学 位 論 文 の 要 旨

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主論文の題名

Semiautomated Segmentation and Volume Measurements of Cervical Carotid High-Signal Plaques Using 3D Turbo Spin-Echo T1-Weighted Black-Blood Vessel Wall Imaging: A Preliminary Study

主論文の要旨

Unstable carotid plaques are visualized as high-signal plaques (HSPs) on 3D turbo spin-echo T1-weighted black-blood vessel wall imaging (3D TSE T1-BB VWI). The purpose of this study was to compare manual segmentation and semiautomated segmentation for the quantification of carotid HSPs using 3D TSE T1-BB VWI. Twenty cervical carotid plaque lesions in 19 patients with a plaque contrast ratio of > 1.3 compared to adjacent muscle were studied. Using the mean voxel value for the adjacent muscle multiplied by 1.3 as a threshold value, the semiautomated software exclusively segmented and measured the HSP volume. Manual and semiautomated HSP volumes were well correlated ($r = 0.965$). Regarding reproducibility, the inter-rater ICC was 0.959 (bias: 24.63, 95% limit of agreement: −96.07, 146.35) for the manual method and 0.998 (bias: 15.2, 95% limit of agreement: −17.83, 48.23) for the semiautomated method, indicating improved reproducibility by the semiautomated method compared to the manual method. The time required for semiautomated segmentation was significantly shorter than that of manual segmentation times (81.7 ± 7.8 s versus 189.5 ± 49.6 s; $p < 0.01$). The results obtained in this study demonstrate that the semiautomated segmentation method allows for reliable assessment of the HSP volume in patients with carotid plaque lesions, with reduced time and effort for the analysis.