# Risk factors for predicting post-operative pneumonia after non-cardiac surgery

[1]고려대학교 안산병원 호흡기내과, [2]고려대학교 의학연구센터, [3]고려대학교 안산병원 중환자의학과

*방지선[1], 차재형[2], 김수아[3], 김병기[1], 김치영[1], 김유진[1], 김제형[1], 신철[1], 이승헌[1]

**Background/Aims:** Pulmonary Function test (PFT) has frequently been performed in pre-operative evaluation for non-cardiac surgery. In addition, it is unsure that small airway disease (SAWD) based on PFT is effective as risk factor predicting post-operative complication; definition of SAWD is post-bronchodilator Forced Expiratory Volume in one second (pFEV1) /post-bronchodilator Forced Vital Capacity (pFVC) < 70 simultaneously with forced expiratory flow at 25 and 75% < 65. This study retrospectively investigated the presumed pre-operative risk factors to predict the post-operative pneumonia for non-cardiac surgery patients. **Methods:** Among 1,107 patients (from October 2016 to March 2019)who underwent non-cardiac surgery after consultation with the pulmonary department in Korea University Ansan Hospital, 21 patients (1.9%) were identified with the development of post-operative pneumonia. After performing 1:2 propensity score matching adjusted by sex, age, type of operation, functional status, weight loss, impaired sensorium, type of anesthesia, cerebrovascular accident, smoking, underlying pulmonary disease, alcohol, and body mass index, 336 SAWD patients matched with 672 non SAWD patients (1:2 matching) were analyzed. **Results:** Among presumed pre-operative risk factors predicting post-operative pneumonia (blood urea nitrogen, pre-operative transfusion, steroid usage history,albumin level, emergency operation, PaCO2, pFEV1%, pFVC%, pFEV1/FVC, SAWD), low albumin level (OR:2.81, C.I.: 1.34-5.95, $p= 0.006$) and emergency operation (OR: 5.25, C.I.: 1.11-24.85, $p=0.036$)were significant factors to predict post-operative pneumonia with univariate logistic regression analysis. But, with the multivariate logistic regression analyses,only low albumin was a significant risk factor(OR=2.44, C.I.: 1.08-5.51, $p= 0.03$). However, pFEV1%($p=0.90$) and pFEV1/FVC ($p=0.12$) were not significant factors with univariate and multivariate analysis ($p>0.05$). **Conclusions:** Pre-operative PFT for airway obstruction seems to be not informative to predict the development of post-operative pneumonia.

Table1. Univariate analyses for development of post-operative pneumonia after non-cardiac surgery.

| Variable | OR (95% CI) | $P$ |
|---|---|---|
| BUN | 1.01 (0.98-1.04) | 0.37 |
| Pre-operative transfusion | 6.41 (0.74-55.40) | 0.09 |
| Steroid usage | 2.32 (0.29-18.47) | 0.43 |
| Lower albumin | 2.81 (1.34-5.95) | 0.006 |
| Emergency operation | 5.25 (1.11-24.85) | 0.036 |
| High PaCO2 | 1.02 (0.92-1.12) | 0.74 |
| Lower pFEV1 % | 1.02 (0.99-1.04) | 0.16 |
| Lower pFEV1/pFVC | 1.04 (0.99-1.08) | 0.06 |
| Small Airway Disease | 1.56 (0.57-4.25) | 0.382 |

BUN=blood urea nitrogen, PaCO2 = arterial pressure of carbon dioxide,

pFEV1 = post-bronchodilator Forced Expiratory Volume in one second,

pFVC = post-bronchodilator Forced Vital Capacity, OR = odds ratio,

CI = confidence interval