Multifocal and multicentric glioblastoma: Improved characterisation with FLAIR imaging and prognostic implications.

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Abstract
Glioblastoma usually presents on imaging as a single peripherally enhancing lesion, but multiple enhancing lesions can occur, termed multifocal if there is a connection between enhancing lesions, or multicentric when no communication is demonstrated. We aim to determine the incidence and prognostic implications of multifocal and multicentric glioblastoma in the era of modern MRI, focusing on the added benefit of T2-weighted fluid-attenuated inversion recovery (FLAIR) imaging. Patients with a new diagnosis of glioblastoma were identified. Preoperative MRI were reviewed to determine whether more than one distinct enhancing lesion was present, and whether there was communication between lesions. The findings were compared against survival data. More than one discrete contrast-enhancing lesion was present in 51 of the 151 patients (34%). Communication between lesions was identified in 47 of these, most commonly direct parenchymal spread (41 patients). The patients with multiple lesions had worse survival (median 176 days, compared to 346 days), but this difference was not statistically significant (p=0.253). These tumours more frequently involved deep structures (p<0.001) and the posterior fossa (p=0.045), both of which were associated with worse survival. The presence of multiple enhancing foci in glioblastoma is common, occurring in about one-third of patients, and the majority have multifocal disease. The FLAIR sequence is the crucial sequence for demonstrating a communication between lesions. The worse survival of these patients is, at least in large part related to more extensive tumour dissemination and more frequent involvement of key structures, rather than multiplicity per se.

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