Table S1 Patient's characteristics distribution between non-PC group and PC group

Variables	Total cases (n=1,837)	Non-PC group (n=1,680)	PC group (n=157)	P value
Median age, years	50.40±13.70	50.06±13.63	54.08±13.96	<0.001
Gender, n (%)				0.017
Male	945 (51)	850 (51)	95 (61)	
Female	892 (49)	830 (49)	62 (39)	
BMI (kg/m²)	22.31±2.80	22.35±2.79	21.90±2.95	0.054
ASA physical status, n (%)				0.023
I	1,378 (75)	1,272 (76)	106 (68)	
II	416 (23)	370 (22)	46 (29)	
III	43 (2)	38 (2)	5 (3)	
Previous medical history, n (%)				
Smoking history	350 (19)	316 (19)	34 (22)	0.385
Cardiovascular disease	185 (10)	162 (10)	23 (15)	0.046
Diabetes	71 (4)	64 (4)	7 (5)	0.687
Pulmonary operation history	44 (2)	41 (2)	3 (2)	0.678
Pulmonary disease	105 (6)	95 (6)	10 (6)	0.712
Hepatic dysfunction	31 (2)	31 (2)	0	0.086
Neurologic diseases	40 (2)	35 (2)	5 (3)	0.366
Non-pulmonary cancer	67 (4)	63 (4)	4 (3)	0.442
RCRI, n (%)				0.648
1 point	1,819 (99)	1,663 (99)	156 (99)	
2 points	18 (1)	17 (1)	1 (1)	
Stair climbing, n (%)				<0.001
≥22 m	1,807 (98)	1,659 (99)	148 (94)	
<22 m	30 (2)	21 (1)	9 (6)	
LVEF (%)	71.23±5.20	71.24±5.16	71.15±5.64	0.844
Pulmonary function tests (%)				
FVE₁% predicted	92.84±18.49	93.44±18.01	86.17±22.03	<0.001
FVC% predicted	95.15±18.38	95.70±18.10	89.27±20.24	<0.001
FEV₁/FVC% predicted	96.94±11.93	97.23±11.27	93.86±17.25	0.001
Types of thoracic procedure, n (%)				0.839
Non-anatomical lung surgery	978 (53)	896 (53)	82 (52)	
Anatomical lung surgery	577 (31)	520 (31)	57 (36)	
Mediastinal mass resection	157 (9)	148 (9)	9 (6)	
Bilateral sympathectomy	59 (3)	56 (4)	3 (2)	
Other surgery	66 (4)	60 (3)	6 (4)	
Surgical location, n (%)				0.313
Left lung	734 (40)	668 (40)	66 (42)	
Right lung	883 (48)	805 (48)	78 (50)	
Mediastinum	207 (11)	195 (11)	12 (7)	
Left and right lung	13 (1)	12 (1)	1 (1)	
Surgical time (min)	95 (60, 145)	95 (60, 140)	135 (70, 185)	<0.001
Blood loss (mL)	20 (10, 50)	20 (10, 50)	35 (10, 100)	<0.001
Anesthesia methods, n (%)				<0.001
TCI + LMA	1,450 (79)	1,346 (80)	104 (66)	
EA	387 (21)	334 (20)	53 (34)	
Intraoperative minimum SpO₂ (%)	97.49±3.01	97.49±3.0	97.42±3.19	0.771
Level of intraoperative SpO₂, n (%)				0.99
94–100%	1,660 (91)	1,518 (91)	142 (90)	
90–93%	151 (8)	140 (8)	11 (7)	
<89%	26 (1)	22 (1)	4 (3)	
Intraoperative maximum PaCO₂ (mmHg)	46.63±7.95	46.50±7.91	48.10±8.26	0.016
Level of intraoperative PaCO₂, n (%)				0.013
30–45 mmHg	996 (54.2)	926 (55)	70 (45)	
46–60 mmHg	746 (40.6)	669 (39.8)	77 (49)	
61–80 mmHg	92 (5)	82 (5)	10 (6)	
>81 mmHg	3 (0.2)	3 (0.2)	0	
Mean ICU stay (days)	0 (0, 1)	0 (0, 1)	0 (0, 1)	<0.001
Duration of chest-tube drainage, d	2 (0, 3)	2 (0, 3)	6 (3, 8)	<0.001
Postoperative hospital stay (days)	5 (3, 7)	5 (3, 6)	10 (6, 15)	<0.001
Preoperative leukocyte (×10⁹)	6.57±2.0	6.55±1.97	6.80±2.24	0.189
Preoperative neutrophil ratio (%)	58.75±9.88	58.55±9.78	60.93±10.72	0.04
Postoperative leukocyte (×10⁹)	10.94±3.65	10.87±3.62	11.68±3.84	0.007
Postoperative neutrophil ratio (%)	80.01±11.08	79.88±11.14	81.35±10.42	0.112
Postoperative complications based on Clavien-Dindo classification, n (%)				<0.001
None	1,680 (91.4)	1,680	0	
Grade I				
Pleural effusion	106 (5.8)	0	106 (67)	
Air leakage in chest tube	15 (0.8)	0	15 (9)	
Fever	6 (0.3)	0	6 (4)	
Grade II				
Arrhythmia	5 (0.3)	0	5 (3)	
Dyspnea	9 (0.5)	0	9 (6)	
Grade III				
Reoperation	4 (0.2)	0	4 (3)	
Chylothorax	4 (0.2)	0	4 (3)	
Grade IV				
Mechanical ventilation	4 (0.2)	0	4 (2)	
Pulmonary embolism	1 (0.1)	0	1 (1)	
Grade IVa				
Cardio-dysfunction	2 (0.1)	0	2 (1)	
Grade V				
Death	1 (0.1)	0	1 (1)	

Data are presented as mean ± SD, median (25th, 75th percentiles) or n (%). PC, post-operative complication; BMI, body mass index; ASA, American Society of Anesthesiologists; LVEF, left ventricular ejection fraction; RCRI, Revised Cardiac Risk Index; FVC% predicted, the forced vital capacity in percent of predicted; FEV₁% predicted, the forced expiratory volume in the first second in percent of predicted; TCI, target controlled infusion; LMA, laryngeal mask airway; EA, epidural anesthesia; SpO₂, pulse oxygen saturation; PaCO₂, arterial partial pressure of carbon dioxide.

Table S2 The data distribution of postoperative complications

Variables	Validation data set	Development data set	χ^2 or t or Z	P
Postoperative complications			14.524	0.205
Total	740 (100.0%)	1,097 (100.0%)		
None	684 (92.4%)	996 (90.8%)		
Pleural effusion	41 (5.5%)	65 (5.9%)		
Mechanical ventilation	1 (0.1%)	3 (0.3%)		
Dyspnea	4 (0.5%)	5 (0.5%)		
Arrhythmia	1 (0.1%)	4 (0.4%)		
Air leakage in chest tube	2 (0.3%)	13 (1.2%)		
Fever	3 (0.4%)	3 (0.3%)		
Reoperation	1 (0.1%)	3 (0.3%)		
Cardio-dysfunction	2 (0.3%)	0 (0.0%)		
Chylothorax	0 (0.0%)	4 (0.4%)		
Pulmonary embolism	1 (0.1%)	0 (0.0%)		
Death	0 (0.0%)	1 (0.1%)		
The incidence of postoperative complications				
Total	740 (100.0%)	1,097 (100.0%)	1.519	0.218
None	684 (92.4%)	996 (90.8%)		
Yes	56 (7.6%)	101 (9.2%)		

Table S3 The comparisons of variables between the validation data set and development data set

Variables	Validation data set	Development data set	χ^2 or t or Z	P
Gender (male), n (%)	346 (46.8%)	546 (49.8%)	1.609	0.205
Smoking history, n (%)	138 (18.6%)	212 (19.3%)	0.131	0.717
Hypertension, n (%)	83 (11.2%)	102 (9.3%)	1.795	0.180
Diabetes, n (%)	30 (4.1%)	41 (3.7%)	0.119	0.730
Pulmonary operation history, n (%)	17 (2.3%)	27 (2.5%)	0.051	0.822
Pulmonary disease, n (%)	42 (5.7%)	63 (5.7%)	0.004	0.951
Non-pulmonary cancer, n (%)	22 (3.0%)	45 (4.1%)	1.603	0.205
Hepatic dysfunction, n (%)	10 (1.4%)	21 (1.9%)	0.844	0.358
Neurologic diseases, n (%)	21 (2.8%)	19 (1.7%)	2.537	0.111
Surgery types, n (%)			1.943	0.746
Non-anatomical lung surgery	386 (52.2%)	592 (54.0%)		
Anatomical lung surgery	234 (31.6%)	343 (31.3%)		
Mediastinal mass resection	71 (9.6%)	86 (7.8%)		
Bilateral sympathectomy	26 (3.5%)	40 (3.6%)		
Other procedures	23 (3.1%)	36 (3.3%)		
Surgery location, n (%)			1.507	0.681
Right lung	359 (48.5%)	524 (47.8%)		
Mediastinum	89 (12.0%)	118 (10.8%)		
Left and right lung	4 (0.5%)	9 (0.8%)		
RCRI, n (%)			0.131	0.718
1 point	732 (98.9%)	1087 (99.1%)		
2 points	8 (1.1%)	10 (0.9%)		
Stair climbing <22 m, n (%)	12 (1.6%)	18 (1.6%)	0.001	0.975
Anesthesia methods, n (%)			0.000	0.990
TCI + LMA	584 (78.9%)	866 (78.9%)		
EA	156 (21.1%)	231 (21.1%)		
Age, years	50.14±14.11	50.58±13.41	−0.663	0.508
BMI, kg/m^2	22.42±2.81	22.24±2.80	1.322	0.186
FEV$_1$, %	95.50 (83.92–105.04)	94.19 (83.34–105.00)	0.719	0.472
FVC, %	96.54 (85.40–107.00)	95.94 (85.00–106.74)	0.595	0.552
FEV$_1$/FVC, %	97.81 (92.27–103.74)	97.55 (92.04–103.56)	0.738	0.461
LVEF, %	71.00 (68.00–75.00)	71.00 (68.00–75.00)	−0.001	1.000
Preoperative leukocyte, ×10^9	6.46 (5.27–7.55)	6.20 (5.20–7.39)	2.140	0.032
Preoperative neutrophil ratio, %	58.90 (52.20–64.95)	58.40 (52.10–64.40)	0.800	0.423
Surgery time, min	97.50 (60.00–145.00)	95.00 (60.00–147.50)	0.148	0.883
Blood lose, mL	20.00 (10.00–50.00)	20.00 (10.00–50.00)	0.286	0.775
SpO$_2$, %	98.00 (96.00–100.00)	98.00 (97.00–100.00)	−1.773	0.076
PaCO$_2$, mmHg	45.00 (42.00–50.00)	45.00 (41.00–50.00)	1.360	0.174
Mean ICU stay, days	0.00 (0.00–1.00)	0.00 (0.00–1.00)	0.262	0.793
Duration of chest-tube drainage, days	2.00 (0.00–3.00)	2.00 (0.00–3.00)	−1.840	0.066
Postoperative leukocyte, ×10^9	10.78 (8.47–12.96)	10.55 (8.50–12.90)	0.272	0.785
Postoperative neutrophil ratio, %	82.55 (73.03–88.88)	82.60 (73.15–88.75)	−0.269	0.788

Table S4 The subgroup comparisons of variables

Subgroup	Development data set			Validation data set		
	AUC	Lower confidence limit	Upper confidence limit	AUC	Lower confidence limit	Upper confidence limit
Age, years						
<65	0.7123	0.6484	0.7762	0.6515	0.5629	0.7400
≥65	0.6267	0.5096	0.7438	0.8901	0.7454	1.0000
ASA level						
I	0.6804	0.6126	0.7483	0.6946	0.5912	0.7981
II	0.7680	0.6858	0.8501	0.7056	0.5663	0.8450
III	0.7063	0.2965	1.0000	0.7222	0.5093	0.9351
Surgery type						
Non-anatomical lung surgery	0.6716	0.5929	0.7503	0.6680	0.5436	0.7924
Anatomical lung surgery	0.6682	0.5784	0.7580	0.6780	0.5512	0.8049
Mediastinal mass resection	0.9042	0.8246	0.9838	0.8554	0.6764	1.0000
Bilateral sympathectomy	0.9265	0.8400	1.0000	1.0000	1.0000	1.0000
Other procedures	0.9688	0.9167	1.0000	0.8125	0.4319	1.0000