DOSE-VOLUME ANALYSIS FOR 4 PATIENTS WITH RADIATION-INDUCED LIVER DISEASE AFTER 3-DIMENSIONAL CONFORMAL RADIOTHERAPY FOR HEPATOCELLULAR CARCINOMA

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Purpose: To evaluate the feasibility and accuracy of the currently documented models for prediction of radiation -induced liver disease (RILD), for patients with hepatocellular carcinoma (HCC) treated with 3-dimensional conformal radiotherapy.

Materials and Methods: From September 1994 to October 1998, four patients with HCC developed RILD within 3 months after completion of 3-dimensional conformal radiotherapy. All patients had CT simulation with the images including the entire liver. The detailed information from the dose-volume histogram (DVH), including V_{30Gy}, $V_{50\%}$, V_{eff} and prediction score (PS), were calculated and assessed. The complication probabilities were compared with several documented models.

Results: Two patients died of RILD-related hepatic failure and 2 recovered. Two patients had more than half of the liver with > 30 Gy survived but the other 2 patients died of RILD with 40% and 23% of the liver receiving > 30 Gy. Three of 4 patient had the recommended doses of radiation based on the calculated $V_{50\%}$. According to the normal tissue complication probability (NTCP) model, the complication probabilities were less than 5% and within 5-20% if 0.69 and 0.32 were applied for the volume effect parameters, respectively.

Conclusion: All the currently documented models fail to accurately estimate the probability of RILD for the 4 patients with HCC treated with 3-dimensional conformal radiotherapy. It is indicated to establish a model for patients with HCC in Taiwan, using the currently available fractionation and the information from the DVH.

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Key words: Hepatocellular carcinoma, Radiotherapy, Radiation-induced liver disease

INTRODUCTION

Hepatocellular carcinoma (HCC) is the leading cancer death in Taiwan. However, only 10-30% of the patients are surgical candidates at diagnosis [1,7,13]. Transarterial embolization, ethanol injection, and intra-arterial chemotherapy remain the non-surgical treatment of choice. The treatment outcome is still dismal for patients with large and unresectable tumors

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