How to predict the risk of post-lobectomy complications in elderly lung cancer patients

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Provenance: This is an invited article commissioned by the Section Editor Laura Chiara Guglielmetti (Cantonal Hospital Winterthur, Kantonsspital Winterthur, Winterthur, Switzerland).

Response to: Ibrahim K, Burt BM. The impact of insight on post-lobectomy complications. J Thorac Dis 2019;11:S289-90.

The proportion of elderly lung cancer patients increases. Compared to younger patients, elderly patients are more likely to have many comorbidities and low physical condition. Unfortunately, a number of elderly patients had significant comorbidities, which increases their risks of postoperative short-term mortality as well as their competing risk of cancer specific death. Therefore, careful patient selection is an important responsibility for a surgeon, particularly when the patients are elderly and have several comorbidities.

Previously, the risk of postoperative morbidity was predicted by a single comorbidity, such as chronic obstructive pulmonary disease, interstitial pneumonia, and history of ischemic heart disease. However, elderly patients have several comorbidities; a comprehensive assessment was necessary to predict postoperative morbidity. We derived the risk score for postoperative complications in patients ≥75 years based on the odds ratio as follows; assigning weight points to ECOG-PS as 7, history of coronary artery disease as 6, history of cerebrovascular accident as 3, restrictive ventilatory impairment as 2, sex: male as 1, and interstitial pneumonia as 1. We demonstrated that the postoperative complication rates in patients with risk score of 0 was 19%, score of 1–2 was 29%, score of 3–5 was 56%, score of 6–8 was 68%, score of 9–14 was 90%, respectively. Furthermore, we classified patients with a risk score of 0 as the low-risk group, those with a risk score of 1–2 as the intermediate-risk group, and those with a risk score greater than 3 as the high-risk group. We also demonstrated that

the high-risk group was significantly associated with a poor prognosis. During their postoperative course, cancer specific death occurred in only 27.9% patients; therefore, many died by other conditions like pneumonia. In elderly lung cancer patients, a high-risk score might be a critical factor in determining prognosis, similar to oncologic outcomes, such as pathological stage and histology.

We compared the properties of our scoring system to those of four other published articles. ASA-PS is a classification system which evaluate a patient's overall physical condition and severity of illness. This scale has been widely used by anesthesiologists to assess the intraoperative risks. ASA-PS was also a strong predictor of the postoperative complications after a thoracoscopic lobectomy. Compared to elderly patients with an ASA-PS Grade <3, those with an ASA-PS Grade of 3 had approximately 6-, 3- and 2-fold greater odds of pulmonary and cardiopulmonary complications, and overall morbidity, retrospectively (1). An adult comorbidity evaluation (ACE)-27 score demonstrates that the severity of the comorbidity could become prognostic factors. Yutaka *et al.* added the interstitial pneumonia to the ACE-27 as a grade 2 comorbidity because it is a risk factor for morbidity and poor prognosis. If the modified ACE-27 score was high, the prognosis became significantly poor (hazard ratio: 2.18). They argued that the postoperative oncologic outcome may be easily offset by death caused by other severe comorbidities. So high ACE-27 scores indicate to be prognostic factors as well as pathologic factors (2). Our

risk score could also demonstrate that a high-risk score decreased overall survival. The Charlson-Deyo (CD) score, which indicates an association of comorbidity and poor prognosis, can predict the mortality rate. Husain *et al.* reported that patients aged ≥75 years who received lobectomy in high CD scores had significantly high risk for mortality; the mortality rate was 6.6%, significantly higher than the 2.2% rate observed in all patients (3). Gulack *et al.* also developed a risk score to predict operative mortality (4), using the odds ratio to assign weighted points to risk factors; ages 65–80 years was 3, ages ≥81 was 5, a history of chronic obstructive pulmonary disease was 2, a history of a cerebrovascular accident or a transient ischemic attack was 2, dependent functional status was 3, a smoking history within the past year was 1, and thoracotomy was 1. A patient with a risk score of 5 or less had similar rates of postoperative mortality and major complications, regardless of lobectomy or limited resection, while in patients with a risk score over 6, a lobectomy had significantly higher rates of operative mortality than limited resection.

Indeed, these preexisting scores could predict morbidity or prognosis of multiple cancer patients for all ages. However, we thought that the original score should be made for elderly individuals and lung cancer patients to predict more simply and precisely. Hence, in our study, the number of risk factors was low, and points assigned to the factors were different from preexisting scores.

To advance our scoring model to the echelons of the highest available level of evidence, we need to correct 2 points. First, we will add a confounding factor of ASA-PS, which will classify a patient's physical status in more detail than ECOG-PS and recalculate the odds ratio. Second, to validate our risk score, a prospectively designed, large clinical trial is required.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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