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Short Communication Open Access

Feasibility and Outcome of Helical Tomotherapy for Irradiation in Pediatric Patients with Pineoblastoma

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Short Communication

Pineoblastoma is an extremely rare primary tumor occurring in the pineal gland and belongs to the supratentorial primitive neuroectodermal tumors [1,2]. Intensive multimodality treatment that combines surgery, craniospinal irradiation (CSI), and chemotherapy is needed for this uncommon disease. CSI still remains one of the most technically challenging processes in radiation therapy (RT) planning and delivery because of the need to irradiate a very large and complex shaped target volume uniformly. There is a growing concern regarding treatment-related side effects and is the clinical motivation for investigating sophisticated emerging RT techniques to reduce doses to non-target tissues to ameliorate toxicity [3]. Consequently, several strategies have been proposed to limit the radiation-induced toxicity, such as the use of helical tomotherapy (HT) [4,5].

The use of HT for CSI, owing to the greater conformality of dose distribution and the ability to restrict the dose to pre-set levels in adjacent, critically sensitive, normal tissues, appears to be an attractive option for pediatric patients with pineal tumors, where the logistics of daily treatment over conventional three dimensional conformal RT may be difficult. Between 2007 and 2011, three female pediatric patients with diagnosis of non-metastasic pineoblastoma were treated with HT in our institution. Patient´s ages were 2, 12, and 13 years old, respectively. The two older patients were treated according to the International Society of Pediatric Oncology (SIOP) protocol [6] which includes postoperative concurrent radio chemotherapy with vincristine weekly followed by maintenance chemotherapy. The younger patient underwent the Head Start II protocol [7] utilizing postoperative chemotherapy followed by consolidation with autologous bone marrow transplantation. RT was delivered after a stable response.

Patients were immobilized in the supine position and received CSI with a total dose of 23.4 Gy at 1.8 Gy/fraction. Additionally, the primary tumor site was boosted up to of 54-55.8 Gy. Acute toxicities were scored according to the Common Toxicity Criteria for Adverse Events version 4.0.

RT was completed without any interruption. The two older patients were evaluated as complete response (CR) after RT. No patient experienced local or distant recurrence. One patient with CR is alive with no evidence of disease after 57 months from diagnosis. The other one died after 47 months from diagnosis due to cerebral hemorrhage of unknown etiology. Finally, the younger patient is alive after 21 months from diagnosis. Grade 3 hematological toxicity and grade 2 fatigue was experienced in all patients during treatment. In addition, grade 2 nausea and vomiting was observed in 2 patients. No other acute toxicity was observed. Mean conformity index and mean homogeneity index was 0.82 and 1.07, respectively, for the tumor bed and 0.74 and 1.11, respectively, for the craniospinal axis.

HT offers a safe and optimal therapeutic option in the multidisciplinary management of pediatric patients with pineoblastoma. Acceptable conformity and homogeneity indexes were achieved. HT seems to have dosimetric advantages over conventional RT which may potentially allow increasing the dose in the tumor bed while sparing surrounding normal tissues in order to achieve better outcome for this aggressive disease.

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