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FIRST-PASS PERFUSION COMPUTED TOMOGRAPHY: INITIAL EXPERIENCE IN DIFFERENTIATING RECURRENT BRAIN TUMORS FROM RADIATION EFFECTS AND RADIATION NECROSIS.

CLINICAL STUDIES

Neurosurgery. 61(4):778-787, October 2007.

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Abstract:


OBJECTIVE: To differentiate recurrent tumors from radiation effects and necrosis in patients with irradiated brain tumors using perfusion computed tomographic (PCT) imaging.

METHODS: Twenty-two patients with previously treated brain tumors who showed recurrent or progressive enhancing lesions on follow-up magnetic resonance imaging scans and had a histopathological diagnosis underwent first-pass PCT imaging (26 PCT imaging examinations). Another eight patients with treatment-naive, high-grade tumors (control group) also underwent PCT assessment. Perfusion maps of cerebral blood volume, cerebral blood flow, and mean transit time were generated at an Advantage Windows workstation using the CT perfusion 3.0 software (General Electric Medical Systems, Milwaukee, WI). Normalized ratios (normalized to normal white matter) of these perfusion parameters (normalized cerebral blood volume [nCBV], normalized cerebral blood flow [nCBF], and normalized mean transit time [nMTT]) were used for final analysis.

RESULTS: Fourteen patients were diagnosed with recurrent tumor, and eight patients had radiation necrosis. There was a statistically significant difference between the two groups, with the recurrent tumor group showing higher mean nCBV (2.65 versus 1.10) and nCBF (2.73 versus 1.08) and shorter nMTT (0.71 versus 1.58) compared with the radiation necrosis group. For nCBV, a cutoff point of 1.65 was found to have a sensitivity of 83.3% and a specificity of 100% to diagnose recurrent tumor and radiation necrosis. Similar sensitivity and specificity were 94.4 and 87.5%, respectively, for nCBF with a cutoff point of 1.28 and 94.4 and 75%, respectively, for nMTT with a cutoff point of 1.44 to diagnose recurrent tumor and radiation necrosis.

CONCLUSION: PCT may aid in differentiating recurrent tumors from radiation necrosis on the basis of various perfusion parameters. Recurrent tumors show higher nCBV and nCBF and lower nMTT compared with radiation necrosis.

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