The efficacy and safety of Carbon ion radiotherapy for Meningiomas: A Systematic review and meta-analysis

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Abstract

Background: Traditional radiotherapy is difficult to carry out definite treatment without damaging the adjacent brain parenchyma. Many studies have shown that the physical properties of carbocation radiation therapy allow treatment to reduce damage to critical structures and thus improve patient survival. Purpose: The purpose of this systematic review and meta-analysis is to evaluate the efficacy and safety of Carbon ion or Carbon ion combination radiation therapy in improving meningioma. Materials and Methods: The related studies published from January 1, 1951 to August 1, 2020 were searched comprehensively on PubMed, Cochrane Library, China Biomedical Literature Database, Web of Science, EMBASE. The extracted data included studies focused on rates and types of adverse events were sorted and classified by excel, and the overall survival and local control rates data were further analyzed with R software, Results: In eight included studies and 506 individuals, the three-year survival rate and annual local control rate of benign meningiomas were 100%. The one-year, two-year and 5-year survival rates of patients with atypical meningioma were 100%, 95% and 50%. The one-year and two-year survival rates of patients with recurrent intracranial meningiomas were 90% and 71% respectively. The one-year and two-year local control rates of non-benign meningiomas were 53% and 33% respectively. Headache, sensory impairment, cognitive impairment, and hearing impairment were the most common toxic reactions, with incidences of 19.4%, 23.7%, 9.1% and 9.1%, respectively.

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