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Abstract

Stereotactic Body Radiotherapy for Pulmonary Oligometastases in Colorectal Cancer Patients: Clinical Outcomes and Prognostic Factors

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Objectives: Stereotactic body radiation therapy (SBRT) has been considered as an option of local therapy that delivers high radiation doses in a few fractions with low morbidity and toxicity. There are many researches available for the pulmonary oligometastases treated with SBRT or the SBRT for CRC oligometastases but few reports specially focused on CRC pulmonary oligometastases. It is necessary to addressed CRC separately: not only for its high morbidity, mortality and great propensity to metastasize but also its radiosensitive histology. This study investigates the efficacy and safety of SBRT for colorectal cancer pulmonary oligometastases and evaluates predictive factors for local control and prognosis.

Methods: This retrospective study included 51 patients with 85 lung metastases treated with SBRT from February 2008 to October 2017. The median follow-up time was estimated with the reverse Kaplan Meier method. The overall survival (OS), progression-free survival (PFS) and local control (LC) rates were calculated by Kaplan-Meier method. Prognostic variables were assessed by using univariable log-rank test and multivariable Cox regression analyses. Youden's index in conjunction with ROC analysis was applied to obtain cut-off points for selected prognostic factors. Statistical significance was defined at a p value of < 0.05. Toxicity was graded according to the Common Terminology Criteria for Adverse Events, version 4.0.

Results: The median follow-up time was 33 months. The median overall survival (OS) and progression-free survival (PFS) were 44 months and 14 months. The 1- and 3-year OS rates, PFS rates, and LC rates were 94% and 62%, 51% and 23%, and 80% and 71%, respectively. On the univariate analysis, the higher BED10 (=138Gy) was significantly associated with better LC (HR 0.378; p=0.032). The 1-year and 3-year LC rates were 92.0% and 79% in higher BED10 (=138Gy) subgroup while were 69.8% and 65.0% in lower BED10 (<138Gy) subgroup. Moreover, the larger sum of GTV (=20mL) was significantly related to worse LC (HR 2.327; p=0.042). The 1-year and 3-year LC rates were 60.8% and 60.9% in larger sum of GTV (=20mL) subgroup while were 86.9% and 74.6% in smaller GTV (<20mL) subgroup. The median BED10 of GTV volume (=20mL) and GTV volume (<20mL) subgroups were 120 Gy and 150 Gy, respectively. On multivariate analysis, BED10 =138Gy was independently associated with favorable LC rates (HR 0.340; p = 0.038). In addition, the patients with lung and other organ oligometastases at SBRT had unfavorable PFS rates (HR 2.144; p = 0.028). The 1-year and 3-year PFS rates were 43.5%

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and 8.7% in extra lung oligometastases subgroup while were 56.5% and 36.8% in only lung oligometastases subgroup. Grade 3 adverse event was only recorded in one patient.

Conclusions: SBRT is a safe, valid and promising non-invasive therapeutic modality with low toxicities and satisfactory outcomes in pulmonary oligometastatic CRC patients, especially patients not eligible for surgery. This study reported that the BED10 escalation (=138Gy) was an independently prognostic factor for better LC. In addition, the patients with lung and other organ oligometastases at SBRT had unfavorable PFS. We identified several prognostic factors but it still requires more prospective clinical trials to obtain convincing evidences.