

## **Reducing futile thoracotomy rates in PET-CT staged non-small cell lung cancer: Clinical risk factors from a population based review**

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### **Objectives**

The use of PET-CT in staging non-small cell lung cancer (NSCLC) reduces futile thoracotomy rates from approximately 40% to 20%. We aimed to identify pre-operative clinical risk factors for futile thoracotomy in patients staged with PET-CT.

### **Methods**

The British Columbia Cancer Agency (BCCA) provides care to 4.5 million people. A retrospective chart review was conducted on all patients referred to the BCCA in 2009-2010 who had staging PET-CT and thoracotomy for NSCLC. Exclusion criteria included clinical N2 disease or any other cancer diagnosis within 5 years. Futile thoracotomy was defined as a benign lung lesion, exploratory thoracotomy, pathologic N2/N3 disease, stage IIIB/IV, inoperable T3/T4 disease, or recurrence or death within 1 year of surgery. The futile thoracotomy and non-futile thoracotomy groups were compared with the Fisher test in univariate analysis and logistic regression model multivariate analysis.

### **Results**

108 patients met inclusion criteria. Thoracotomy was futile in 27 patients (25%); 14 recurred within 1 year of surgery, 10 had pathologic N2 and 1 each incomplete resection, pleural disease at surgery, or death within 1 year. On univariate analysis, PET-CT + N1 (odds ratio [OR] 3.77, p 0.008) and primary tumor size > 3.2 cm (OR 2.93, p 0.026) were associated with futile thoracotomy. On multivariate analysis, ECOG >1 (OR 4.57, p 0.017), PET-CT + N1 status (OR 4.24, p 0.006) and primary tumor size > 3.2cm (OR 2.87, p 0.039) were associated with futile thoracotomy. 82%, 73%, and 60% of patients with these risk factors, respectively, did not undergo mediastinal staging with either mediastinoscopy or endobronchial ultrasound (EBUS). Thoracotomy was futile due to N2 disease in 21% and 23% in patient with a non-staged mediastinum with risk factors of PET-CT+ N1 or primary tumor > 3.2cm, respectively, whereas patients with ECOG greater than 1 had futile thoracotomies primarily due to relapse within 1 year of surgery (31%). Overall, 30% of all patients had pre-operative mediastinal staging with mediastinoscopy and/or EBUS.

### **Conclusions**

Mediastinal staging with mediastinoscopy or EBUS is underutilized for patients with futile thoracotomy risk factors of PET+N1 or primary tumor size >3.2cm, with associated high rates of futile thoracotomy due to N2 disease. Pre-operative ECOG >1 is primarily associated with futile thoracotomy due to relapse within 1 year of surgery, not N2 disease.