Diagnosis and management of brain radiation necrosis

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Abstract

Brain radiation necrosis (BRN) is a significant and complex side effect of stereotactic radiotherapy (SRT). Differentiating BRN from local tumor recurrence is critical, requiring advanced diagnostic techniques and a multidisciplinary approach. BRN typically manifests months to years post-treatment, presenting with radiological changes on MRI and may produce neurological symptoms. Key risk factors include the volume of irradiated brain tissue, the radiation dose, and prior radiotherapy history. This manuscript reviews the diagnostic process for BRN, emphasizing the importance of assessing baseline risk, clinical evaluation, and advanced imaging modalities. Multimodal imaging enhances diagnostic accuracy and aids in distinguishing BRN from tumor relapse. Therapeutic management varies based on symptoms. Asymptomatic BRN may be monitored with regular imaging, while symptomatic BRN often requires corticosteroids to reduce inflammation. Emerging therapies like bevacizumab have shown promise in clinical trials, with significant radiographic and symptomatic improvement. Surgical intervention may be necessary for histological confirmation and severe, treatment-resistant cases. Ongoing research aims to improve diagnostic accuracy and treatment efficacy, enhancing patient outcomes and quality of life. This review underscores the need for a multidisciplinary approach and continuous advancements to address the challenges posed by BRN in brain tumor patients.

Keywords: IRM; Imagerie multimodale; MRI; Multimodal imaging; Radiation necrosis; Radionécrose cérébrale.

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