Brain Radiation Necrosis in a State-based Registry

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Abstracts will be considered for both poster and platform presentations

Neuro-oncology

INTRODUCTION: Radiation necrosis (RN) is an irreversible injury after radiation, difficult to distinguish from disease progression. Knowledge on the clinical basis of development, management, or prognostic value of RN in the brain is limited, and is a significant diagnostic challenge. We provide the largest study to date to describe clinical and outcome patterns of brain RN.

METHODS: We analyzed the Kentucky Cancer Registry (KCR) electronic pathology (e-Path) system for all cases of radiation necrosis to the brain. Pathology reports were retrospectively evaluated to establish the diagnosis of brain RN based on known pathological characteristics of brain tumors. The cases diagnosed at the University of Kentucky (UK) were evaluated for an in-depth review of clinical and prognostic implications of RN.

RESULTS: Our search identified 136 patients with RN. We present our preliminary results from 31 patients identified from UK. The median age at RN presentation was 55 years, with a male gender predominance (54.8%). One patient was African American and there were no pediatric cases. The diagnosis of RN was unclear in 4 patients due to overlapping characteristics with pre-existing tumor. The majority of patients had a diagnosis of primary brain tumor (58.1%), of which grade IV was the most common (27.8%). The most common primary diagnosis was astrocytoma (22.6%), glioblastoma (16.1%), followed by non-small cell lung cancer (16.1%), breast cancer (6.5%), and glioma not otherwise specified (6.5%). Tumor presence in the biopsy was confirmed in 19.4% of the patients. Over 74% of patients have had surgery to the brain, and the majority presented one focal area of enhancement on imaging (61.3%). The majority of patients received several course of radiation. Details on radiation treatment were missing in 9 patients that were treated outside UK. Median dose of first radiation was 57 Gy over 29.5 fractions. Over 48% received stereotactic radiosurgery and 77.4% received external beam radiation. Over 19% received radiation outside the brain, and over 35% received concurrent chemotherapy. Forty-eight percent of patients presented any neurological complain, that included weakness, gait instability, paresthesia, memory loss, and altered mental status. Nine-percent presented seizures, and 19% cognitive decline. The median time to RN from the first dose of brain radiation was 10 months, and was similar between primary and metastatic lesions (8 months for primary, and 15 months for metastatic p=0.467). Median survival after RN was 42 months for primary brain tumors and 17 months for metastatic tumors.

CONCLUSIONS: RN occurred more frequently in patients with primary brain tumors as initial diagnosis, likely associated to high doses of radiation. The survival after pathological confirmation of RN was significantly longer to literature descriptions for recurrent primary or metastatic lesions, which highlights the need to establish clinical and imaging determinants of RN. Neurological complains were common, particularly seizures, and cognitive impairment. Our analysis will provide insights on the prognostic significance of brain RN along with the largest clinical description of this phenomenon.