characterize intracranial lesions and aid in detection of other lesions that may not be visualized on noncontrast imaging, particularly in immunocompromised patients.

In this case, a T1 axial, postcontrast, spin-echo sequence demonstrated dural enhancement and a peripherally enhancing lesion in the epidural space. The lesion was convex to the cortex with no internal contrast enhancement, consistent with an epidural abscess. Metastatic lesions and lymphoma typically will have more solid enhancement.

Conclusion

Intracranial extension of infection, including epidural abscess, may be a complication of paranasal sinus infection in children. GBCA-enhanced MRI best characterizes intracranial extension. In this case, contrast-enhanced MRI demonstrated peripheral enhancement lesion with reduced diffusion, making the diagnosis of epidural abscess.

References

1. Starkey J, Moritani T, Kirby P. MRI of CNS fungal infections: review of aspergillosis to Hhstoplasmosis and everything in between. *Clin Neuroradiol*. 2014:217-230. doi:10.1007/s00062-014-0305-7.

2. Silvia MT, Licht DJ. Pediatric central nervous system infections and inflammatory white matter disease. *Pediatr Clin North Am*. 2005;52(4):1107-1126. doi:10.1016/j.pcl.2005.03.003.

3. Bonfield CM, Sharma J, Dobson S. Pediatric intracranial abscesses. *J Infect*. 2015;71:10-14. doi:10.1016/j.jinf.2015.04.012.