

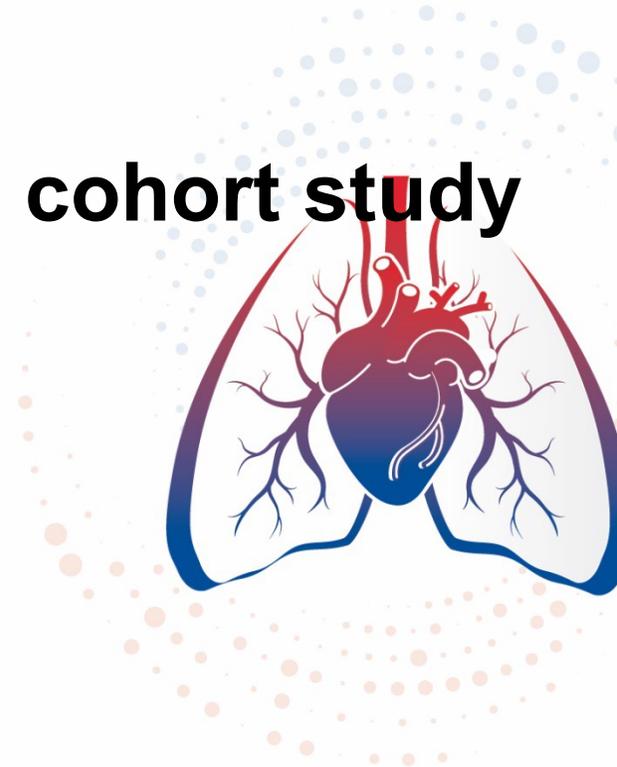
2023 대한심장혈관흉부외과학회

# 제55차 추계학술대회 & APELSO 2023

2023. 11. 02 (Thu) - 11. 04 (Sat), 그랜드 인터컨티넨탈 파르나스 서울

**LUng CAncer Surgery in sarcoPENia patients:**

**Final results for early outcome from prospective cohort study**



- Sarcopenia has previously been shown to be a predictor of poor surgical results and long-term outcomes in patients with lung cancer.
- However, the evidence is limited due to the lack of standardized measurements of sarcopenia and small retrospective studies.
- The aim of this study was to investigate the association between sarcopenia and outcomes of lung cancer patients undergoing curative surgical resection with large prospective cohort study

Target number of the cohort = 400

From April 2021 to July 2023,  
Age over 70 undergoing lung cancer surgery



Total screened patients  
(n=650)

Previous cancer Hx within 5 year (n=101)  
Refusal to enrollment (n=36)  
Other reasons (n=103)

Enrolled patients (n=400)

Not lung cancer (N=15)  
Pleural seeding (N = 5)  
Operation canceled (N = 5)  
Other reasons (N = 3)

N = 372

## Pre-operative evaluation

- Routine lung cancer w/u with PFT (FVC, FEV<sub>1</sub>, D<sub>LCO</sub>)
- Sarcopenia work up
  - 1) Appendicular skeletal muscle mass (ASM)  
→ Bioelectrical impedance analysis
  - 2) Muscle Strength → Handgrip strength
  - 3) Physical performance → 6-meter walk speed
    - **Diagnosis:** Low ASM + (Low muscle strength AND/OR Low physical performance)  
*(based on Asian Working Group for Sarcopenia 2019)*
- Questionnaires
  - Geriatric depression scale → GDS-K
  - Quality of life → EQ-5D-5L, EQ-VAS
  - Cognitive function → K-MOCA



Planned Surgery → ERAS



## Follow-up

- PFT at 1 year after surgery
- Questionnaires at 1, 3 and 5 years after surgery

	Normal group (n=334)	Sarcopenia group (n=24)	p value
Age	74.0 (70.0-86.0)	75.5 (70.0 – 86.0)	0.109
Male	211 (63.2%)	19 (79.2%)	0.128
BMI (kg/m <sup>2</sup> )	24.3 (17.0 – 33.7)	22.6 (18.1 – 27.5)	0.042
Ever smoker	189 (56.6%)	16 (66.7%)	0.397
ECOG ≥1	47 (14.1%)	7 (29.2%)	0.069
ASM index (kg/m <sup>2</sup> )	7.7 (5.4 – 11.2)	6.6 (5.4 – 9.8)	<0.001
Handgrip strength (kg)	25.1 (7.8 – 47.6)	24.4 (8.4 – 36.4)	0.581
Gait speed (m/sec)	1.01 (0.40 – 1.72)	0.97 (0.56 – 1.54)	0.366
FVC (% predicted)	106.0 (64.0-160.0)	103.5 (56.0 – 137.0)	0.428
FEV1 (% predicted)	109.5 (59.0 – 190.0)	105.0 (59.0 – 157.0)	0.341
DLCO (% predicted)	98.0 (50.0 – 172.0)	92.0 (60.0 – 134.0)	0.278
cStage			<0.001
I	275 (82.3%)	12 (50.0%)	
II	36 (10.8%)	9 (37.5%)	
III	22 (6.6%)	2 (8.3%)	
Minimal invasive surgery	302 (90.4%)	20 (83.3%)	0.284
Op extent			0.864
subloabr	101 (30.2%)	8 (33.3%)	
lobectomy/bilobectomy	229 (68.6%)	16 (66.7%)	
pneumonectomy	4 (1.2%)	0	
Complication	72 (21.6%)	6 (25.0%)	0.798
Major complication	12 (3.6%)	2 (8.3%)	0.240
Respiratory complication	51 (15.3%)	5 (20.8%)	0.558
Major respiratory complication	4 (1.2%)	2 (8.3%)	0.055
In-hospital mortality	0	0	
Length of stay in hospital	4 (1 - 33)	4 (2 – 113)	0.334

## Postoperative complication

	Normal group (n=334)	Sarcopenia group (n=24)
Prolonged air leak	34 (10.2%)	2 (8.3%)
Atrial fibrillation	8 (2.4%)	2 (8.3%)
Pneumonia	15 (4.5%)	2 (8.3%)
Chylothorax	9 (2.7%)	0
Recurrent laryngeal nerve palsy	3 (0.9%)	0
Post operative bleeding	2 (0.6%)	0

## Questionnaires

	Normal group	Sarcopenia group	p value
GDS-K	3 (0 – 26)	7 (0– 22)	0.007
EQ5D5L index	0.829 (0.471 – 1.000)	0.728 (0.563 - 1.000)	0.010
EQ VAS	80 (40 – 100)	70 (45 – 100)	0.024
K-MOCA (≤17)	22 (14- 30)	22 (7-29)	0.387

- Most baseline clinical characteristics, except BMI, were similar between normal and sarcopenia group. **There were no difference in post-operative complication rate and length of hospital stays.**
- **Sarcopenia patients had more depression and low Quality of life scores preoperatively.**

## Multivariable analysis for all complications

	Univariable analysis		Multivariable analysis	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Age	0.98 (0.91 – 1.05)	0.605		
Male	3.20 (1.76 – 6.17)	<0.001	3.90 (1.49 – 10.20)	0.005
BMI (kg/m <sup>2</sup> )	0.93 (0.86 – 1.01)	0.091		
Never smoker	0.52 (0.30 – 0.87)	0.015	1.53 (0.65 – 3.50)	0.316
ECOG ≥1	0.86 (0.41 – 1.73)	0.713		
Low ASM index	1.77 (0.80 – 3.72)	0.140		
Low Handgrip strength	0.72 (0.43 – 1.20)	0.209		
Low Gait speed	0.54 (0.32 – 0.91)	0.022	0.62 (0.36 – 1.06)	0.083
FEV1 (% predicted)	0.99 (0.98 – 1.01)	0.389		
DLCO (% predicted)	1.01 (1.00 – 1.02)	0.125		
Sarcopenia (AWGS)	1.21 (0.43 – 3.01)	0.693		
Minimal invasive surgery	0.29 (0.14 – 0.61)	<0.001	0.34 (0.16 – 0.72)	0.004
Op extent				
lobectomy/bilobectomy	reference			
sublobar	0.68 (0.38 – 1.19)	0.233		
pneumonectomy	3.34 (0.39 – 28.3)	0.191		

## Multivariable analysis for respiratory complications

	Univariable analysis		Multivariable analysis	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Age	1.00 (0.93 – 1.09)	0.916		
Male	3.51 (1.74 – 7.86)	<0.001	3.74 (1.42 – 9.82)	0.007
BMI (kg/m <sup>2</sup> )	0.86 (0.78 – 0.95)	0.002	0.94 (0.86 – 1.03)	0.185
Never smoker	0.54 (0.29 – 0.97)	0.042	1.50 (0.63 – 3.44)	0.341
ECOG ≥1	0.89 (0.37 – 1.90)	0.770		
Low ASM index	2.03 (0.85 – 4.45)	0.090	1.27 (0.53 – 2.90)	0.574
Low Handgrip strength	1.01 (0.57 – 1.77)	0.982		
Low Gait speed	0.58 (0.32 – 1.02)	0.064	0.63 (0.36 – 1.08)	0.095
FEV1 (% predicted)	0.99 (0.98 – 1.01)	0.536		
DLCO (% predicted)	1.01 (1.00 – 1.02)	0.140		
Sarcopenia (AWGS)	1.46 (0.47 – 3.82)	0.471		
Minimal invasive surgery	0.37 (0.18 – 0.83)	0.012	0.35 (0.17 – 0.73)	0.050
Op extent				
lobectomy/bilobectomy	reference			
sublobar	0.63 (0.31 – 1.20)	0.176		
pneumonectomy	1.61 (0.08 – 12.88)	0.685		

- By multivariable analysis, we identified that the values for evaluating sarcopenia (ASM index, handgrip strength, gait speed) was not correlated with the rate of both all complications and respiratory complications.
- **Traditional risk factors such as male gender, minimally invasive surgery were significantly associated with the rate of complications**

- This study is the first large prospective cohort study that evaluated the sarcopenia according to the international guideline and analyzed the clinical outcome after lung cancer surgery.
- The sarcopenia group had a higher rate of generic depression, a lower life of quality score. However, the baseline and clinical characteristics were not different between normal and sarcopenia groups.
- The postoperative outcome and length of stays were also similar between the two groups. Moreover, the multivariable analysis showed that traditional risk factors, not sarcopenia variables, were significantly associated with all complications as well as respiratory complications.
- In the era of minimally invasive surgery and ERAS, the lung cancer surgery can be safely performed in old age, sarcopenic patients. Long-term effects of sarcopenia should be closely followed up for this prospective cohort.