Purpose: This aim was to explore the relationship between dose-volumetrics and changes of pulmonary function tests (PFTs) and provide criteria of dose-volumetrics to predict these changes of PFTs after radiotherapy with NSCLC.

Methods: Between March 2008 to November 2009, 39 patients (male 30, female 9, median age 66 years) with inoperable NSCLC received definitive 3DCRT or IMRT treatment were included in this study. The GTV included primary tumor and metastasis lymph node in hilar or mediastinum, and delineated the PTV from GTV 1.5 to 2.0 centimeter outside. The prescription doses ranged from 60-68Gy with a median dose of 66Gy. The forced vital capacity (FVC), forced expiratory volume in one second (FEV1.0) and diffusion capacity of carbon monoxide (DLCO) were checked for each patient two times, one week pretreatment and 2 to 4 months after radiotherapy. dose-volumetrics of lung V10, V15, V20, V25, V30, V35, V40, lung mean dose and GTV100, GTV95, GTV90, GTV80 were analyzed. Statistical methods of Pearson and Line regression were used to determine whether correlation existed between these metrics and the changes in PFTs.

Results: This investigation showed that FVC went down 2.4±1.6 from 77.2±18.7 to 74.1±18.5, FEV1.0 went down 5.9±3.2 from 74.1±20.5 to 70.9±20.2 (P=0.065) and DLCO went down 17.9±6.3 from 70.4±20.5 to 59.8±16.0 (P=0.000) after radiotherapy. No correlation was found between dose-volumetrics and the changes in PFTs. Excluding patients (n=15) with pretreatment atelectasis, significant correlation was retained between dose-volumetrics (lung V20, V25, V30, V35, V40, lung mean dose and Veff) and the PFTs changes (P<0.05). Multivariate analysis showed that lung V30 was risk factor for the changes of FEV1.0 and DLCO (P=0.046 and 0.041). Furthermore analysis by stratifies, compared lung V30≥18% and <18%, the dropped values of FVC, FEV1.0, DLCO were 6.9±2.5 and 4.5±1.8 (P=0.061), 15.2±4.0 and 6.1±2.3 (P=0.033), 22.8±2.0 and 11.6±1.4 (P=0.000) respectively, showed PFTs became more worse with lung V30≥18%.

Conclusions: Lung V30 is risk factor to affect PFTs changes in patients with NSCLC excluding those who have had pretreatment atelectasis.

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