DIFFUSION-WEIGHTED IMAGING IN THE FOLLOW-UP OF TREATED HIGH-GRADE GLIOMAS: TUMOR RECURRENCE VERSUS RADIATION INJURY

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ABSTRACT

Diffusion-weighted (DW) MR imaging is a means to characterize and differentiate morphologic features, including edema, necrosis, and tumor tissue, by measuring differences in apparent diffusion coefficient (ADC). These researchers hypothesized that DW imaging has the potential to differentiate recurrent or progressive tumor growth from treatment- induced damage to brain parenchyma in high-grade gliomas after radiation therapy.

METHOD

These researchers retrospectively reviewed follow-up conventional and DW MR images obtained starting 1 month after completion of radiation treatment with or without chemotherapy for histologically proved high-grade gliomas. Eighteen patients with areas of abnormal enhancing tissue were identified. ADC maps were calculated from echo-planar DW images, and mean ADC values and ADC ratios (ADC of enhancing lesion to ADC of contralateral white matter) were compared with final diagnosis. Recurrence was established by histologic examination or by clinical course and a combination of imaging studies.

RESULTS

Recurrence and non recurrence could be differentiated by using mean ADC values and ADC ratios. ADC ratios in the recurrence group showed significantly lower values (mean _SD, 1.43 _ 0.11) than those of the non recurrence group (1.82 _ 0.07, $P < .001$). Mean ADCs of the recurrent tumors (mean _ SD, 1.18 _ 0.13 _ 10_3 mm/s2) were significantly lower than those of the non recurrence group (1.40 _ 0.17 _ 10_3 mm/s2, $P < .006$).

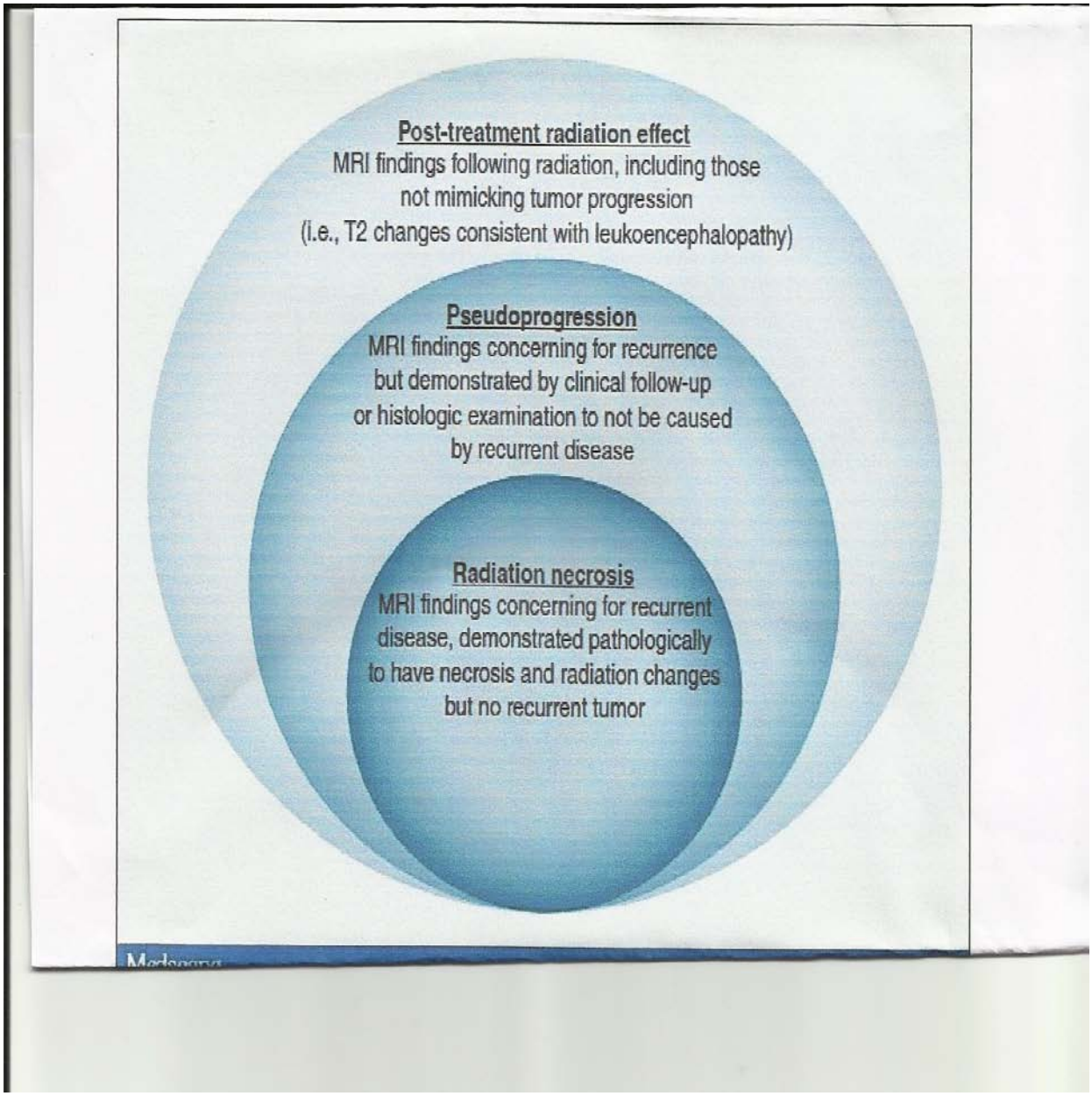
CONCLUSION

Assessment of ADC ratios of enhancing regions in the follow-up of treated high-grade gliomas is useful in differentiating radiation effects from tumor recurrence or progression.

Limitations of the above study were Noteworthy limitations of their study were the small number of patients, the lack of histologic confirmation in all cases (although one can argue that the clinical course in follow-up is as reliable an indicator as histologic examination, considering

the difficulties to differentiate histologically between post treatment effects, recurrent neoplasm, and tissue in which both are present in varying proportions), and technical difficulties in correlating the abnormal enhancing regions with the corresponding region in the ADC maps. Although histologic confirmation in all patients may be desirable, it is not always clinically practicable. In an approach similar to that of other published studies (15), we used the clinical course in follow-up as a surrogate indicator of histology.

PICTORAL DEMONSTRATION



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