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The crucial role of cerebrospinal fluid cytology in the diagnosis and prognosis of medulloblastoma at M1 stage

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Abstract

Introduction: Medulloblastoma is the most common pediatric malignant embryonal tumor of the cerebellum. In the absence of radiologically proven metastasis, lumbar puncture with cytological examination of the cerebrospinal fluid (CSF) is mandatory for identification of the M1 stage. This study aims to evaluate CSF cytomorphology and prognosis of the M1 stage.

Materials and methods: A retrospective 6-year audit (2017 - 2023) was performed for all cases of medulloblastoma on histopathology (n = 303). CSF cytology was evaluated in 177 cases on 2 routinely prepared smears after cytocentrifugation. A detailed evaluation of cytomorphological features and corresponding histopathology was performed and correlated with outcome in M1 stage cases (n = 18).

Results: Out of 177 cases of histopathology-proven medulloblastoma, CSF cytology was reported as positive for infiltration in 18 cases (14 classical and 4 desmoplastic variants) and were assigned M1 stage. The median age of the patients was 7.5 years. CSF smear showed high cellularity with malignant cell clusters of more than 200 cells in 8 cases, whereas 4 cases had low cellularity with scattered cells and admixed with inflammatory cells. Tumor cells showed a high nucleocytoplasmic ratio, coarse chromatin, and prominent nuclear molding. Nucleoli were inconspicuous in 9 cases but were prominent and eosinophilic in 9 cases. The median overall survival (OS) and progression-free survival (PFS) in M1 stage medulloblastoma was poor, 2 months and 1 month, respectively. There was a difference in age and tumor histology among the M0, M1, and M2/3 stage medulloblastomas.

Conclusion: CSF infiltration by medulloblastoma cells characterized by high nucleocytoplasmic ratio, nuclear molding, and coarse chromatin, represents the M1 stage and portends a poor prognosis.

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