Effect of tumor involvement on activity determination of resin Yttrium-90 in selective internal radiation therapy of metastatic liver cancer

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INTRODUCTION

Body surface area (BSA) method is used in determining resin Yttrium-90 (Y90) activity in selective internal radiation therapy of liver metastasis.[1]

Y90 activity is calculated as a summation of activities obtained from height-weight based calculation and tumor involvement (ratio between tumor volume and liver volume).

AIM

The aim of the study was to review the activity calculation, with a focus on investigating the effect of tumor involvement on resin Y90 activity determination.

METHOD

102 cases of resin Y90 microsphere treatment were studied. Calculated activity, i.e., total activity (TA), and tumor involvement (TI) of each case were evaluated.

The contributions of TI to TA, i.e., the effect of TI on TA, were calculated with the ratio of TI/TA.

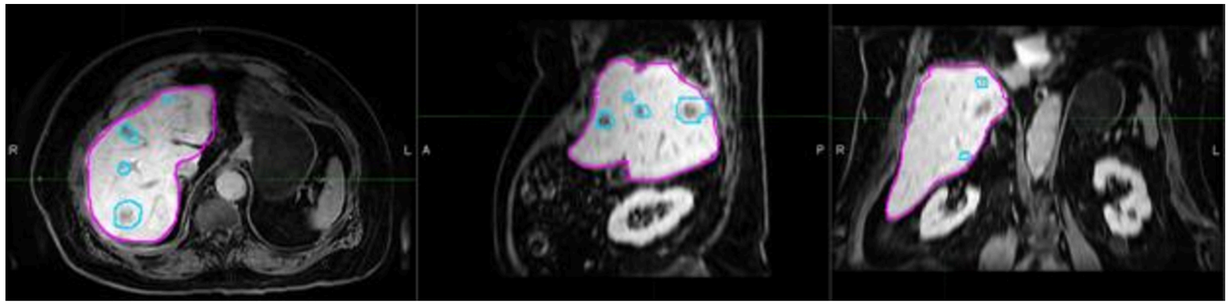

Fig. 1 Example of tumor and liver structures contoured for tumor involvement (TI) calculation. The contribution of TI to total activity (TA) was 1.2% in this case.

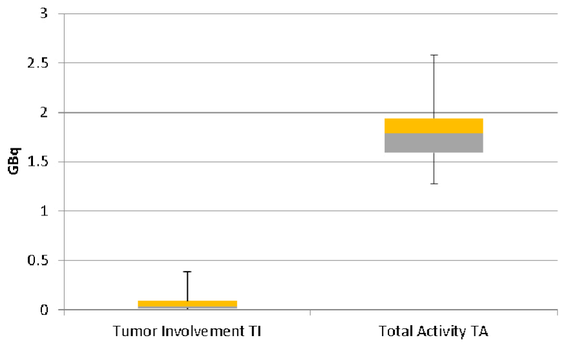

Fig. 2 Tumor Involvement TI and Total Activity TA of 102 cases.

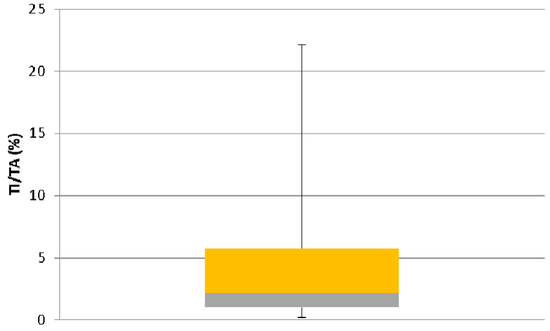

Fig. 3 Ratio of Tumor Involvement TI and Total Activity TA, TI/TA, of 102 cases.

RESULTS

Among the 102 cases, the average contribution of TI to TA was 4.1% (standard deviation 4.4%). The contributions were < 5.8% in 75% of the cases, < 2.2% in 50% of the cases, and < 1.0% in 25% of the cases.

CONCLUSIONS

Overall the effect of tumor involvement on the activity determination was small.

The BSA method could be simplified, i.e., TI could be neglected in the activity determination in quite a number of cases, e.g., in 25% of the cases in the study.

In those cases, contouring tumor and liver structures for TI calculation, which is time consuming, could be avoided, and the efficiency of the workflow for resin Y90 procedures could thus be improved.

REFERENCES

1. Kennedy A et al., Recommendations for radioembolization of hepatic malignancies using yttrium-90 microsphere brachytherapy: a consensus panel report from the radioembolization brachytherapy oncology consortium. Int J Radiat Oncol Biol Phys. 2007 May 1;68(1):13-23.

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