IDH1 mutant malignant astrocytomas are more amenable to surgical resection and have a survival benefit associated with maximal surgical resection.


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Abstract

BACKGROUND: IDH1 gene mutations identify gliomas with a distinct molecular evolutionary origin. We sought to determine the impact of surgical resection on survival after controlling for IDH1 status in malignant astrocytomas-World Health Organization grade III anaplastic astrocytomas and grade IV glioblastoma.

METHODS: Clinical parameters including volumetric assessment of preoperative and postoperative MRI were recorded prospectively on 335 malignant astrocytoma patients: n = 128 anaplastic astrocytomas and n = 207 glioblastoma. IDH1 status was assessed by sequencing and immunohistochemistry.

RESULTS: IDH1 mutation was independently associated with complete resection of enhancing disease (93% complete resections among mutants vs 67% among wild-type, P < .001), indicating IDH1 mutant gliomas were more amenable to resection. The impact of residual tumor on survival differed between IDH1 wild-type and mutant tumors. Complete resection of enhancing disease among IDH1 wild-type tumors was associated with a median survival of 19.6 months versus 10.7 months for incomplete resection; however, no survival benefit was observed in association with further resection of nonenhancing disease (minimization of total tumor volume). In contrast, IDH1 mutants displayed an additional survival benefit associated with maximal resection of total tumor volume (median survival 9.75 y for >5 cc residual vs not reached for <5 cc, P = .025).

CONCLUSIONS: The survival benefit associated with surgical resection differs based on IDH1 genotype in malignant astrocytic gliomas. Therapeutic benefit from maximal surgical resection, including both enhancing and nonenhancing tumor, may contribute to the better prognosis observed in the IDH1 mutant subgroup. Thus, individualized surgical strategies for malignant astrocytoma may be considered based on IDH1 status.

KEYWORDS: IDH1, anaplastic astrocytoma, glioblastoma, malignant glioma, surgical resection

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