

A scoring system to quantify late effects in children after treatment for medulloblastoma/ependymoma and its correlation with quality of life and neurocognitive functioning

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Abstract

Background The aim of this study was to quantify the severity of late effects by a simple numerical score (late effects severity score, LESS) in patients who received radiochemotherapy for medulloblastoma or ependymoma. The LESS was correlated with neurocognitive and quality of life (QoL) outcomes.

Patients and methods The LESS was calculated by assigning 0, 1, or 2 points within each of four different categories (neurology, endocrine, visual/auditory, others). Twenty-three patients with medulloblastoma ($n=18$) or ependymoma ($n=5$) underwent extensive neurocognitive and QoL testing at a median of 56 months (range, 1–174) after the end of treatment. Eight patients with low-grade glioma (LGG) who underwent tumor resection only served as control group.

Results Patients with medulloblastoma/ependymoma had significantly higher LESS and significantly lower Wechsler Adult Intelligence Scale (WAIS)/Wechsler Intelligence Scales for Children (WISC) scores compared to patients with LGG. There was no statistically significant correlation between neurocognitive performance and QoL. The total

LESS was negatively correlated with WAIS/WISC, attention, concentration, and verbal learning scores. Comparison of QoL and late effects in patients with medulloblastoma/ependymoma demonstrated a significant negative correlation only for neurological late effects and the KINDL score suggesting that younger patients with more severe late effects reported on a worse QoL.

Conclusions This LESS seems to be a simple and practical tool to quantify late effects in former brain tumor patients. Although both groups differ significantly with regard to neurocognitive parameters and severity of late effects, this does not apply for all QoL outcomes. Neurological late effects seem to be most predictive for an impaired QoL in younger children.

Keywords Children · Primitive neuroectodermal tumors · Low-grade astrocytoma · Late effects · Quality of life · Neurocognitive functioning

Introduction

Posterior fossa primitive neuroectodermal tumors (PF-PNET) are the second most common central nervous system (CNS) neoplasms in children followed by ependymoma with incidence rates of 6.5 and 3.4 per million children (0–14 years) per year, respectively [30]. The use of multimodality treatment concepts including surgery, radiotherapy, and chemotherapy resulted in a significant improvement of prognosis during the past decades in these patients [30]. Prognosis primarily depends on the tumor site, age at diagnosis, stage of the disease, and extent of resection [10, 20, 39]. Patients with average-risk PF-PNET

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