Title: Predicting pathological effects using the tumor volume reduction rate after induction chemoradiotherapy in locally advanced non-small-cell lung cancer.

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Purpose: Induction chemoradiotherapy and surgery are standard options in the treatment of locally advanced non-small-cell lung cancer (LA-NSCLC). However, the pathological effect (Ef) to induction chemoradiotherapy (CRT) remains unclear, until the examination of the surgical specimens. In this study, we assessed the possibility of using the tumor volume reduction rates (TVRR) to predict pathological effects to induction CRT

Methods and Materials: A total of 52 patients with LA-NSCLC were treated with induction CRT and surgery between October 2006 and July 2015 and their medical records were retrospectively reviewed. The patient characteristics were as follows: median age, 61.5 years; male/female: 40/12; clinical stage T1/2/3/4: 7/17/16/12; N0/1/2/3: 12/4/34/2 (UICC-7); adenocarcinoma/squamous cell carcinoma/others: 25/23/4. The chemotherapy regimens consisted of carboplatin and paclitaxel in 31 patients or cisplatin and vinorelbine in 21. The irradiation doses were 42Gy in 28 fractions (b.i.d.) in 17 patients, 50Gy in 25 fractions in 29 and others in 6. The surgical resection methods were lobectomy in 50 patients and pneumonectomy in 2. TVRR was determined using the equation TVRR = $(V_{Pre-CRT} - V_{Post-CRT}) / V_{Pre-CRT} \times 100\%$ ($V_{Pre-CRT}$ represents for pre-chemoradiotherapy tumor volume, $V_{Post-CRT}$ represents for post-chemoradiotherapy tumor volume). The pathological effect to induction CRT evaluated after surgical resection was classified as follows; Ef 1: slight pathological response, Ef 2: moderate pathological response, Ef 3: complete pathological response. The Fisher exact test was used for the statistical analysis.

Results: The median pre- and post- induction CRT primary tumor volume were 59.5 (range: 1.0-314) cm^3 and 15.0 (range: 0.5-161) cm^3, respectively. The median tumor volume reduction rate was 0.34 (range: 0.09-0.85). The pathological characteristics were as follows: pathological stage T0/1/2/3/4: 13/14/12/9/4; N0/1/2/3: 32/6/14/0; Ef1/2/3: 13/23/16. Twenty-nine patients had down staging of their primary tumor. The tumor volume reduction rate was significantly correlated to pathological response ($p < 0.01$; Fisher exact test).

Conclusions: The post-induction CRT tumor volume reduction rate can be an important predictive factor for the pathological response after induction CRT.