Localization and quantification of the delivered dose to the spinal cord. Predicting actual delivered dose during daily MVCT image-guided tomotherapy.

The goal of the present work was to localize and quantify the actual delivered dose to the cervical spinal cord (SC) during head and neck cancer (H&N) treatment. A total of 20 H&N patients treated with bilateral nodal irradiation with helical tomotherapy (HT) were analyzed. Daily MVCTs were performed for image guidance. On every second MVCT, the SC was recontoured and the delivered dose for the given treatment fraction (12 fractions per patient) was recalculated. The magnitude and localization (CT slice, spinal cord quadrant) of the Dmax to the SC on the planning CT (PLAN-Dmax) and of the actual delivered Dmax (a-Dmax) were analyzed. A systematic deviation from the PLAN-Dmax was observed in 15 out of 20 patients. Large interpatient variability of the a-Dmax in the spinal cord was noted (4.5±4%). Intrapatient variability in a-Dmax was, generally, minimal (1.8±2.7%). Throughout the treatment course, the higher dose was located in the same CT slices and in the same quadrants (anterior right and anterior left) for the same patient. Exact localization and quantification of the change of the a-Dmax can be made for most patients by recalculating the dose on the daily IGRT-MVCTs. This could be helpful in assessing whether replanning is necessary in patients with doses close to the known...
tolerance doses of the spinal cord.

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