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Neurocognitive outcomes and functional independence in adult survivors of childhood medulloblastoma diagnosed over three decades

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Abstract

Background: Treatment of childhood medulloblastoma has evolved to reduce neurotoxicity while improving survival. However, the impact of evolving therapies on late neurocognitive outcomes and adult functional independence remains unknown.

Methods: Adult survivors of childhood medulloblastoma (n=505; median[minimum-maximum] age, 29[18-46] years) and sibling controls (n=727; 32[18-58] years) from the Childhood Cancer Survivor Study completed surveys assessing neurocognitive problems and chronic health conditions (CHCs). Treatment exposures were categorized as historical (craniospinal irradiation [CSI]≥30 Gy, no chemotherapy), standard-risk (CSI>0 to <30 Gy +chemotherapy) and high-risk (CSI≥30 Gy +chemotherapy) therapy. Latent class analysis identified patterns of functional independence using employment, independent living, assistance with routine/personal care needs, driver's license, marital/partner status. Multivariable models estimated risk of neurocognitive impairment in survivors versus siblings and by treatment exposure group, and associations between neurocognitive impairment, CHCs, and functional independence.

Results: Survivors in each treatment exposure group had 4- to 5-fold elevated risk of impaired memory and task efficiency compared to siblings. Contemporary risk-based therapies did not confer lower risk compared to historical therapy. Survivors treated in the 1990s had higher risk of memory impairment (relative risk [RR] 2.24, 95% confidence interval [CI] 1.39-3.60) compared to survivors treated in the 1970s. Sensorimotor, hearing problems and seizures were associated with 33%-34%, 25-26% and 21%-42% elevated risk of task efficiency and memory impairment, respectively. Treatment-related CHCs and neurocognitive impairment were associated with non-independence.

Conclusions: Despite treatment changes, long-term survivors of childhood medulloblastoma remain at risk for neurocognitive impairment, which was associated with CHCs. Neurocognitive surveillance after contemporary regimens is imperative.

Keywords: childhood cancer; functional independence; medulloblastoma; neurocognitive impairment; survivorship.

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