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The Value of Diffusion Tensor Imaging in Differential Diagnosis of Embryonal Tumors Occurring in the Brainstem and Brainstem Gliomas in Pediatric Patients

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Abstract

Background: There are no apparent distinctions in clinical presentation or conventional imaging findings between brainstem gliomas and embryonal tumors occurring in the brainstem. Our aim was to study the role of diffusion tensor imaging in differentiating embryonal tumors from gliomas of the brainstem.

Methods: Three cases of embryonal tumors occurring in the brainstem and 19 cases of brainstem gliomas were analyzed retrospectively.

Result: The most common brainstem gliomas are diffuse intrinsic pontine gliomas. On the fiber tracking images, brainstem gliomas were associated with relatively intact projection fibers that continuously traversed the tumor and followed the trajectory of normal neural fibers, whereas embryonal tumors were associated with disruption of projection fibers. The close cellularity created tissues with significant directional properties in embryonal tumors, restricting the diffusion of water molecules. As a result, there were areas of high anisotropy within the embryonal tumors. Additionally, we observed that the apparent diffusion coefficient value of embryonal tumors occurring in the brainstem was lower than that of brainstem gliomas and the difference was statistically significant ($P < 0.05$).

Conclusion: Disruption of projection fibers within the tumor on diffusion tensor imaging may help differentiate embryonal pathology from glial.

Keywords: Brainstem gliomas; DTI; Embryonal tumors; Fiber tracking.

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