

Comparison Between Two Techniques (Extended Source to Surface Distance & Field Alignment) Of Craniospinal Irradiation (CSI) In the Eclipse Treatment Planning System

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Abstract : Due to the involvement of the large target volume, Craniospinal Irradiation makes it challenging to achieve a uniform dose, and it requires different isocenters. This isocentric junction needs to shift after every five fractions to overcome the possibility of hot and cold spots. This study aims to evaluate the Planning Target Volume coverage & sparing Organ at Risk between two techniques and shows that the Field Alignment Technique does not need replanning and resetting. Planning method for Craniospinal Irradiation by Eclipse treatment planning system Field Alignment and Extended Source to Surface Distance technique was developed where 36 Gy in 20 Fraction at the rate of 1.8 Gy was prescribed. The patient was immobilized in the prone position. In the Field Alignment technique, the plan consists of half beam blocked parallel opposed cranium and a single posterior cervicospine field was developed by sharing the same isocenter, which obviates divergence matching. Further, a single field was created to treat the remaining lumbosacral spine. Matching between the inferior diverging edge of the cervicospine field and the superior diverging edge of a lumbosacral field, the field alignment option was used, which automatically matches the field edge divergence as per the field alignment rule in Eclipse Treatment Planning System where the couch was set to 2700. In the Extended Source to Surface Distance technique, two parallel opposed fields were created for the cranium, and a single posterior cervicospine field was created where the Source to Surface Distance was from 120-140 cm. Dose Volume Histograms were obtained for each organ contoured and for each technique used. In all, the patient's maximum dose to Planning Target Volume is higher for the Extended Source to Surface Distance technique to Field Alignment technique. The dose to all surrounding structures was increased with the use of a single Extended Source to Surface Distance when compared to the Field Alignment technique. The average mean dose to Eye, Brain Stem, Kidney, Oesophagus, Heart, Liver, Lung, and Ovaries were respectively (58% & 60 %), (103% & 98%), (13% & 15%), (10% & 63%), (12% & 16%), (33% & 30%), (14% & 18%), (69% & 61%) for Field Alignment and Extended Source to Surface Distance technique. However, the clinical target volume at the spine junction site received a less homogeneous dose with the Field Alignment technique as compared to Extended Source to Surface Distance. We conclude that, although the use of a single field Extended Source to Surface Distance delivered a more homogenous, but its maximum dose is higher than the Field Alignment technique. Also, a huge advantage of the Field Alignment technique for Craniospinal Irradiation is that it doesn't need replanning and resetting up of patients after every five fractions and 95% prescribed dose was received by more than 95% of the Planning Target Volume in all the plane with the acceptable hot spot.

Keywords : craniospinalirradiation, cranium, cervicospine, immobilize, lumbosacral spine

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