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We read with interest both the recent case report by Desprechins et al (1) and the editorial by Mauricio Castillo (2) on the subject of differentiation between cerebral abscess and tumor determined using diffusion-weighted imaging. We have recently had a case of subdural empyema that also showed increased signal intensity on diffusion-weighted images.

A 54-year-old woman with a history of chronic otitis media presented with a 2-day history of headache, neck stiffness, and pyrexia. Meningitis appeared to be a likely diagnosis, and, prior to lumbar puncture, an MR scan of the brain was done. T2- and diffusion-weighted axial, diffusion-weighted coronal, and T1-weighted coronal pre- and postcontrast sequences were obtained. ADC maps were not calculated for the diffusion-weighted images. The 'conventional' MR images revealed a parafalcine fluid collection over the parietal lobes bilaterally with marked enhancement of the adjacent meninges in keeping with an empyema. This fluid collection also showed increased signal on the echo-planar diffusion-weighted images (Fig 1). A lumbar puncture performed at this time revealed turbid CSF, and *Haemophilus influenzae* was cultured from it. After appropriate treatment, the patient improved, and subsequent MR findings were normal.

Presumably the explanation for the increased signal within the empyema on diffusion-weighted images is the same for that proposed regarding cerebral abscesses (1, 3, 4), and relates to the high viscosity of the infected fluid, resulting in decreased microscopic diffusional motion of the water particles and, hence, the increased signal.

It would appear that when a superficial arcus of high signal intensity is seen on a diffusion-weighted image of the brain, care should be taken to ensure that it does not lie in the subdural space. As in the case we describe, its presence in this region suggests infection. Potentially this sign may be of value in the follow-up of patients with fluid collections.

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References

1. Desprechins B, Stadnick T, Koerts G, Shabana W, Breucq C, Osteaux M. **Use of diffusion weighted MR imaging in differential diagnosis between intracerebral necrotic tumours and cerebral abscesses.** *AJNR Am J Neuroradiol* 1999;20:1252–1257
2. Castillo M. **Imaging brain abscesses with diffusion-weighted and other imaging sequences.** *AJNR Am J Neuroradiol*. 1999;20:1193–1194
3. Ebisu T, Tanaka C, Umeda M, et al. **Discrimination of brain abscess from necrotic or cystic tumors by diffusion-weighted echo planar imaging.** *Magn Reson Imaging* 1996;14:1113–1116
4. Kim Y, Chang K, Song I, et al. **Brain abscess and necrotic or cystic tumor: Discrimination with signal intensity on diffusion-weighted MR imaging.** *AJR Am J Roentgenol* 1998;171:1487–1490

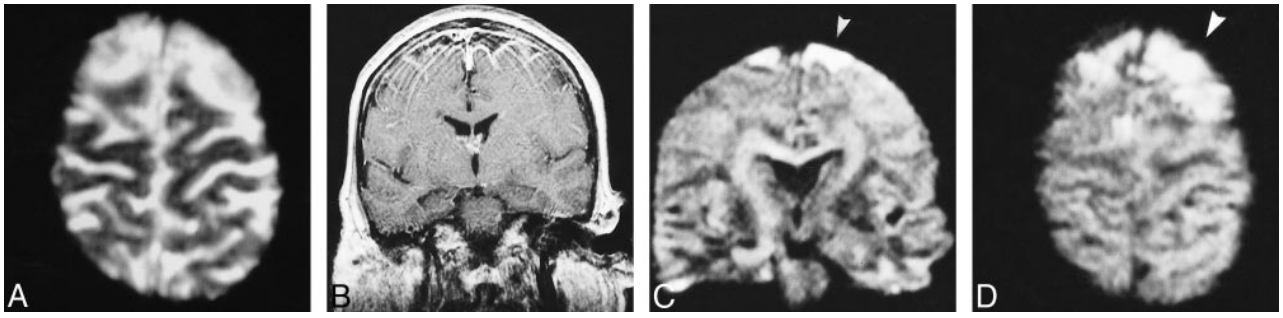

FIG 1. *A,* Axial T2-weighted image (4000/1030/1 [TR/TE/excitations]) revealing increased signal from fluid collection *B,* Coronal T1-weighted image (570/14/1) post intravenous contrast showing enhancement of the meninges adjacent to the fluid collection. *C,* (coronal, Dyy) and *D* (axial, Dzz), echo-planar diffusion-weighted trace images (4000/1030/1, b=1000) depicting increased signal within the fluid collection (*arrows*).