

Distinct Trajectories of Dyspnea-Related Functional Impairment by the Extent of Lung Resection in Early-Stage Lung Cancer

Joosun Shin¹; Bryan Rettner²; Sandeep Bodduluri³; Vignesh Raman¹; Angela Wei^{2,6}; Alexander Zhu^{2,6}; Alexandra Potter^{2,6}; Deepti Srinivasan^{2,4}; Chase Marso^{2,6}; Michael Lanuti^{2,6}; Xiao Li⁵; **Chi-Fu Jeffrey Yang^{2,6}**

¹ University of California, Los Angeles ² Massachusetts General Hospital ³ University of Alabama at Birmingham ⁴ Tufts University ⁵ Case Western Reserve University ⁶ Harvard Medical School

Background

- Dyspnea-related functional impairment is common after lung resection and may delay recovery
- Distinct longitudinal trajectories of dyspnea-related functional impairment by the extent of lung resection remain poorly characterized

Purpose

- Characterize trajectories of dyspnea-related functional impairment over 90 days following surgery by the extent of lung resection

Methods

- Design:** Nested prospective cohort study of thoracic surgical patients (N = 73) at a single academic center (10/2024 – 12/2025)



- Measure:** Modified Medical Research Council (mMRC: range 0 – 4) dyspnea scale
- Endpoint:** Change in mMRC score over time. A clinically meaningful change was defined as a 1-point difference
- Analysis:** Linear mixed-effects models with fixed effects for time and random intercepts for individuals were used, adjusting for age, sex, body mass index, and smoking status. Time-by-group interactions assessed differences by the extent of lung resection

Results

Table 1. Longitudinal changes in mMRC dyspnea scores by the extent of lung resection

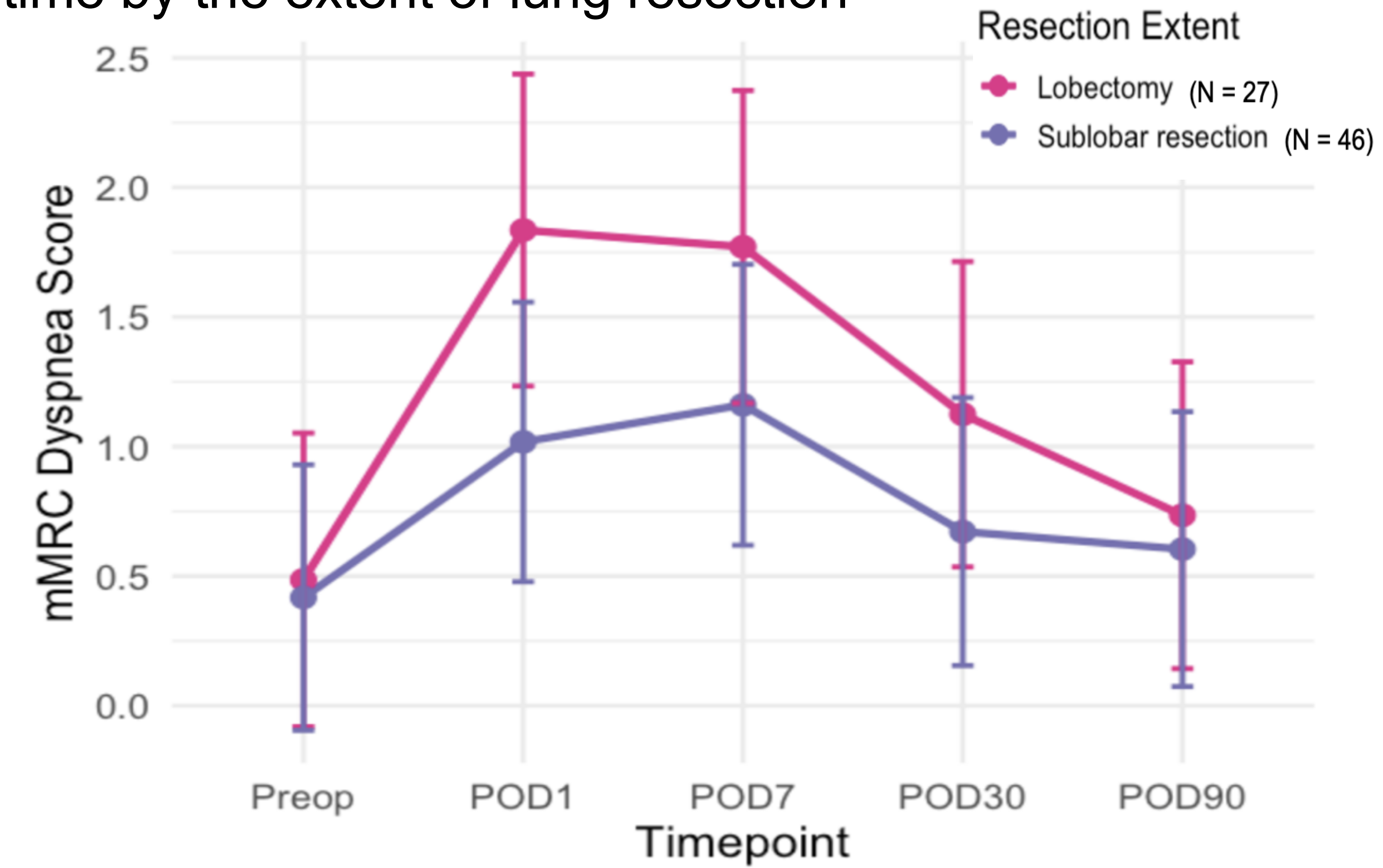
Comparison	Δ mMRC	SE	p-value
Lobectomy (N = 27)			
Preop vs POD1	-1.35	0.22	<0.001
Preop vs POD7	-1.29	0.22	<0.001
Preop vs POD30	-0.64	0.21	0.021
Preop vs POD90	-0.25	0.21	0.764
POD1 vs POD7	+0.06	0.24	0.999
POD1 vs POD30	+0.71	0.23	0.021
POD1 vs POD90	+1.10	0.24	<0.001
POD7 vs POD30	+0.65	0.23	0.041
POD7 vs POD90	+1.04	0.23	<0.001
POD30 vs POD90	+0.39	0.22	0.397
Sublobar resection (N = 46)			
Preop vs POD1	-0.60	0.17	0.006
Preop vs POD7	-0.74	0.18	<0.001
Preop vs POD30	-0.25	0.17	0.553
Preop vs POD90	-0.19	0.18	0.844
POD1 vs POD7	-0.14	0.19	0.942
POD1 vs POD30	+0.35	0.18	0.312
POD1 vs POD90	+0.41	0.20	0.217
POD7 vs POD30	+0.49	0.18	0.061
POD7 vs POD90	+0.56	0.20	0.038
POD30 vs POD90	+0.07	0.19	0.996

Values are estimated marginal mean differences from linear mixed-effects models adjusted for age, sex, body mass index, and smoking status. Negative values indicate worse dyspnea-related functional impairment relative to the reference time point

p-values adjusted using the Tukey method; bold rows are statistically significant

mMRC = modified Medical Research Council; Preop = preoperative day; POD = postoperative day; SE = standard error

Figure 1. Adjusted mean mMRC dyspnea scores over time by the extent of lung resection



Error bars represent 95% confidence intervals
Abbreviations: mMRC = modified Medical Research Council; Preop = preoperative day; POD = postoperative day

Conclusions & Clinical Implications

- Dyspnea-related functional impairment increases early after lung resection in both groups
 - Peaks within the first postoperative week
 - Returns to baseline by 90 days
- Distinct trajectories by the extent of lung resection
 - Sublobar resection is associated with less dyspnea-related functional impairment than lobectomy during the first postoperative month
- Preliminary findings can be used to inform perioperative education for patients with early-stage lung cancer
- Risk-stratified perioperative symptom management by resection extent may be required for patients with early-stage lung cancer