■ Sat-221 ■

Contributory factors and prevalence of obstructive sleep apnea in patients with ILD in Korea

인제대학교 해운대백병원 내과

*이원혁, 정나리, 이재하, 장항제

Background/Aims: The Recent literatures show an increased of obstructive sleep apnea (OSA) in patient with interstitial lung disease (ILD), also a worse quality of sleep-life and poor prognosis than ILD alone are well known. But, contributory factors and prevalence of OSA in Korean patients with ILD are not well defined. **Methods:** Between December 2017 and June 2018, thirty seven ILD patients (IPF 24, other ILD 13), who were hospitalized at Haeundae-Paik hospital, were included and clinical data were prospectively analyzed. Portable monitoring (SOMNOcheck micro) was performed. **Results:** In thirty seven patient (aged 69.1 ± 11.6, men 64.9%), OSA was diagnosed in seventeen (45.9%), according to AHI ≥5. IPF was the most common among ILD with OSA and age (p=0.020), male sex (p=0.040), neck circumference (p=0.015) and history of diabetes mellitus (p=0.004) were a significantly different between two groups. Comparing IPF and other ILD, the prevalence of OSA was high in the IPF (62.5% vs 15.4%, p=0.006), FVC and FEV1 in spirometry was statistically different factors. Also, in sleep assessment, the distinction in longest apnea duration (p=0.002) in with or without OSA were found. **Conclusions:** The prevalence of OSA in patients with ILD in this study was 45.9%. IPF, older age, male sex and neck circumference is significant predictor of OSA in ILD. In sleep architecture, longest apnea duration is a characteristic finding. Evaluation for obstructive sleep apnea is preferentially needed in ILD patients with these factors.

Table 1. Baseline characteristics of 37 ILD patients with and without OSA

Characteristics	ILD with OSA (n = 17)	ILD without OSA (n = 20)	*P* - value
Age, years	73.7 ± 7.9	65.2 ± 12.9	0.020
Male, n(%)	14 (82.4)	10 (50.0)	0.040
Height (cm)	163.6 ± 7.4	159.7 ± 9.3	0.220
Weight, (kg)	66.3 ± 11.1	59.2 ± 14.2	0.065
BMI, (kg/m²)	24.7 ± 3.6	23.1 ± 4.1	0.232
Neck circumference (cm)	38.1 ± 3.7	34.9 ± 4.5	0.015
Interstitial lung disease			0.033
Idiopathic pulmonary fibrosis	15 (88.2)	9 (45.0)	
Nonspecific interstitial pneumonia	0	2 (10.0)	
Connective tissue disease-related	1 (5.9)	6 (45.0)	
Cryptogenic organising pneumonia	0	2 (10.0)	
Hypersensitivity pneumonitis	1 (5.9)	1 (5.0)	
Long term home oxygen therapy	2 (11.8)	4 (20.0)	0.667
Previous acute exacerbation	4 (23.5)	6 (30.0)	0.725
Underlying disease/condition, n(%)			
Cardiovascular disease	10 (58.8)	10 (50.0)	0.629
Diabetes mellitus	9 (52.9)	2 (10.0)	0.004
Chronic kidney disease	3 (17.6)	1 (5.0)	0.315
Chronic liver disease	2 (11.8)	1 (5.0)	0.584
Neurovascular disease	5 (29.4)	2 (10.0)	0.212
Gastroesophageal reflux disease	7 (41.2)	5 (25.0)	0.160
Malignancy	3 (17.6)	3 (15.0)	1.000
SBQ risk, n(%)			0.369
Low risk	2 (11.8)	8 (40.0)	
Moderate risk	12 (70.6)	7 (35.0)	
High risk	3 (17.6)	5 (25.0)	
BQ risk, n (%)	12 (70.6)	11 (55.0)	0.330

All data are reported as the mean ± SD, unless otherwise specified.
BMI, body mass index; BQ, Berlin questionnaire; SBQ, STOP-Bang Questionnaire

Table 2. Physiologic characteristics and sleep architecture of 37 ILD patients with and without OSA

Characteristics	ILD with OSA (n = 17)	ILD without OSA (n = 20)	*P* - value
Spirometry			
FVC(L)	2.9 ± 0.7	2.5 ± 0.6	0.071
FVC (% predicted)	73.9 ± 14.5	72.7 ± 10.9	0.975
FEV1 (L)	2.28 ± 0.5	1.96 ± 0.4	0.052
FEV1 (% predicted)	85.4 ± 14.6	79.2 ± 17.0	0.156
FEV1/FVC (%)	78.2 ± 6.4	78.7 ± 7.6	0.684
DLco (L)	10.4 ± 3.1	8.8 ± 3.2	0.117
DLco (% predicted)	56.7 ± 14.3	49.7 ± 17.2	0.365
Six-minute walk test			
Distance (m)	394.1 ± 72.3	325.6 ± 111.3	0.082
Initial SpO2 (%)	96.2 ± 2.3	94.5 ± 4.6	0.478
Lowest SpO2 (%)	89.9 ± 5.5	87.1 ± 10.8	0.737
Polysomnographic data			
Apnea	12.2 ± 9.4	0.86 ± 0.87	<0.001
Hypopnea	5.2 ± 2.6	1.0 ± 0.76	<0.001
Mean SpO2 (%)	94.8 ± 1.6	94.7 ± 1.8	0.775
Lowest SpO2 (%)	82.9 ± 6.6	83.6 ± 5.8	0.916
Duration <90% for 5 min (min)	2.4 ± 3.8	1.9 ± 5.5	0.557
Snoring (%)	5.2 ± 9.1	4.2 ± 7.5	0.568
Longest apnea (second)	39.9 ± 13.9	16.3 ± 9.8	<0.001
Arousal index	11.9 ± 7.9	8.7 ± 6.4	0.350

Table 3. Comparison of characteristics and sleep architecture between IPF and other ILD patients

Characteristics	IPF (n = 24)	Other ILD (n = 13)	*P* - value
Age, years	75.3 ± 6.9	61.3 ± 14.3	0.003
Male, n(%)	21 (87.5)	3 (23)	<0.001
Height (cm)	164.4 ± 8.1	156.2 ± 7.2	0.005
BMI, (kg/m²)	24.2 ± 3.5	23.4 ± 4.5	0.212
Smoking, n (%)	18 (75)	3 (23)	0.002
Neck circumference (cm)	38.3 ± 3.9	32.9 ± 3.1	<0.001
Arterial oxygen pressure (mmHg)	83.8 ± 25.2	82.7 ± 31.7	0.360
BAL			
Neutrophil (%)	25.5 ± 22.7	11.5 ± 11.4	0.091
Lymphocyte (%)	34.4 ± 28.5	16.3 ± 12.3	0.049
Spirometry			
FVC (L measured)	2.9 ± 0.7	2.3 ± 0.3	0.016
FEV1 (L measured)	2.2 ± 0.5	1.9 ± 0.3	0.041
DLco (L measure)	82.7 ± 31.7	82.7 ± 31.7	0.291
Six-minute walk test			
Distance (m)	373.9 ± 95.2	322.1 ± 105.6	0.129
Initial SpO2 (%)	95.6 ± 2.9	94.8 ± 5.4	0.535
Lowest SpO2 (%)	88.7 ± 6.3	87.7 ± 12.9	0.458
Polysomnographic data			
Obstructive sleep apnea	15 (62.5)	2 (15.4)	0.006
AHI index	13.2 ± 11.9	1.95 ± 2.1	<0.001
Mean SpO2 (%)	94.7 ± 1.8	94.7 ± 1.6	0.962
Lowest SpO2 (%)	83.1 ± 5.7	83.6 ± 6.9	0.626
Duration <90% for 5 min(min)	2.7 ± 5.5	1.1 ± 2.8	0.263
Snoring (%)	6.1 ± 9.6	3.4 ± 8.2	0.161
Longest apnea(second)	33.8 ± 15.7	16.3 ± 12.7	0.002
Arousal index	8.3 ± 5.9	12.2 ± 8.1	0.158

All data are reported as the mean ± SD, unless otherwise specified.
FVC, forced vital capacity, FEV1, forced expiratory volume in one second; DLco, diffusing capacity for carbon monoxide; SpO2, saturation of percutaneous oxygen
Smoking – current smoker and ex-smoker

■ Sat-222 ■

Blood urea nitrogen to albumin ratio predicts 28-day mortality of critically ill patients

연세대학교 의과대학 내과학교실

*장혜진, 정경수, 김송이, 정지예, 강영애, 박무석, 김영삼, 장준, 임아영

Background/Aims: High blood urea nitrogen (BUN) and low albumin are common in critically ill patients and related with poor outcomes. The aim of this study is to evaluate the association between the BUN/albumin ratio and prognosis of critically ill patients. **Methods:** This was a retrospective cohort study of 538 patients admitted to the medical ICU. We evaluated the prognostic value of BUN/albumin ratio to predict mortality at 28 days after ICU admission, using Cox proportional hazard model and Kaplan-Meier survival analysis. **Results:** The 28-day mortality was 31.2%. In the univariate analysis, the Acute Physiology and Chronic Health Evaluation II (APACHE II) score (P<0.001), BUN level (P<0.001), albumin level (P<0.001), and BUN/albumin ratio (P<0.001) were related to 28-day mortality in ICU patients (Table 1). The receiver operating characteristic curves for mortality in ICU patients between the BUN/albumin ratio and the APACHE II score and the area under the curve (0.629 and 0.688, respectively) were not significantly different (P=0.084) (Figure 1). The cut-off point for BUN/albumin ratio for mortality in ICU patients was 9.98. On Cox proportional-hazard regression analysis, APACHE II score (hazards ratio [HR]=1.05, 95% CI=1.04–1.07, P<0.001) and BUN/albumin ratio (HR=1.93, 95% CI=1.39–2.66, P<0.001 for high BUN/albumin ratio) were independent predictors of 28-day mortality (Table 2). In the Kaplan-Meier survival analysis, a higher BUN/albumin ratio (> 9.98) was significantly correlated with higher 28-day mortality rates (P=0.001) (Figure 2). **Conclusions:** Higher BUN/albumin ratio was associated with increased mortality in critically ill patients. Therefore, clinicians might predict poor prognosis through the initial assessment of BUN/albumin ratio.

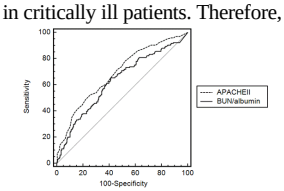

Figure 1

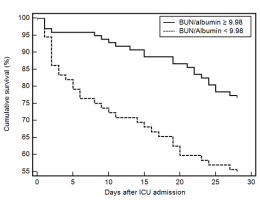

Figure 2

Table 1. Baseline characteristics of patients at ICU admission (n=538, day 0)

Variables	Survivors (n=370)	Non-survivors (n=168)	*P*-value
Age, yr	64.7 ± 15.8	66.8 ± 13.6	0.135
Male	232 (62.7)	100 (59.5)	0.482
BMI, kg/m²	22.0 ± 5.3	21.7 ± 5.4	0.578
Disease severity			
APACHE II score	20.6 ± 9.7	27.5 ± 10.3	<0.001
SOFA score	7.4 ± 3.8	10.6 ± 4.0	<0.001
SAPSII score	36.9 ± 16.9	49.4 ± 19.3	<0.001
Underlying diseases			
Diabetes mellitus	116 (31.4)	43 (25.6)	0.175
Chronic lung disease[b]	64 (17.3)	29 (17.3)	0.992
Hypertension	178 (48.1)	74 (44.0)	0.382
Heart failure	28 (7.6)	11 (6.5)	0.672
Coronary artery disease	33 (8.9)	18 (10.7)	0.510
Cancer	95 (25.7)	62 (36.9)	0.008
Acute renal failure	92 (24.9)	60 (35.7)	0.010
ARDS	34 (9.2)	23 (13.7)	0.116
Sepsis			
Laboratory parameters			
WBC (10^3/uL)	14.7 ± 11.7	14.2 ± 12.7	0.623
Hct (%)	30.6 ± 6.7	28.6 ± 7.1	0.002
Platelets, 10^3/mm^3	188.7 ± 123.9	132.2 ± 115.4	<0.001
Blood urea nitrogen, mg/dL	29.0 ± 20.8	36.9 ± 23.6	<0.001
Albumin, g/dL	2.7 ± 0.5	2.4 ± 0.6	<0.001
Creatinine, mg/dL	2.1 ± 19.4	1.4 ± 1.0	0.613
BUN/Albumin ratio	10.5 ± 8.7	15.1 ± 12.8	<0.001

BMI, body mass index; *APACHE II*, Acute Physiology and Chronic Health Evaluation II; *SOFA*, Sequential Organ Failure Assessment
[a] Data are presented as numbers (percentages) or median (interquartile range) unless otherwise indicated.

Table 2. Cox proportional-hazard regression analysis

Variables	HR	95% CI	p-value
Age	0.992	0.982 - 1.003	0.140
Sex			
Male	Reference	Reference	Reference
Female	1.307	0.959 - 1.782	0.090
BMI			
APACHEII score	1.056	1.038 - 1.075	<0.001
Underlying diseases			
Cancer	1.380	1.008 - 1.890	0.045
BUN/Albumin			
Low (< 9.98)	Reference	Reference	Reference
High (≥ 9.98)	1.928	1.394 - 2.667	<0.001

BMI, body mass index; *APACHE II*, Acute Physiology and Chronic Health Evaluation II