

## Comparison of Helical tomotherapy and Cyberknife in Spine Radiosurgery

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중심어 : Helical tomotherapy, Cyber knife, Spine radiosurgery

### 서론

The purpose of this study is planning comparison of helical tomotherapy and Cyber knife in spine radiosurgery. Spine radiosurgery is an alternative to invasive spine surgery. The tomotherapy is megavoltage CT(MVCT) based image guided helical IMRT delivery system. The cyberknife using robotic arm and image guided based fiducial marker kilovoltage X-ray image.

### 재료 및 방법

In the helical tomotherapy planning(HTP) system, the operator must choose 3 parameters. Those are field width(1, 2.5, 5 cm), pitch, and modulation factor(MF). The field width is defined as the slice thickness of the radiation field. The pitch is defined as the couch movement relative to the field width during one gantry rotation. The modulation factor is defined as the ratio of the maximum number of opening leaves and the average number of opening leaves in active gantry

rotations. We choose 1 cm field width, 2.15 pitch and 3 MF in this study. In the cyber knife planning(CKP) system, the operator must choose 2 parameters. Those are cone size, beam path. We choose 7.5 mm cone size and full beam path. We acquired 2 mm thickness CT image and fusion MRI image to decide target. The PTV (vertebra body, T-spine) encompassed the gross tumor volume (GTV) with an additional localization uncertainty margin of 1.0 mm in 3 dimensions.

### 결과 및 고찰

We prescribed dose 15 Gy in both plan. The Spinal cord maximum dose was 11.9 Gy and 10 Gy received volume is 2.334 % in HTP. The CKP was able to reduce Spinal cord dose 8Gy. Because, it was machine mechanical limit in helical tomotherapy. The helical tomotherapy is modulated by a 64-multileaf collimator that has paired, pneumatically driven, 6.25-mm-wide leaves calculated to open or close at approximately every 7° of LINAC rotation, or 51 times per gantry rotation. But cyber knife use

100 or more than bean path. Although, cord maximum dose in CKP is lower than HTP, target homogeneity in HTP is better than CKP. Target coverage is 85% in CKP, 92% in HTP. It was benefit of helical radiationtherapy.

## 결론

Tomotherapy and cyberknife are useful equipment to spine radiosurgery.

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