Comparative dosimetric study between Intensity Modulation Radiotherapy versus Volumetric Modulation Radiotherapy in the treatment of pancreatic cancer patients

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Abstract

Adjective:

The work presented here is the development of the optimal treatment planning for each pancreatic cancer patient whatever his or her tumor's complexibility.

Specifically, the objectives of the work reported here have been as follows; Develop different IMRT and VMAT plans and choose the optimal one for the same cases to best dose delivery time quality and dose avoidance to OAR.,

Materials and Methods:

For each case, after the assessment of all constructed plans we construct comparison between the IMRT plan and the VMAT (2 -Arc plan) plan by using evaluation tools of treatment plan using treatment planning system eclipse and data for Varian linear accelerator model true beam. To date, there have been few papers were published reported the benefits of VMAT use in pancreatic patients compared with IMRT. In current study Twenty n patients with cancer of pancreases treated with two techniques IMRT or VMAT. two arc VMAT(RA) and a 5-field IMRT plan were generated for each of the 20 patients using the same defined tumor volumes, organs at risk (OAR) volumes, dose, fractionation, and constraints for optimization algorithms.

Results and Discussion:

The planning tumor volume (PTV) maximum dose (52.7Gy vs. 54.3 Gy), PTV mean dose (49.2 Gy vs. 47.86 Gy), and conformality index (0.98 vs. 0.94) were statistically significantly for VMAT better than IMRT plan. The VMAT plans had a statistically significant reduction in monitor units compared with the IMRT plans (1459 vs. 546p < 0.003). In addition, the doses to the liver, small bowel, and spinal cord were comparable between the IMRT and VMAT plans. VMAT was preferred in patients with pancreatic cancer and compared with the advance plan of IMRT. VMAT was found to have improved dosimetric parameters for all endpoints considered. Specifically, VMAT lead to huge reduction in monitor units as time for treatment session and improved both kidneys dose reduction as the main OAR.

Conclusion:

The superior plan quality as well as the delivery good efficiency of VMAT in compared with that of IMRT and VMAT may be the preferred as the modality for treating pancreases cancer regardless tumor size and site.