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Diffusion-Weighted MR Imaging of Subdural and Epidural Empyemas

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Purpose
It is well known that contents of brain abscess show apparent hyperintensity on diffusion-weighted MR images. However, diffusion-weighted imaging findings of subdural and epidural empyemas have been reported very little (1). This study was performed to present their findings on diffusion-weighted imaging and assess the diagnostic value of this technique for their diagnosis.

Materials & Methods
We retrospectively reviewed diffusion-weighted images obtained from three patients with subdural empyema and three patients with epidural empyema. The patients included two men and four women ranging in age from 17 to 77 years. Their diagnosis was established surgically in three patients and made on the basis of clinical and imaging findings in another three patients. Diffusion-weighted images were obtained at 1.5 T using echo-planar sequences applying a motion-probing gradient of 1000–1326 sec/mm² in the z direction. Apparent diffusion coefficient (ADC) maps were created in three patients.

Results
In all patients with subdural empyema, their lesions showed hyperintensity that was confirmed to be due to restricted diffusion on ADC maps. In two patients who had an associated brain abscess, their empyemas were as hyperintense as the abscess. Epidural empyemas in the three patients were slightly hypointense to the brain. However, in one patient whose lesion developed 1 month after craniotomy, part of the empyema was hyperintense.

Discussion: Findings on conventional MR imaging of subdural and epidural empyemas are well established (2, 3). They are demonstrated as extraaxial collections of hypointense on T1-weighted images and hyperintense on T2-weighted images to the brain. A surrounding membrane shows intense contrast enhancement. Besides the difference in clinical findings, identifying the hypointense dura on MR images often helps to diagnose the precise location. Our results indicate that difference in intensity on diffusion-weighted images is also helpful for discriminating the two lesions. Subdural empyemas show hyperintensity probably due to restriction of proton motion by high viscosity or cellularity as in brain abscesses. Meanwhile, in contents of epidural empyemas, we assume that protons are moving freely. In fresh epidural empyemas, however, part of them may show hyperintensity as noted in one of our patients.

Conclusion
Diffusion-weighted MR imaging is a useful tool to differentiate subdural and epidural empyemas. It may provide information about the status of their contents that is not obtained by conventional MR imaging.
References