

Dosimetric comparison of 3-D Conformal Radiotherapy (3DCRT) and Intensity Modulated Radiotherapy (IMRT) for patients with hepatocellular carcinoma (HCC).

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Abstract

Introduction

The use of radiotherapy in treating HCC is rapidly increasing. IMRT is more suitable for treating complex target volumes as it creates complex dose distributions that conform to the target volume than those allowed using 3DCRT.

Purpose

To compare dose distribution and dosimetric parameters of 3DCRT and IMRT for patients with hepatocellular carcinoma.

Methods

Ten patients with HCC (average volume 336cc) planned using 3DCRT and IMRT. The PTV, spinal cord, kidneys and normal liver were outlined. 40Gy was prescribed. Dose volume histogram parameters (DVPs) for both plans were compared and analyzed statistically using SPSS Wilcoxon Signed Ranks test.

Results

3DCRT and IMRT achieved adequate and comparable target coverage as assessed by PTV $D_{95\%}$ (39.24Gy and 39.44 Gy, $P= 0.493$) and dose homogeneity index (1.07 and 1.07, $P= 0.257$). For sparing of adjacent normal organs: IMRT resulted in significantly lower irradiated normal liver volume at 5Gy-30Gy; it showed a significant reduction of 2.5%, 5%, 6% and 15% of normal liver V_{5Gy} , V_{10Gy} , V_{20Gy} and V_{30Gy} compared to 3DCRT ($P= 0.041$, 0.010, 0.048 and 0.013 respectively). IMRT also achieved better sparing of spinal cord and kidneys with a non significant reduction of 9%, 12% and 2% of spinal cord maximum dose, right and left kidney mean doses compared to 3DCRT ($P =0.203$, 0.205 and 0.498 respectively).

Conclusion

Comparing the dose distribution of 3DCRT and IMRT of HCC; IMRT provides adequate comparable target coverage with significant sparing of normal liver at 5Gy-30Gy and less exposure of spinal cord and kidneys compared to 3DCRT.