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Objectives

At our institution, to prevent gastrointestinal (GI) toxicity, the GI tract was spared from the irradiation field midway through proton beam therapy (PBT) for hepatocellular carcinoma (HCC) adjacent to the GI tract. The purpose of this study was to evaluate whether this strategy affects the local recurrence (LR) rate.

Methods

This retrospective study included patients with HCC who underwent PBT at our institution between 2008 and 2018. Patients were categorized into two groups: those with tumors adjacent to the GI tract (GI-adjacent group) and those without (non-adjacent group). Cumulative LR rates were compared between the two groups using Gray's test, treating death without LR as a competing risk. GI toxicities were also evaluated.

Results

A total of 149 patients were included, comprising 20 in GI-adjacent group and 129 in non-adjacent group. Patients in the GI-adjacent group received a total dose of 72.6 to 76 Gy (RBE) administered in 20 to 38 fractions. In the non-adjacent group, patients received a total dose of 66 to 76 Gy (RBE) delivered in 10 to 20 fractions. The median tumor size was 4.35cm (range, 2-15cm) in the GI-adjacent group and 4.3cm (range, 0.8-15cm) in the non-adjacent group. The median follow-up duration was 42 months (range, 1-129 months). The 3-year LR rates were 24.9% (95%CI: 7.2%-48%) for the GI-adjacent group and 13.6% (95%CI: 7.6%-21.3%) for the non-adjacent group. No significant difference was observed when considering competing risk event ($p = 0.52$). Univariate and multivariate analyses indicated that tumor size was associated with LR. Stratified analysis further revealed that, in the GI-adjacent group, larger tumor size was associated with a higher LR rate (HR=1.308; 95% CI: 1.036-1.652; $p=0.024$). No Grade 3 or higher GI toxicities were observed in either group.

Conclusions

For patients with HCC adjacent to the GI tract, sparing the GI tract from the irradiation field during PBT does not appear to adversely affect LR rates. However, larger tumor size may be associated with an increased risk of LR in patients with HCC adjacent to the GI tract.
