Early-Stage Glioblastomas: MR Imaging-Based Classification and Imaging Evidence of Progressive Growth.

Toh CH¹, Castillo M².

Abstract

BACKGROUND AND PURPOSE: The serial imaging changes describing the growth of glioblastomas from small to large tumors are seldom reported. Our aim was to classify the imaging patterns of early-stage glioblastomas and to define the order of appearance of different imaging patterns that occur during the growth of small glioblastomas.

MATERIALS AND METHODS: Medical records and preoperative MR imaging studies of patients diagnosed with glioblastoma between 2006 and 2013 were reviewed. Patients were included if their MR imaging studies showed early-stage glioblastomas, defined as small MR imaging lesions detected early in the course of the disease, demonstrating abnormal signal intensity but the absence of classic imaging findings of glioblastoma. Each lesion was reviewed by 2 neuroradiologists independently for location, signal intensity, involvement of GM and/or WM, and contrast-enhancement pattern on MR imaging.

RESULTS: Twenty-six patients with 31 preoperative MR imaging studies met the inclusion criteria. Early-stage glioblastomas were classified into 3 types and were all hyperintense on FLAIR/T2-weighted images. Type I lesions predominantly involved cortical GM (n = 3). Type II (n = 12) and III (n = 16) lesions involved both cortical GM and subcortical WM. Focal contrast enhancement was present only in type III lesions at the gray-white junction. Interobserver agreement was excellent (k = 0.95; P < .001) for lesion-type classification. Transformations of lesions from type I to type II and type II to type III were observed on follow-up MR imaging studies. The early-stage glioblastomas of 16 patients were pathologically confirmed after imaging progression to classic glioblastoma.

CONCLUSIONS: Cortical lesions may be the earliest MR imaging-detected abnormality in some human glioblastomas. These cortical tumors may progress to involve WM.

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