Multifocal glioma

Some of the following terms are inconsistently used interchangeably: “multicentric glioma,” “multifocal glioma,” and “multiple glioma”.

Described by Gower in 1896 for the first time.

Multifocal glioma consists of tumors separated by white matter tracts within the same hemisphere, whereas multicentric glioma consists of tumors in opposite hemispheres or separated by the tentorium.

Epidemiology

Multifocal gliomas (MCGs) are a well-recognized but relatively uncommon entity, with a reported incidence of approximately 2 to 5% of total high-grade gliomas. There is a wide range in age at presentation of multiple gliomas, but the majority of patients are of middle–old age. No significant differences between sexes have been found. MGs are often designated as multicentric or multifocal lesions.

Not to be confused with Multicentric gliomas when there is no macroscopic or microscopic connection between the multiple brain tumors, and multifocal when there is evidence of microscopic connection or spread from a primary site.

see Multifocal glioblastoma.

Pathogenesis

The pathogenesis of multiple gliomas remains unknown. Many pathogenetic theories have been suggested to explain multiplicity. Zulch stated that multiple lesions are metastases from a primary focus via CSF or the white matter tracts. In the second theory, MCGs may arise from cells that, although not neoplastic in themselves, are nevertheless “primed” by an acquired or inherited genetic defect and scattered throughout the nervous system during development. The most recognized was Willis’ “ 2-step process” theory. In the initiation step, a large area of brain undergoes neoplastic transformation, thus more susceptible to neoplastic growth. In the promotion step, multiple areas of malignant transformation occur following various kinds of stimulation (biochemical, hormonal, mechanical, or viral), giving rise to multifocal glioma. A few genetic changes have been reported in MCGs, including TP53 mutation, BRCA-1 mutation, and deletion of chromosome 1p36, whereas TP53 mutation and PDGFR (platelet-derived growth factor receptor) overexpression represent early changes during low-grade glioma development, anaplastic progression is associated with pRB alteration and loss of heterozygosity (LOH) of 19q, further malignant progression to glioblastoma multiform including LOH 10q and mutations of PTEN gene. In a patient with multiple CAA, hereditary colorectal cancer, transcobalamin II deficiency, agenesis of the corpus callosum and mental retardation, a germline mutation of the PMS2 gene was found. Furthermore, families with MCGs but without obvious connection to known tumor syndromes were described in several case reports and epidemiological studies.

Diagnosis

The advent of computed tomography and magnetic resonance imaging made it increasingly apparent that gliomas could have a multifocal or multicentric appearance [1].

Differential diagnosis

Patients who present with multiple cerebral tumors are usually considered as having metastatic disease. If they have a history of a primary cancer in another site, the brain tumors are considered metastases.

They should not always be considered to have metastatic disease even if they have a previous diagnosis of systemic cancer, and multifocal glioma should be ruled out [2].

Most MCGs are glioblastomas with <4 lesions supratentorially, and are lack of typical symptoms and special detections.

MCG can present with a clinical and radiological picture similar to that of metastatic disease, especially if there is a history of other cancers or clinical manifestation of other systems. Correct diagnosis can hardly be made without the help of advanced imaging technology and biopsy pathological examination. MCGs may either exhibit the same or different pathological patterns, among which, multiform glioblastomas are the most common [3].

In only a few case reports, the MCGs exhibit oligodendroglioma, juvenile pilocytic astrocytoma (JPA) or cerebral anaplastic astrocytoma (CAA)

Through a rare MCG case, Kong et al aim to present this rarity and emphasize the need to correctly diagnose multiple intracranial lesions using a variety of diagnostic modalities to ensure that the patient receives proper treatment.

They present a case of multifocal cerebral anaplastic astrocytomas with a total of 8 lesions located in the left frontal lobe and invading the lateral ventricle, presenting with dysphasia and phantosmia. The disease course, including diagnosis and treatment, is presented and analyzed in detail. The pertinent literature is reviewed regarding this uncommon entity.After an initial impression of brain metastases from lung cancer because of the magnetic resonance imaging (MRI) resemblance and history of chronic bronchitis, they were able to use positron emission tomography (PET) and excisional biopsy to get the final diagnosis. After 10 months, the patient's overall condition deteriorated and succumbed to his disease.MCGs are easy to be misdiagnosed as metastatic diseases. In addition to MRI, PET adds more biochemical and molecular information and is helpful in the differentiation. Although uncommon, if multiple lesions are present in various locations in the hemispheres, MCG should be kept in mind [4]

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