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学位論文の題名	<p>Dosimetric Comparison of Helical Tomotherapy, Volumetric-Modulated Arc Therapy, and Intensity-Modulated Proton Therapy for Angiosarcoma of the Scalp (頭皮血管肉腫に対するヘリカルトモセラピー、回転型強度変調放射線療法、強度変調陽子線治療の線量比較)</p> <p>Technology in Cancer Research &amp; Treatment, 20: 19, 2021</p>
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**Objective:** We compared radiotherapy plans among helical tomotherapy (HT), volumetric-modulated arc therapy (VMAT), and intensity-modulated proton therapy (IMPT) for angiosarcoma of the scalp (AS).

**Methods:** We conducted a planning study for 19 patients with AS. The clinical target volume (CTV) 1 and CTV2 were defined as the gross tumor volume with a specific margin and total scalp, respectively. For HT and VMAT, the planning target volume (PTV) 1 and PTV2 were defined as CTV1 and CTV2 with 0.5-cm margins, respectively. For IMPT, robust optimization was used instead of a CTV-PTV margin (i.e. CTV robust). The targets of the HT and VMAT plans were the PTV, whereas the IMPT plans targeted the CTV robust. In total, 70 Gy and 56 Gy were prescribed as the D95% (i.e. dose to 95% volume) of PTV1 (or CTV1 robust) and PTV2 (or CTV2 robust), respectively, using the simultaneous integrated boost (SIB) technique. Other constraint goals were also defined for the target and organs at risk (OAR).

**Results:** All dose constraint parameters for the target and OAR met the goals within the acceptable ranges for the 3 techniques. The coverage of the targets replaced by D95% and D98% were almost equivalent among the 3 techniques. The homogeneity index of PTV1 or CTV1 robust was equivalent among the 3 techniques, whereas that of PTV2 or CTV2 robust was significantly higher in the IMPT plans than in the other plans. IMPT reduced the Dmean of the brain and hippocampus by 49% to 95%, and the Dmax of the spinal cord, brainstem, and optic pathway by 70% to 92% compared with the other techniques.

**Conclusion:** The 3 techniques with SIB methods provided sufficient coverage and satisfactory homogeneity for the targets. Above all IMPT achieved the best OAR sparing