

Is two-dimensional field definition sufficient for pelvic node coverage in rectal cancer compared to technical three-dimensional definition?

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ABSTRACT

Background and aim. To assess the effectiveness of the potential advantages with 3-dimensional-based treatment planning *versus* 2-dimensional pelvic bone-based treatment planning in patients with rectal cancer, controlled for clinical stage.

Methods and materials. Areas at risk from computed tomography in 30 patients were delineated: mesorectum, presacral, internal iliac, obturator and external iliac nodes. Two planning target volumes per patient were created: PTV_T3 (M + PSN + ON + IIN) and PTV_T4 (M + PSN + ON + IIN + EIN). Two- and 3-dimensional treatment plans for each planning target volume were calculated. Three analyses were performed: 1) mean volume receiving doses >95% and >105%; according to the percentage of prescribed dose to cover at least 95% of the planning target volume, the treatment plan was defined as optimal dose >95%, acceptable dose between 95% and 90%, inferior dose <90%; 2) comparison of the percentage of volume covered by the dose for 2- *vs* 3-dimensional; 3) determination of the doses at which the lack of volume coverage started to decrease significantly.

Results. For PTV_T3, the following was seen: 1) 2D *vs* 3D comparison showed optimal PTV_T3 coverage in 76.7% and 96.7%, respectively; 2) 2D *vs* 3D TP coverage difference was significant between 29%-95% of the total dose; 3) the lack of volume coverage started at 30% for 2D and 89% for 3D. For PTV_T4, the following was seen: 1) 2D *vs* 3D comparison showed an optimal PTV_T4 coverage in 33.3% and 86.7%, respectively; 2) 2D *vs* 3D TP coverage difference was significant between 7%-97% of the total dose; 3) the lack of volume coverage started at 7% for 2D and 87% for 3D.

Conclusions. The 3D treatment planning was superior to 2D treatment planning in covering areas at risk for pelvic recurrence in patients treated for rectal cancer. The areas with suboptimal coverage may lead to an increased risk of recurrence and should be correlated with the patterns of recurrence.

Key words: dosimetric comparison, radiotherapy, rectal cancer.

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