

## Craniospinal Irradiation in Patients with CNS Germinoma: Dosimetric Evaluation of Supine LINAC Treatment and Helical Tomotherapy

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### 서 론

CNS germinoma is a rare primary CNS tumor in pediatric patients. Craniospinal irradiation is the gold standard in treatment of CNS germinoma at risk for leptomeningeal dissemination. Conventional LINAC treatment is required to careful junctioning between opposed lateral cranial field and posterior spinal field. Periodic junctioning shift has potential risk of underdose or overdose at the junction. Use of single portal at the spinal field shows inhomogeneous dose distribution on vertebral body and results in asymmetric growing of vertebral body. To reduce late toxicities, novel approach as helical tomotherapy or proton therapy has been introduced for craniospinal irradiation. We compared craniospinal irradiation treatment plan with conformal radiotherapy and helical tomotherapy.

### 재료 및 방법

Three patients with CNS germinoma received supine craniospinal irradiation with conformal radiotherapy using LINAC. The clinical target

volume(CTV) include whole brain, subarachnoid space, and spinal cord from foramen magnum to end of thecal sac. The planning target volume (PTV) was defined with skull, base of skull, and entire spine. For conformal radiotherapy, the cranial fields were treated with lateral fields and a table angle to match their divergence to the superior edge of the upper spinal field. The collimator was rotated to match the divergence from the upper spinal field. Helical tomotherapy was planned with iterative inverse treatment planning optimization algorithm. The dose computation was determined using the superior/convolution method. Normal tissue complication probability calculation was performed for parotid gland, kidney, lens, small bowel, ovary, testis.

### 결과 및 고찰

Homogeneous vertebral body coverage for tomotherapy compared with conformal radiotherapy was found. The mean dose to the each parotid gland decreased by 7.3Gy and 10Gy, respectively

with tomotherapy. The volume of esophagus and small bowel receiving more than 10 Gy was significantly lower than with LINAC treatment. The V2, V5, V10, and V20 of the lung is 81.6%, 12.4%, 2.3%, 0% with tomotherapy.

## 결 론

Helical tomotherapy showed excellent homogeneous dose distribution within vertebra body (PTV) and sparing of the normal tissue but large volume of lung and total body received low radiation dose. Further evaluations for treatment outcome, pulmonary toxicities and second cancer are needed in patients receiving craniospinal irradiation using helical tomotherapy.