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Intensity modulated radiotherapy in chemoreduced retinoblastoma

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Background: Intensity modulated radiotherapy (IMRT) has the potential of reducing dose to adjacent critical structures, achieves better target coverage, dose uniformity and sharp dose fall-off. Therefore, aim of our present study is to assess the feasibility of IMRT as a focal therapy for chemo-reduced group II retinoblastoma with regard to target coverage and sparing adjoining critical normal structures.

Material and methods: Six patients of chemo reduced group II retinoblastoma were undertaken for the study. Radiation therapy planning was done with all immobilized in supine position by a thermoplastic cast under general anesthesia. Planning CT was done with 3mm slice thickness and Gross Tumor Volume (GTV) was delineated in CT images as per the post chemotherapy clinical, radiological and opthalamoscopic examination under anesthesia findings. A margin of 2mm was given to generate Clinical Target Volume (CTV), a further expansion of 4mm was given for Planning Target Volume (PTV). The delineated organs at risk (OAR) include optic nerve, temporal lobe, hypo-thalamo pituitary axis (HPA), lacrimal gland, orbit, cornea and the retina. Nine field non-coplanar beam arrangement was used for IMRT planning in the Pinnacle TPS for Elekta synergy linear accelerator. The planning objectives were: prescribed dose of 45Gy/25f for PTV and HPA<37.5Gy temporal lobes<37.5Gy, lacrimal gland <34Gy, orbit<20Gy, lens<10Gy, cornea <23Gy and retina<40 Gy.

Results: IMRT achieved adequate coverage to the PTV. For all patients, 95% of the PTV was covered by 98% of the isodose line. The calculated Conformity Indices (TVRI/VRI) were 0.9391±0.96. Homogeneity Indices (I_{max}/RI) were 1.1475±0.55. Quality of coverage indices (I_{min}/RI) were 0.80±0.40. For ipsilateral OAR doses, the maximum dose to the brain stem was 5.155±1.45Gy and temporal lobe was 40.65±0.53Gy. Maximum dose to the optic chiasm was 8.94±2.51Gy. Optic nerve maximum dose was 45.81±1.74Gy and cornea max dose was 24.98±12.32Gy. Similarly, max dose for the lens and HPA were 15.51±4.50Gy and 8.505±2.86Gy, respectively. Maximum dose to the lacrimal was 34.41±10.32Gy and mean was 20.62±3.37Gy. Orbital mean doses were 16.04±4.34Gy. The maximum doses to the retina were 45.50±1.72Gy and mean doses were 30.75±1.67Gy.

Conclusions: Delivery of IMRT as a focal therapy in chemo-reduced group II retinoblastoma is feasible and provides adequate dose coverage to the target volume. The IMRT spares the adjoining critical normal structures with the given priority apart from the lens.

Biography

Dr Aman Sharma MBBS IGMC Shimla (1997-2003), Medical officer incharge Ex-HPHS(2003-2006), MD Radiation oncology (2006-2009) Regional Cancer Centre IGMC Shimla, Ex-Fellowship Neuroradio-oncology TATA Memorial Hospital Mumbai(sept2009-dec2010), presently work as Senior Resident in All India Institute of Medical Sciences New Delhi. He has conducted a prospective randomized phase III trial in locally advanced HNSCC, scientific paper presented at 13 chapter AROI, review article accepted in NNP, abstract accepted for poster ASCO, three abstracts submitted in ESTRO & head and neck conference.