



Surgical strategies for lung cancer patients aged 80 years or older

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Provenance: This is an invited article commissioned by the Section Editor Shuangjiang Li (Department of Thoracic Surgery and West China Medical Center, West China Hospital, Sichuan University, Chengdu, China).

Comment on: Hino H, Karasaki T, Yoshida Y, *et al.* Risk factors for postoperative complications and long-term survival in lung cancer patients older than 80 years. *Eur J Cardiothorac Surg* 2018;53:980-6.

Submitted Apr 17, 2019. Accepted for publication May 21, 2019.

doi: 10.21037/jtd.2019.05.64

View this article at: <http://dx.doi.org/10.21037/jtd.2019.05.64>

Lung cancer ranks the leading cause of malignancy-related death worldwide (1). There is an increasing number of octogenarians with operable lung cancer during the latest decades (2). However, life expectancy for people with ≥ 80 years old is limited by death from a variety of natural causes, especially from malignant progression and coexistent common comorbidities. Thus, octogenarian patients are less likely to expect to undergo surgical resection. Also, both morbidity and mortality rates are higher in octogenarians compared with those in younger patients. Despite substantial advances in minimally invasive techniques, anesthesia strategies, and postoperative care (3), thoracic surgeons still hesitate to recommend radical surgery for octogenarians with lung cancer. Therefore, a meticulous preoperative risk assessment might help surgeons to settle the optimal treatment option for octogenarians, including non-operative therapy, the extent of pulmonary resection (lobectomy, limited segmentectomy and wedge resection) and lymph node dissection (without any lymph node dissection, hilar lymph node dissection or complete mediastinal lymph node dissection).

Several previous studies have demonstrated that curative pulmonary resection is a safe and effective treatment method and provides satisfactory surgical outcomes in terms of short-term mortality, morbidity and long-term prognosis for octogenarians with lung cancer (4-7). Therefore, chronological age alone should not contraindicate surgical resection for lung cancer (8). To our knowledge, to reduce postoperative morbidity and mortality rates, identification of the putative risk factors which help to select appropriate

candidates for surgery is extremely essential. We are in great interest in the excellent article reported by Hino *et al.* (5) in the *European Journal of Cardio-Thoracic Surgery*. The authors presented acceptable 5-year overall and recurrence-free survival rates (66.1% and 60.3%, respectively). Meanwhile, they demonstrated that male gender and operation time were leading risk factors for postoperative complications, and male gender, Charlson Comorbidity Index (CCI), Glasgow Prognostic Score (GPS) and p-stage were independent prognostic factors for the long-term survival of octogenarians with lung cancer. Therefore, gender, CCI, and GPS can be considered preoperatively in routine clinical practice to select individuals who are suitable for surgical treatment.

In the Hino's study, a total of 119 (35.3%) octogenarians developed complications postoperatively, which compared favorably with those reported in previous studies (2,3,7). Perioperative mortality among octogenarians undergoing lung cancer surgery has been reported to range 0-21% in the available literature (3). The possible reasons underlying a lower mortality rate (1.8%) in Hino's study might be attributed to a fairly strict patient selection and application of video-assisted thoracoscopic surgery (VATS). In the study, 82.2% of the patients have been diagnosed with pathological stage I tumors. Meanwhile, VATS or hybrid VATS was performed for 72.1% of the patients.

The standardized surgical procedure for lung cancer was lobectomy with systematic mediastinal lymph node dissection. However, we suggest that thoracic surgeons should not only focus on the 'curative' intent of surgical

procedure but also consider the quality of life after surgery since the extent of surgery is generally regarded as a major determinant of operative risk (9). To decrease both morbidity and mortality rates, a limited resection with less extent of lymph node dissection was preferred to the octogenarian lung cancer patients with multiple underlying comorbidities. This study conducted by Hino *et al.* (5) indicated that the extent of lung resection was not a significant factor for the survival of octogenarian patients undergoing curative resection for p-stage I–IIIA lung cancer. Other existing evidence has demonstrated that sub-lobar resection (segmentectomy or wedge resection) is superior to standardized lobectomy for octogenarians with early-stage lung cancer in terms of morbidity rate, long-term oncological outcomes and quality of life (6,7,10,11). Therefore, sub-lobar resection may serve as a reasonable surgical alternative for octogenarian patients with early-stage lung cancer without compromising long-term survival. Also, limited sub-lobar resection has less impact on the quality of life than a lobectomy because of a decline in surgical stress and impaired pulmonary function.

Presence of lymph node metastasis is one of the most important prognostic factors in lung cancer patients. Dissecting a limited number of lymph nodes might cause stage migration. Extensive lymphadenectomy contributes to clean the potential micro-metastatic nodes and define the pN status accurately, contributing to improving the survival outcomes. However, extensive lymph node dissection is considered as a risk factor for postoperative complications in octogenarians (6), which may subsequently hurt long-term survival. Interestingly, in Hino's study (5), mediastinal lymph node dissection didn't have any impact on survival. The authors speculated that pulmonary resection without complete mediastinal lymph node dissection could be suggested in the selective octogenarians. Of course, the indication for lymph node dissection must be carefully considered. Similar results have been reported in many previous studies (4,6,12). Miyazaki *et al.* (4) did not identify the lymph node dissection (mediastinal *vs.* limited) as a significant prognostic factor for long-term outcomes of lung cancer octogenarians (stage I tumor accounting for 73.1% of the cohort). Okami *et al.* (6) indicated that the extent of lymph node dissection was not significantly associated with postoperative survival but was a significant risk factor for postoperative complications. Therefore, limited lymph node dissection should be considered for octogenarian patients who have early-stage lung cancer with severe preoperative comorbidities, even though there is a paradox to the survival

benefit of more extensive lymphadenectomy (13).

Prior studies (14,15) have reported a range of advantages of VATS for octogenarian patients with operable lung cancer, including the less blood loss, shortened period of chest tube drainage, and lower level of maximal serum creatine phosphokinase after surgery, leading to a large decline in morbidity and mortality rates. Therefore, to improve both short-term and long-term survival without increasing the invasiveness, VATS-operated sub-lobar resection with less extent of lymph node dissection is highly recommended for high-risk octogenarian lung cancer patients rather than just remaining conservative management or leaving untreated.

The median life expectancy of octogenarians, generally six years for male and eight years for female, is relatively longer compared to the 1.5 years for patients remaining untreated or palliating operable lung cancer (2). In our opinion, octogenarians should not be denied surgery solely due to their advanced age. Of course, a detailed preoperative risk evaluation must be performed to help thoracic surgeons to select appropriate candidates for pulmonary resection. In the selected cases, a multi-disciplinary team meeting among pulmonologists, radiologists, oncologists, thoracic surgeons, anesthesiologists, cardiologists, geriatric specialists, and physical therapists should be more carefully prepared before surgery.

We congratulate Dr. Hino and his colleagues for this innovative and excellent study, although some points of their study warrant further discussion. Firstly, it has been reported that octogenarians usually experience at least one comorbidity (16). CCI has been developed by taking into account the number and severity of comorbid diseases and proved to be a reliable prognostic indicator for octogenarians undergoing lung cancer surgery (17,18). However, not all comorbidities have the same impact on long-term survival, and the type of comorbidity (particularly the cardiovascular and respiratory diseases) should also be focused on (19). For example, a clinical report from the Mayo Clinic (7) demonstrated that previous stroke is independent of other comorbid diseases as a significant risk factor for postoperative morbidity in octogenarians with lung cancer. Secondly, the study conducted by Hino *et al.* (5) presented a cohort of octogenarians undergoing radical surgery for stage I–IIIA lung cancer. We recommend that further subgroup analysis based on different TNM-stages can be considered in a larger elderly cohort. Thirdly, the results regarding the independent risk factors for postoperative morbidities vary across studies. The heterogeneity in the morbidity definition may be the potential reason (20). We strongly recommend the Society

of Thoracic Surgeons and the European Society of Thoracic Surgeons joint standardization of variable definitions for more risk analysis studies in the future (21).

Acknowledgments

We give special thanks to Dr. Shuangjiang Li, from Department of Thoracic Surgery, West China Medical Center, West China Hospital, Sichuan University, Chengdu, China, for his great help for English language editing on this manuscript.

Footnote

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

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Cite this article as: Zhang H, Zhang W, Shang Q, Chen L, Zhou Q. Surgical strategies for lung cancer patients aged 80 years or older. *J Thorac Dis* 2019;11(6):2198-2200. doi: 10.21037/jtd.2019.05.64