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Titel des Beitrags: Advanced techniques in neoadjuvant radiotherapy allow dose escalation without increased dose to the organs at risk: Planning study in esophageal carcinoma.

Abstract: The goal of this work was to investigate the potential of advanced radiation techniques in dose escalation in the radiotherapy (RT) for the treatment of esophageal carcinoma. A total of 15 locally advanced esophageal cancer (LAEC) patients were selected for the present study. For all 15 patients, we created a 3D conformal RT plan (3D-45) with 45 Gy in fractions of 1.8 Gy to the planning target volume (PTV1), which we usually use to employ in the neoadjuvant treatment of LAEC. Additionally, a 3D boost (as in the primary RT of LAEC) was calculated with 9 Gy in fractions of 1.8 Gy to the boost volume (PTV2) (Dmean) to a total dose of 54 Gy (3D-54 Gy), which we routinely use for the definitive treatment of LAEC. Three plans with a simultaneous integrated boost (SIB) were then calculated for each patient: sliding window intensity-modulated radiotherapy (IMRT-SIB), volumetric modulated arc therapy (VMAT-SIB), and helical tomotherapy (HT-SIB). For the SIB plans, the requirement was that 95 % of the PTV1 receive >= 100 % of the prescription dose (45 Gy in fractions of 1.8 Gy, D95) and the PTV2 was dose escalated to 52.5 Gy in fractions of 2.1 Gy (D95). The median PTV2 dose for 3D-45, 3D-54, HT-SIB, VMAT-SIB, and IMRT-SIB was 45, 55, 54, 56, and 55 Gy, respectively. Therefore, the dose to PTV2 in the SIB plans was comparable to the 3D-54 plan. The
lung dose in the SIB plans was in the range of the standard 3D-45, which is applied for neoadjuvant radiotherapy. The mean lung dose for the same plans was 13, 15, 12, 12, and 13 Gy, respectively. The V5 lung volumes were 71, 74, 79, 75, and 73 %, respectively. The V20 lung volumes were 20, 25, 16, 18, and 19 %, respectively. New treatment planning techniques enable higher doses to be delivered for neoadjuvant radiotherapy of LAEC without a significant increase in the delivered dose to the organs at risk. Clinical investigations are warranted to study the clinical safety and feasibility of applying higher doses through advanced techniques in the neoadjuvant treatment of LAEC.