

Radiation Induced Cerebral Cavernomas in Pediatric Neuro-Oncology: A 25 Year Single Institution Review

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Learning Objectives

1. Identify the epidemiology and natural history of radiation induced cavernous malformations in the pediatric neuro-oncology population

Introduction

Radiation has a significant role in the management of pediatric brain tumors. Secondary complications to irradiation can include vascular malformations such as cavernous malformations, brain atrophy, necrosis, and demyelination. Although recognized as a potential complication, the pathogenesis and natural history of radiation induced cavernous malformations continues to be defined. We present a retrospective, single institution study of 138 patients who underwent cerebral radiotherapy as part of their comprehensive pediatric brain tumor management.

Methods

Institutional review board permission was obtained and a retrospective review of all available patients with a pediatric brain tumor at our institution was completed. Patients who underwent radiotherapy and developed cavernous malformations were selected and the initial tumor type, frequency, and the radiological as well as clinical history were recorded and analyzed.

Results

From 1980-2005, 134 patients received radiotherapy for a pediatric brain tumor. Of this cohort, 28 patients (21%) subsequently developed at least one cerebral cavernous malformation. 21 of the patients had multiple cavernomas while only 7 were solitary. 15 patients were male. The mean time until discovery was 13.5 years. The tumor biology included 14 gliomas, 9 medulloblastomas, and 1 ependymoma. 14 patients received chemotherapy and all received at least short term corticosteroids. One patient required surgical excision of a cavernous malformation for repeated symptomatic hemorrhages.

Conclusions

Cavernous malformations are a frequent long term sequelae of pediatric radiotherapy. Although common, they are rarely associated with neurological complications even decades later and are largely discovered asymptotically during routine surveillance screening of their primary disease. Future research in our database will be focused on establishing the relationship of radiation dose, age at irradiation, localization of radiotherapy, chemotherapy, anti-epileptics, and other medications on radiation induced cavernous malformations with the hope of identifying modifiable risk factors for clinical decision making application in a prospective fashion.