Anaplastic oligodendroglioma, IDH-mutant & 1p/19q-codeleted

After substantial redefinition in the 2016 edition, the diagnosis of oligodendroglioma, IDH-mutant and 1p/19q-codeleted, is not markedly changed in the 2021 fifth edition. As the name states, IDH mutation and 1p/19q codeletion are required for the diagnosis of oligodendrogliomas. Historical pathologic features such as “perinuclear halos” creating “fried egg cells” and “chicken wire vasculature” remain characteristic although not necessary or sufficient for diagnosis. These tumors may be assigned CNS WHO grades of 2 or 3, and in the latter case the previous term “anaplastic oligodendroglioma” is no longer formally applied.

Old and obsolete Literature

Differentiated from a grade II oligodendroglioma, IDH-mutant & 1p/19q-codeleted by histologic features of prominent mitotic activity, microvascular proliferation, and necrosis.

The designation of grade III oligodendroglioma (high grade) generally subsumes the previous diagnoses of anaplastic or malignant oligodendroglioma.

In one study, classic oligodendrogliomas showed 1p loss in 35 of 42 (83%) cases, 19q loss in 28 of 39 (72%), and these were combined in 27 of 39 (69%) cases; there was no significant difference in 1p/19q loss of heterozygosity status between low-grade and anaplastic oligodendrogliomas.

Epidemiology

Data was analyzed from the Central Brain Tumor Registry of the United States (CBTRUS) from 2000 to 2013. Age-adjusted incidence rates per 100,000 person-years with 95% confidence intervals (CI) and annual percent changes (APCs) with 95% CI were calculated for OD and anaplastic oligodendroglioma (AOD) by age, sex and race. Survival rates were calculated for age, sex and race using a subset of the CBTRUS data. OD and AOD incidence peaked at 36-40 and 56-60 years, respectively. AOD:OD ratio increased up to age 75. Overall, OD and AOD incidence decreased [OD: APC -3.2 (2000-2013), AOD: -6.5 (2000-2007)]. OD incidence was highest in Whites but decreased significantly (2000-2013: APC -3.1) while incidence in Black populations did not significantly decrease (2000-2013: APC -1.6). Survival rates decreased with advancing age for OD, while persons aged 0-24 had the lowest survival for AOD. The current study reports a decrease in overall OD and AOD incidence from 2000 to 2013. Furthermore, AOD makes up an increasing proportion of oligodendroglial tumors up to age 75. Lower AOD survival in 0-24 years old may indicate molecular differences in pediatric cases. Thus, surveillance of tumor-specific trends by age, race and sex can reveal clinically relevant variations [1)].

Diagnosis

The only MRI feature that was associated with anaplastic transformation was an elevation of the choline/creatine ratio >2.4 which was observed in 4 out of 6 patients with anaplastic transformation versus 1 out of 14 patients without anaplastic transformation. In patients without 1p/19q co-deletion, an elevation of the choline/creatine ratio >2.4 was associated with the occurrence of anaplastic transformation in all cases (4 out of 4 patients), with a mean time of 12 months. In contrast, in patients with a 1p/19q co-deletion, no anaplastic transformation was observed in the patient who had an elevation of >2.4 of the choline/creatine ratio and two patients demonstrated an anaplastic transformation without any elevation of this ratio.Prospective validation in a larger series is needed, yet the present study suggests that combining data from in vivo proton MRS and genetic analysis could be a promising strategy to predict time to anaplastic transformation at the individual level in patients with low-grade oligodendrogliomas and may help deciding when chemotherapy and/or radiotherapy should be initiated in these tumors [2)].

Treatment

The management of AO is deeply changed in the recent years. Maximal safe surgical resection followed by radiotherapy (RT) was considered as the standard of care since paramount findings regarding molecular aspects, in particular co-deletion of the short arm of chromosome 1 and the long arm of chromosome 19, revealed that these subsets of AO, benefit in terms of overall survival (OS) and progression-free survival (PFS), from the addition of chemotherapy to RT. Allelic losses of chromosomes 1p and 19q occur in 50%-70% of both low-grade and anaplastic tumors, representing a strong prognostic factor and a powerful predictor of prolonged survival. Several other molecular markers have potential clinical significance as IDH1 mutations, confirming the strong prognostic role for OS. Malignant brain tumors negatively impacts on patients' quality of life. Seizures, visual impairment, headache, and cognitive disorders can be present. Moreover, chemotherapy and RT have important side effects. For these reasons, “health-related quality of life” is becoming a topic of growing interest, investigating on physical, mental, emotional, and social well-being. Understanding the impact of medical treatment on health-related quality of life will probably have a growing effect both on Healthcare strategies and on patients [3)].

RT + TMZ may be a promising treatment for both codeleted and non-codeleted AO [4)].

Outcome

Anaplastic Oligodendroglioma has a better prognosis in the presence of 1p19q co-deletion and IDH-1 mutation but spinal leptomeningeal dissemination of cerebral anaplastic oligodendroglioma is a rare occurrence. A 47-year-old man with spinal leptomeningeal dissemination eight months after resection of an anaplastic cerebral oligodendroglioma presenting with encephalitis. Felipe Andres et al. presented the radiological, biochemical, intraoperative and histological features of this syndrome. Despite the resolution of symptoms with corticosteroid treatment and favorable biochemical markers, prognosis remains poor when the spinal leptomeningeal disease is present [5)].

Case reports

An unusual case of a 9-year-old boy developing a huge anaplastic oligodendroglioma. A high-grade astrocytoma-like supratentorial tumor was discovered by a sophisticated brain scan employing magnetic resonance imaging. The tumor was identified by histopathology as an anaplastic oligodendroglioma. Anaplastic oligodendroglioma should be considered while making the differential diagnosis of high-grade astrocytoma notwithstanding its rarity [6)]

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