AbstractID: 6373 Title: Electronic tissue compensation achieved with both dynamic and static multileaf collimator in Eclipse treatment planning system for Clinac 6EX and 2100CD Varian Linear Accelerators: Feasibility and dosimetric study.

Abstract

Purpose: Dynamic multileaf collimator (DMLC) and static multileaf collimator (SMLC) along with three dimensional treatment planning system (3DTPS) opens the possibility of tissue compensation. A method using electronic tissue compensator (ETC) has been implemented in Eclipse 3DTPS at our centre. The ETC was tested for head and neck conformal RT planning. The purpose of this study was to verify the feasibility of DMLC and SMLC in head and neck field irradiation, simultaneously delivering homogeneous dose at depth. In addition, the emphasis was given on the dosimetric aspects in commissioning ETC in Eclipse.

Methods and Materials: A Head and Neck Phantom (The Phantom Laboratory, USA) was used for the dosimetric verification. Planning was carried out for both DMLC and SMLC ETC plans. The point dose calculated at central axis by Eclipse with DMLC and SMLC was noted. This was compared with the measured dose on machine with ion chamber and TLD. The calculated idsodoses and profiles were also compared with the measured one. The line dose profiles from Eclipse were also compared with the profile obtained from Amorphous Silicon (AS500) Electronic portal imaging device (EPID) on Clinac 6EX machine.

Results: In uniform dose regions, measured dose values resulted in agreements with the calculated doses within 3%. Distance to agreement between calculated and measured isodoses in dose gradient zone was within 3 mm. Both the comparison of isodoses and the profile were in good agreement and acceptable. The measured and the calculated line dose profiles were flat for both DMLC and SMLC.

Conclusion: The dosimetric verification of ETC for both the linacs demonstrated the feasibility and the accuracy of the ETC treatment modality for achieving uniform dose distributions. Therefore ETC can be used as a new tool in head and neck treatment planning optimization for improved dose uniformity.