Original Article

The value of fibrosis score and ^{18}F-FDG by positron emission tomography-computed tomography in lung cancer patients with interstitial lung disease

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Background: Compared to general population, patients with interstitial lung disease (ILD) shows an increased risk of lung cancer (LC), and higher LC complications. Hence, this study aims to analyze the factors related to the postoperative complications and mortality of patients with malignant lung tumor-and ILD after surgical resection.

Methods: This study analyzed the clinical information, surgical conditions, preoperative computed tomography (CT) and positron emission tomography (PET) examination data, as well as postoperative follow-up data of 60 non-small cell LC patients and 60 non-small cell LC patients with interstitial lung disease (LC-ILD). In this study, 120 patients with non-small cell LC were retrospectively reviewed, of which 60 were assigned to LC group and 60 to LC-ILD group. Cohorts were evaluated for differences in clinical data, surgical conditions, preoperative CT/PET examination data, and postoperative follow-up data.

Results: The postoperative complications in the LC-ILD group were slightly higher than those in the LC group (P<0.001), and the prognosis of LC patients with ILD was significantly worse than that of those without ILD (P=0.048). The standardized uptake value ratio (SUVR) of noncancerous interstitial pneumonia (IP) area in patients with postoperative complications was higher than that of patients without complications (P=0.005), and it was the risk factor for postoperative complications in LC-ILD group [hazard ratio (HR) 3.384 (1.023–25.441); P=0.02]. Until the end of follow-up, the CT scores of non-survivors were higher than those of survivors (9.30±3.56 *vs.* 5.52±2.26; P=0.001). Age [HR 3.919 (1.094–7.789); P=0.04], the CT score [HR 2.352 (1.028–4.033); P=0.007], and smoking history [HR 0.354 (0.096–0.643); P=0.03] were the risk factors for mortality.

Conclusions: The postoperative complications and mortality of LC-ILD significantly increase. Higher SUVR of noncancerous IP area usually indicates an increase of postoperative complications. Higher CT score and smoking history suggest a poor prognosis. A follow-up longitudinal study is needed to validate the findings.

Keywords: Computed tomography score (CT score); positron emission tomography-computed tomography (PET-CT); postoperative complications; mortality; lung cancer (LC)

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Introduction

Interstitial lung disease (ILD) is histologically and radiologically characterized by inflammation and/or fibrosis in the lung interstitium. The incidence of lung cancer (LC) complications in ILD patients was about 5 times that of without ILD individuals, and about 10% of idiopathic interstitial pneumonia (IP) patients might eventually develop cancer (1,2). For LC patients undergoing surgeries, the postoperative morbidity, including acute exacerbation (AE), was reported ranging from 9.3% to 26% (3). Postoperative AE-ILD refers to ILD that occurs within 30 days after surgery and cannot be explained by pulmonary infection or other diseases. Its symptoms include progressive dyspnea, increased interstitial shadows on chest computed tomography (CT) or X-rays, and a decrease in blood oxygen partial pressure >10 mmHg (4,5). High-resolution computed tomography (HRCT), a non-invasive and sensitive technique, is currently the main diagnostic method for ILD. The finding of CT scan for pulmonary fibrosis is consistent with that of pathological examination, and interstitial abnormalities in parenchymal involvement include ground-glass opacity (GGO), fibroreticular changes, bronchiectasis, and honeycombing (6). Many quantitative analyses on HRCT showed that the CT signature is a potential prognostic biomarker of ILD (7,8). However, few studies discuss the value of CT and PET on the postoperative complications and mortality after surgery among LC patients with ILD.

It has been cited that the ^{18}F-fluorodeoxyglucose (FDG) uptake of pulmonary fibrosis tissue has increased due to fibrotic injury, leading to neovascularization and an increase of erythrocytes and inflammatory cells (neutrophils and macrophages) (9). Although the accumulation of FDG in interstitial tissue was often associated short-term survival in LC-ILD (10,11), further investigations are still needed to verify whether the prognosis is associated with high FDG accumulation in LC-ILD patients.

Although the surgical risk in patients with LC is usually low, the incidence of postoperative pulmonary complications and death is significantly higher in idiopathic pulmonary fibrosis (IPF) patients. In this study, we analyzed multiple factors related to the postoperative complications and mortality among LC patients with ILD after lung resection to better understand the role of CT and positron emission tomography (PET) in prognostic evaluation. The results may be useful for guiding preoperative evaluation and perioperative management of cancer patients with ILD to achieve optimal surgical outcome. We present this article in accordance with the STROBE reporting checklist (available at https://jtd.amegroups.com/article/view/10.21037/jtd-24-1512/rc).

Highlight box

Key findings

- Higher standardized uptake value ratio (SUVR) of noncancerous interstitial pneumonia (IP) area usually indicates an increase of postoperative complications.
- Higher computed tomography (CT) score and smoking history suggest a poor prognosis.

What is known and what is new?

- The postoperative complications and mortality of lung cancer (LC) combined with interstitial lung disease (ILD) significantly increase.
- We added the value of CT and positron emission tomography (PET) on the morbidity and mortality after major lung resection among LC patients with ILD.

What is the implication, and what should change now?

- CT and ^{18}F-fluorodeoxyglucose (FDG) PET/CT could be useful for assessing disease severity, and for prediction of survival in patients of LC with interstitial lung disease (LC-ILD).
- For patients with high SUVR in noncancerous IP areas detected during preoperative examination, surgical indications should be carefully considered and postoperative monitoring should be closely monitored to avoid serious postoperative complications.
- The CT scores of non-survivors were significantly higher than that of survivors.
- For LC patients, clinical physicians may need more collaboration with radiologists in the future, and more prospective trials are needed to open up new treatment ideas for LC-ILD.

Methods

Patients and data collection

Patients were eligible if they received surgical resection for suspicious pulmonary nodules/masses in the Department of Thoracic Surgery of China-Japan Friendship Hospital from November 1, 2020 to October 31, 2023. According to the following protocol, all patients underwent preoperative ^{18}F-FDG PET/CT and HRCT for LC staging. We collected patients' information including preoperative demographics, pathological features of tumors, laboratory indicators, postoperative complications, and followed up on patients' mortality. Non-survivors referred to the interval between the surgical date and all-cause death or the last follow-up visit date. Survivors referred to the time interval from the date of surgery to the date of recurrence or the

last follow-up. In October 2024, the final patient status was determined based on their recent outpatient visits or hospitalizations, or through telephone interviews.

Ethical approval

The study was conducted in accordance with the Helsinki Declaration (as revised in 2013). This study was approved by the Ethics Committee of the China-Japan Friendship Hospital (2022-KY-127). Due to the retrospective nature of this study, the need for informed consent was waived by the Ethics Committee of China-Japan Friendship Hospital.

^{18}F-FDG PET/CT protocol

All ^{18}F-FDG PET/CT images of patients were obtained using the hybrid PET-CT scanner (GE Discovery ST; GE Healthcare Life Sciences, Chalfont, UK). Patients fasted for 4–6 hours, and then received intravenous injection of 185-370 MBq (5–10 mCi) FDG. Prior to injection, height, weight, and blood glucose concentration data were measured. The dosage of ^{18}F-FDG typically needs to be determined based on factors such as height and weight, with an injection coefficient of approximately 3.7 MBq (0.1 mCi) per kg·body-weight. For patients weighing over 90 kg, the injection dose was 333 MBq (9 mCi). ^{18}F-FDG was provided by Beijing Atomic High Tech Co., Ltd. (Beijing, China). The imaging agent had a radiochemical purity of >95%. After resting for 1h, patients underwent whole-body PET/CT imaging by remaining supine on the table raised both hands, and performed a spiral CT scan using a tube voltage of 120 kV, a tube current of 60–180 mA, a noise index of 25, a matrix of 512×512, and a reconstruction layer thickness of 3.75 mm from the skull base to the middle femur. PET scanning parameters included bed width 15.7 cm, 2.5 min/bed, 6–8 beds for full body collection, matrix 192×192, reconstruction layer thickness 3.27 mm. We calculated maximum standardized uptake value (SUVmax) based on the highest voxel value in the region of interest (ROI) of the image slice. The method for measuring the mean SUV (SUVmean) was to draw a red circle with a diameter of 1 centimeter at the center of SUVmax. The standardized uptake value ratio (SUVR) referred to dividing the SUVmax of ROI by SUVmean of the liver (measured by drawing a 3 cm circle in the right liver lobe) to adjust for individual differences in SUVs (9,12).

CT protocol

CT scans was performed within 2 weeks before/after PET examination. The CT scans were acquired using a 16-slice (Toshiba Aquilion, Otawara, Japan) or 320-slice CT scanner (Toshiba Aquilion One) with a slice thickness of 2 mm and were obtained at suspended end inspiration in the supine position without intravenous injection of contrast medium. The scanning parameters were as follow: slice thickness 5 mm, section spacing 5 mm, pitch 0.75, reconstruction matrix 512×512. Based on raw data, a high spatial frequency algorithm (B60S; Toshiba Aquilion) was used to reconstruct 1mm thick slice images at 1 mm intervals. Additional CT features were assessed according to the definitions given by the Fleischner Society (13). Visual evaluation according to Camiciottoli *et al.* (14). included scores of severities and extent. We classified the lung parenchymal abnormalities on HRCT into 5 categories, reflecting the severity of lung involvements: ground-glass appearance (score 1), irregular pleural margins (score 2), septal and subpleural lines (score 3), honeycombing (score 4), and subpleural cysts (score 5). Therefore, the severity score range was from 0 (no abnormality) to 15 (all abnormalities present). The range of involvement score was obtained by observing the number of affected lung segments: one to three segments involved mean a score of 1; four to nine segments mean a score of 2; more than nine segments mean a score of 3. Therefore, the involvement score ranged from 0 (no abnormality in any segment) to 15 (all five abnormalities in more than nine segments). Finally, added the severity and involvement scores of the disease to obtain the total score (ranging from 0 to 30).

Statistical analysis

Statistical analyses were performed using SPSS 17.0 software and MedCalc for Windows, Version 14.8.1. P values <0.05 were considered as statistically significant. Means ± standard deviation was used to represent variables with a normal distribution. Paired *t*-test was used to compare normally distributed data. Welch's *t*-test was used for non-parametric data. We performed Fisher's exact test or Chi-squared to test the categorical values. The correlation between two variables was determined by Pearson or Spearman correlation test. Survival was estimated by the Kaplan-Meier survival curve and compared by log-rank test. Hazard ratios (HRs) and 95% confidence

intervals (CIs) were used to analyze the association of the variables of interest with survival through univariate and multivariate Cox proportional-hazards models.

Results

A total of 120 eligible individuals were included in this study (*Table 1*). Firstly, referring to the 2013 American Thoracic Society/European Respiratory Society classification criteria for idiopathic IP as diagnostic criteria (15), patients were divided into LC and LC-ILD groups (n=60) (*Table 1*). Although there were more males than females in each group, there was no significant difference between the two groups genders. The postoperative complications in the LC-ILD group were 5 times higher than those in the LC group, and the prognosis of LC patients with ILD was significantly worse than that of those without ILD. According to Spearman correlation analysis, CT score was significantly positively correlated with SUVR in the LC-ILD group (R=0.428, P=0.003).

Secondly, in order to differentiate the clinical factors between LC-ILD patients with and without postoperative complications, LC-ILD subjects were assigned to with/without-complications groups (*Table 2*). In with-complications group, most patients with postoperative complications were male (96%) and had a history of smoking (85%). Most patients had the complication of chronic obstructive pulmonary disease (COPD) and a history of AE. The PET SUVR of noncancerous IP area were significantly higher in patients with postoperative complications than in those without postoperative complications. There was no statistically difference in CT scores in with/without complications groups. In patients with postoperative complications, 13 patients had ground-glass appearance, 5 had irregular pleural margins (defined as sign 1), 4 had septal and subpleural lines (defined as sign 2), 13 had honeycombing (defined as sign 3), 4 had subpleural cysts (defined as sign 4), respectively. Among them, 12 had mixed appearances. While in patients without postoperative complications, cases of sign 1–4 were 10, 5, 9, 3, 13, respectively.

Thirdly, according to the final patient status, LC-ILD patients were divided into non-survivors group and survivors group (*Table 3*). At the end of follow-up, we found that non-survivors were older than the survivors. Most of them had a history of smoking and COPD. The PET SUVR of noncancerous IP area and the CT scores in non-survivors were higher than those of survivors. Cases of sign 1–4 were 2, 1, 1, 6, 6, respectively. Among them, 4 cases presented with combined honeycombing and subpleural cysts and 2 cases presented with combined ground-glass appearance and honeycombing.

According to a univariate and multivariate Cox proportional hazards model, the factors affecting the postoperative complications were smoking history [HR 0.253 (0.074–0.459); P=0.02] and the PET SUVR of noncancerous IP area [HR 3.384 (1.023–25.441); P=0.02] (*Table 4*). While the age [HR 3.919 (1.094–7.789); P=0.04], CT score [HR 2.352 (1.028–4.033); P=0.007], the smoking history [HR 0.354 (0.096–0.643); P=0.03] were the risk factors of mortality in patients of LC-ILD (*Table 5*).

The median survival time were 27 months in LC group and 17 months in LC-ILD group. There was a statistically significant difference in survival time between the two groups (P=0.03) (*Figure 1*).

Discussion

Compared to the general population, ILD patients have an increased risk of LC. For LC with concomitant ILD in an early stage, surgical resection remains the preferred treatment option (16). However, in this study, we found that interstitial lung abnormalities identified by lung tumor imaging exams were associated with increased postoperative complications and mortality. ILD is a risk factor for poor prognosis in LC patients (17). Compared with patients with only LC, LC patients with ILD have significantly shorter survival times. By analyzing the clinical characteristics and related prognostic factors of LC patients with ILD, it is expected to provide the best clinical strategy for LC-ILD population.

In this study, the risk of postoperative complications was significantly associated with high SUVR of noncancerous IP area. The reason may be that AE was the main postoperative complication of LC-ILD in our study, while high FDG uptake may predict AE in LC patients with pulmonary fibrosis after lung resection (9,11,18). Although the pathological changes in ILD include increases of interstitial cells and matrix components, infiltration of inflammatory cells, tissue cell reactions, and proliferation and metaplasia of alveolar epithelial cells, the proportion and distribution of pathological components vary among different types of interstitial diseases (19). Bondue *et al.* (20) found that the early uptake of ^{18}F-FDG uptake may be associated with the early recruitment of leukocytes and related inflammation. Both types of inflammatory cells

Table 1 Patient's clinical characteristics

Characteristic	LC (n=60)	LC-ILD (n=60)	T value	χ^2	P value
Age (years)				2.143	0.14
Mean ± standard deviation	64.03±10.3	66.65±8.1	−3.35		0.20
≥65	32	24			
<65	28	36			
Sex				2.228	0.14
Female	18	11			
Male	42	49			
Smoking history				0.141	0.70
No	24	22			
Yes	36	38			
Preoperative comorbidity					
COPD				9.069	0.003*
No	56	34			
Yes	4	16			
BMI (kg/m^2), mean ± standard deviation	26.0±4.1	25.2±3.0	−1.272		0.21
Surgical methods				0.901	0.34
VATS	53	56			
Thoracotomy	7	4			
Operative modality				1.420	0.39
Lung wedge resection	20	23			
Lobectomy	40	36			
Pneumonectomy	0	1			
Histologic subtype				1.504	0.47
Adenocarcinoma	38	36			
Squamous cell carcinoma	14	19			
Others	8	5			
Postoperative complications	3	17		15.418	<0.001*
AE	0	6			
Prolonged air leakage	2	4			
Empyema	0	2			
Bronchopleural fistula	0	4			
Atelectasis	1	1			
Mortality				3.927	0.048*
Survivors	57	52			
Non-survivors	2	8			

The symbol * stands for that there are statistical differences between two groups. AE, acute exacerbation; BMI, body mass index; COPD, chronic obstructive pulmonary disease; LC, lung cancer; LC-ILD, lung cancer with interstitial lung disease; VATS, video-assisted thoracoscopic surgery.

Table 2 Comparison of characteristics between with and without complications group among patients of LC- ILD

Characteristic	With complications (n=26)	Without complications (n=34)	T value	χ^2	P value
Age (years)				0.724	0.40
Mean ± SD	66.36±8.2	65.89±7.3	1.756		0.32
≥65	12	12			
<65	14	22			
Sex				6.432	0.01
Female	1	10			
Male	25	24			
Smoking history				8.949	0.003*
No	4	18			
Yes	22	16			
History of AE					
No	18	34		12.071	0.001*
Yes	8	0			
CT score, mean ± SD	6.46±3.9	5.88±2.87	0.771		0.44
PET SUVR, mean ± SD					
Noncancerous IP area	1.32±0.75	0.32±0.05	4.24		0.005*
Cancer	5.54±5.48	5.33±4.79	2.22		0.18

*, there are statistical differences between two groups. AE, acute exacerbation; CT, computed tomography; IP, interstitial pneumonia; LC-ILD, lung cancer with interstitial lung disease; PET SUVR, positron emission tomography standardized uptake value ratio; SD, standard deviation.

Table 3 Comparison of characteristics between non-survivors and survivors among patients of LC-ILD

Characteristic	Non-survivors (n=10)	Survivors (n=50)	T value	χ^2	P value
Age (years)				8.000	0.005*
Mean ± SD	68.89±5.1	65.47±10.2	4.32		0.01*
≥65	8	16			
<65	2	34			
Sex				0.022	0.88
Female	2	9			
Male	8	41			
Smoking history				4.477	0.03*
No	2	20			
Yes	8	30			
History of AE				0.462	0.50
No	8	44			
Yes	2	6			
CT score, mean ± SD	9.30±3.56	5.52±2.26	4.352		0.001*
PET SUVR, mean ± SD					
Noncancerous IP area	1.23±0.45	0.81±0.59	1.38		0.04*
Cancer	5.66±5.32	5.46±3.06	3.22		0.05

*. there are statistical differences between two groups. AE, acute exacerbation; CT, computed tomography; IP, interstitial pneumonia; LC-ILD, lung cancer with interstitial lung disease; PET SUVR, positron emission tomography standardized uptake value ratio; SD, standard deviation.

Table 4 Risk factors for postoperative complications in patients of LC-ILD according to a univariate and multivariate Cox proportional hazards model

Variable	Univariate analysis		Multivariate analysis	
	HR (95% CI)	P value	HR (95% CI)	P value
Age (years)	1.614 (0.527–2.710)	0.36		
Male	1.547 (0.233–2.389)	0.44		
Smoking history	0.497 (0.174–1.168)	0.04	0.253 (0.074–0.459)	0.02
History of AE	1.032 (0.751–7.182)	0.73		
CT score	2.650 (0.152–5.133)	0.04		
SUVR of noncancerous IP area	3.134 (0.374–9.157)	0.006	3.384 (1.023–25.441)	0.02
SUVR of cancer	1.094 (0.892–1.929)	0.74		

AE, acute exacerbation; CT, computed tomography; CI, confidence interval; HR, hazard ratio; IP, interstitial pneumonia; LC-ILD, lung cancer with interstitial lung disease; SUVR, standardized uptake value ratio.

Table 5 Risk factors for mortality in patients of LC-ILD according to a univariate and multivariate Cox proportional hazards model

Variable	Univariate analysis		Multivariate analysis	
	HR (95% CI)	P value	HR (95% CI)	P value
Age (years)	1.132 (1.006–1.761)	0.04	3.919 (1.094–7.789)	0.04*
Male	2.719 (0.365–20.109)	0.26		
Smoking history	0.404 (0.115–1.178)	0.04	0.354 (0.096–0.643)	0.03*
History of AE	1.060 (0.992–3.131)	0.81		
CT score	1.331 (1.062–1.603)	0.02	2.352 (1.028–4.033)	0.007*
SUVR of noncancerous IP area	2.796 (0.104–7.225)	0.049		
SUVR of cancer	3.110 (0.602–7.374)	0.45		

*, there are statistical differences between two groups. AE, acute exacerbation; CT, computed tomography; LC-ILD, lung cancer with interstitial lung disease; CI, confidence interval; HR, hazard ratio; IP, interstitial pneumonia; SUVR, standardized uptake value ratio.

express glucose transporter 1, leading to increased glucose uptake in pulmonary fibrosis (21).

Usually, ground glass opacities without structural abnormalities on HRCT are often accompanied by inflammation (22). When inflammatory cells were cleared, fibroblasts proliferated, forming irreversible fibrosis, the highest uptake of ^{18}F-FDG in the lungs were generally concentrated in the honeycomb like area on HRCT. It is possible that fibroblasts are recognized to express glucose transporter-1 (22) and then manifest as high affinity for FDG. A previous study had demonstrated that fibroblasts would increase glucose uptake under oxidative stress in the tumor microenvironment (23).

Bondue *et al.* (20) indicated that ^{18}F-FDG uptake mainly occurred in lung consolidation areas. Hes *et al.* (24) studied the potential prognostic role of HRCT in patients with polymyositis/dermatomyositis, and concluded that higher short-term mortality was correlated with lower consolidation/GGOs styles. Here we found that ground-glass appearance and irregular pleural margins score were significant higher in patients with complications than in those without complications. Through Cox proportional-hazards models analysis we found that SUVR, rather than was the risk factor for postoperative complications in LC-ILD group, possibly because the CT manifestations of the postoperative complications group showed more ground-glass appearance than other types, resulting in higher SUVR and lower CT values in these tissues. Compared

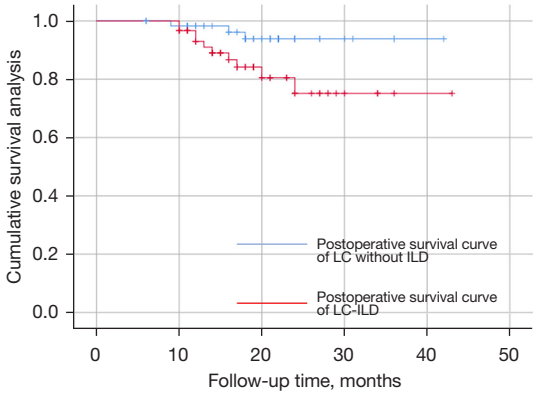

Figure 1 Postoperative survival curve of lung cancer patients with combined ILD and those without ILD. LC, lung cancer; ILD, interstitial lung disease.

with patients without ILD (25), patients with ILD have lower functional reserve in tolerating pneumonectomy and poor healing ability of lung tissue caused by pulmonary fibrosis, leading to postoperative air leakage and pleural effusion. In addition, pulmonary interstitial changes may lead to pulmonary arterial hypertension, emphysema, and obstructive sleep apnea, thereby increasing the risk of postoperative complications (26). In our study the complication rate of LC-ILD group was significantly higher than that of LC group. Therefore, for patients with high SUVR in noncancerous IP areas detected during preoperative examination, surgical indications should be carefully considered and postoperative monitoring should be closely monitored to avoid serious postoperative complications.

Different patterns of fibrosis on HRCT are known to correlate with reduced survival in some ILDs. Obi *et al.* (27) reported that patients with basal subpleural honeycombing had the worst pulmonary function and survival. Yamakawa *et al.* (28) found that patients with a honeycomb showed a worse tendency for survival. We found that the CT scores of non-survivors were significantly higher than that of survivors, with the scores mainly consisting of honeycombing, septal and subpleural lines. Moreover, the distribution of raised ^{18}F-FDG was found to match that of the lung parenchymal abnormality. In 60% non-survivals, the area of honeycombing showed high ^{18}F-FDG uptake on HRCT. However, some patients showed lower SUVR but higher CT score because of relatively low cellular composition in the area of subpleural cysts. As mentioned above, this HRCT manifestation is often associated with irreversible fibrotic diseases and these fibroblasts promote high FGD uptake. One previous study has revealed that the fibroblast foci (aggregation of collagen activated fibroblasts or myofibroblasts) were indicators of active pulmonary injury, and their abundance may be predictive factors for physiological degeneration or mortality, especially in IPF (29). Fibroblast foci are a key histological feature of ILD fibrosis progression, and their severity is associated with poorer clinical outcomes (30). It is explainable that the CT scores rather than SUVR of noncancerous IP area were the risk factors for mortality in patients of LC-ILD in Cox proportional hazards model analysis. Therefore, for LC patients, clinical physicians may need more collaboration with radiologists in the future, and more prospective trials are needed to open up new treatment ideas for LC-ILD.

Long term smoking can deteriorate lung function, and the inflammatory effect on the small airways can predispose the lungs to respiratory complications. One meta-analysis showed that the risks of recurrence and death were higher in smokers with lung invasive mucinous adenocarcinoma (31). Andreas *et al.* (32) revealed that the overall mortality in smokers was almost 3 times higher than that in nonsmokers. Smoking is associated with precursor lesions of interstitial lung abnormalities (ILAs) and multiplicity of ILDs (33). Besides smoking for over 30 pack years, radiographic ILA/ILD and isolated honeycomb were the greatest predictors of mortality. This was not related to age, body mass index (BMI), resected cancer nodule, or radiological or histological emphysema. Agostini *et al.* (34) found that current smoking is an independent risk factor for pulmonary complications after VATS surgery. In our findings, smoking history was not significantly different between the LC and LC-ILD groups, but it was significantly associated with postoperative complications and prognosis.

This study has several limitations. First, the studies we included were retrospective, so there may be some prejudice that unable to reflect the practicality of all patients. Second, due to some reasons such as small sample size and short follow-up time for some patients, the accuracy of the results may be lack, which expands the 95% confidence intervals in risk estimates. The sample size of this study is insufficient and does not in accordance with the requests of EPV (event per variable). Hence, the results may not be convincing enough. Anyway, the survival rate of patients with both LC and ILD was lower because of pulmonary complications. Careful preoperative evaluation and perioperative management are required to achieve optimal surgical outcomes in these patients.

Conclusions

In conclusion, our results showed a significant increase of the postoperative complications and mortality of LC combined with ILD. CT and ^{18}F-FDG PET/CT could be used to assess disease severity, and predict mortality in LC-ILD patients. SUVR of noncancerous IP area was a predictor of postoperative complications. While higher CT fibrosis score and smoking history could suggest a poor prognosis. The findings might need to be further validated by a follow-up longitudinal study.

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Footnote

Reporting Checklist: The authors have completed the STROBE reporting checklist. Available at https://jtd.amegroups.com/article/view/10.21037/jtd-24-1512/rc

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Helsinki Declaration (as revised in 2013). This study was approved by the Ethics Committee of the China-Japan Friendship Hospital (2022-KY-127). Due to the retrospective nature of this study, the need for informed consent was waived by the Ethics Committee of China-Japan Friendship Hospital.

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