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Posterior fossa tumors in children: current insights

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Abstract

While in adults most intracranial tumors develop around the cerebral hemispheres, 45 to 60% of pediatric lesions are found in the posterior fossa, although this anatomical region represents only 10% of the intracranial volume. The latest edition of the WHO classification for CNS tumors presented some fundamental paradigm shifts that particularly affected the classification of pediatric tumors, also influencing those that affect posterior fossa. Molecular biomarkers play an important role in the diagnosis, prognosis, and treatment of childhood posterior fossa tumors and can be used to predict patient outcomes and response to treatment and monitor its effectiveness. Although genetic studies have identified several posterior fossa tumor types, differing in terms of their location, cell of origin, genetic mechanisms, and clinical behavior, recent management strategies still depend on uniform approaches, mainly based on the extent of resection. However, significant progress has been made in guiding therapy decisions with biological or molecular stratification criteria and utilizing molecularly targeted treatments that address specific tumor biological characteristics. The primary focus of this review is on the latest advances in the diagnosis and treatment of common subtypes of posterior fossa tumors in children, as well as potential therapeutic approaches in the future. Conclusion: Molecular biomarkers play a central role, not only in the diagnosis and prognosis of posterior fossa tumors in children but also in customizing treatment plans. They anticipate patient outcomes, measure treatment responses, and assess therapeutic effectiveness. Advances in neuroimaging and treatment have significantly enhanced outcomes for children with these tumors. What is Known: • Central nervous system tumors are the most common solid neoplasms in children and adolescents, with approximately 45 to 60% of them located in the posterior fossa. • Multimodal approaches that include neurosurgery, radiation therapy, and chemotherapy are typically used to manage childhood posterior fossa tumors What is New: • Notable progress has been achieved in the diagnosis, categorization and management of posterior fossa tumors in children, leading to improvement in survival and quality of life.

Keywords: Biomarkers; Ependymoma; Medulloblastoma; Pilocytic astrocytoma; Posterior fossa tumors.

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