



Comparison Between 3D DVH Base Patient QA and VMAT Treatment Plan for TBI Treatment

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Purpose:

Our propose was to present the clinical accuracy, feasibility and reliability of TBI treatment with linac-based VMAT on the coach in thirty three patients with akut myeloid leukemia (AML), akut lenfoblastik leukemia (ALL), aplastik anemia (AA), idiyopatik aplastik anemia (IAA).

Methods:

Patients underwent radiotherapy treatment with a VMAT-based TBI technique on the coach. The VMAT-TBI technique consisted of three isocentres and three overlapping arcs, linac-based VMAT could treat targets up to 120 cm length. We added one or two more overlapping arcs which depended on the height of the patient for feet to gantry CT sets. We eliminated high dose junction region after fusion of two CT sets via bias dose properties of Monaco[®] 5.11 TPS (Elekta AB, Sweden) by using monte carlo algorithm. The quality assurance comprised the verification of the irradiation plans via 3D DVH based patient QA system which was Dolphin[®] and Compass[®] (IBA Dosimetry, Germany). Also, each tratment plans were recalculated with 3 mm, 6 mm and 9 mm longitudinal misallignment of second and third overlapping arcs by TPS.

Results:

When we compared plan and 3D DVH based patient QA results, we determined an average difference %2,4±1,2 mean kidneys doses, %1,4±1,2 mean lungs doses, %2,4±1,2 higher maximum lens doses and %2,4±1,2 higher mean target dose. When we recalculated plan's with longitudinal misalignments, we obtained %1.9±0,8, %2,5±1,9 and %3,5±1,7 higher mean lungs doses, %3,7±1,5, %10,4±4,5 and %11,6±3,8 higher maximum lung doses and %6,2±2,0, %16,3±5,0 and %19,8±4,0 higher point doses with each 3 mm, 6 mm and 9 mm longitudinal misallignment.

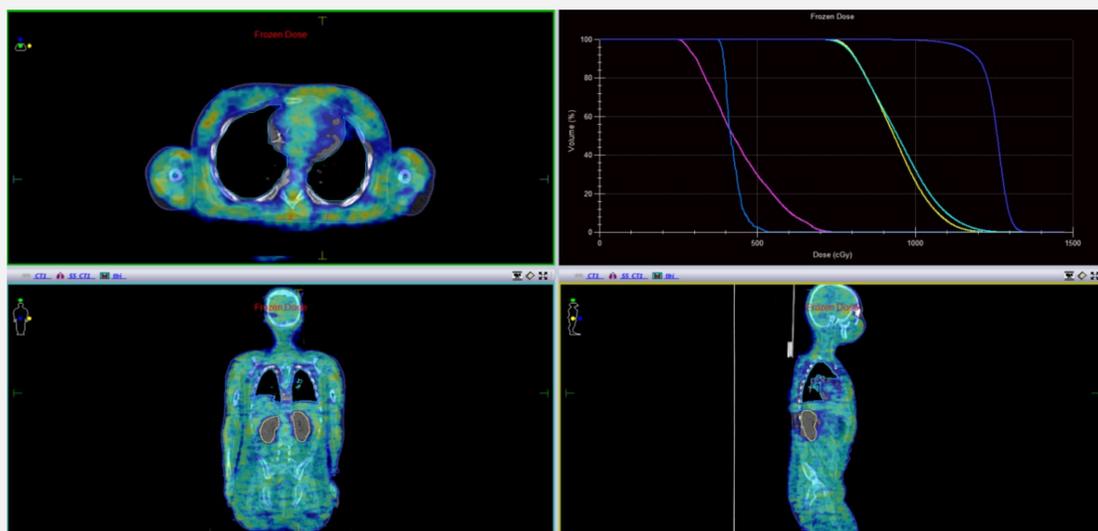


Figure1: %95 of Prescribe dose of TBI treatment

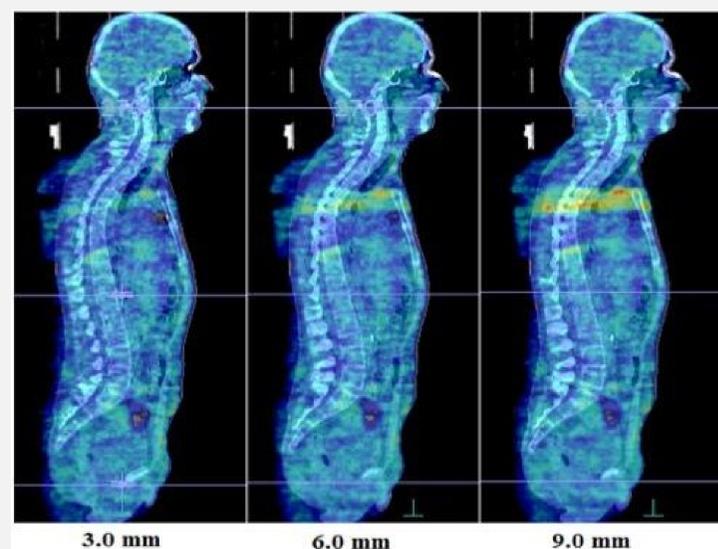


Figure2: Longitudinal misallignment of TBI treatment

Conclusions:

We conclude that linac-based VMAT simplifies the process of TBI. Up to 3 mm longitudinal misalignment brought less than %2 mean lungs dose enhancement. Therefore, we obtained reliability of VMAT-based TBI technique. High accurate DVH based patient dose verification QA is possible with linac-based VMAT showing small difference between plan and delivered dose.

Keywords: TBI, VMAT, Patient QA