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INTRODUCTION

Centrally located clinical stage I NSCLC may exhibit more aggressive biological behavior than peripheral tumors, which is not fully captured by conventional risk stratification systems. This study aimed to evaluate the prognostic impact of pathological invasive features (PIF) in centrally located c-stage I NSCLC.

METHODS

Design: Retrospective Study

This retrospective study included patients who underwent curative surgery without induction therapy for centrally located c-stage I NSCLC at two institutions between January 2004 and December 2024. Central location was defined as tumors located within the inner two-thirds of the lung. The distance ratio was calculated as the distance from the pulmonary hilum to the tumor center divided by the distance from the hilum to the visceral pleural surface along the same line. PIF were defined as the presence of any one of the following: Ly, V, STAS, or Grade 3.

DISCUSSION AND CONCLUSION

Actionable Take Away Message

- PIF centrally located c-stage I NSCLC with an increased risk of recurrence. In centrally located tumors with a high-risk radiologic phenotype careful selection of the extent of resection, particularly segmentectomy, and appropriate postoperative surveillance should be considered.

Future Direction for Research

- Future studies should also determine whether surgical extent and surveillance strategies tailored to the predicted biological risk can reduce recurrence while avoiding unnecessary treatment, thereby supporting more individualized care for patients with centrally located early-stage NSCLC.

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RESULTS

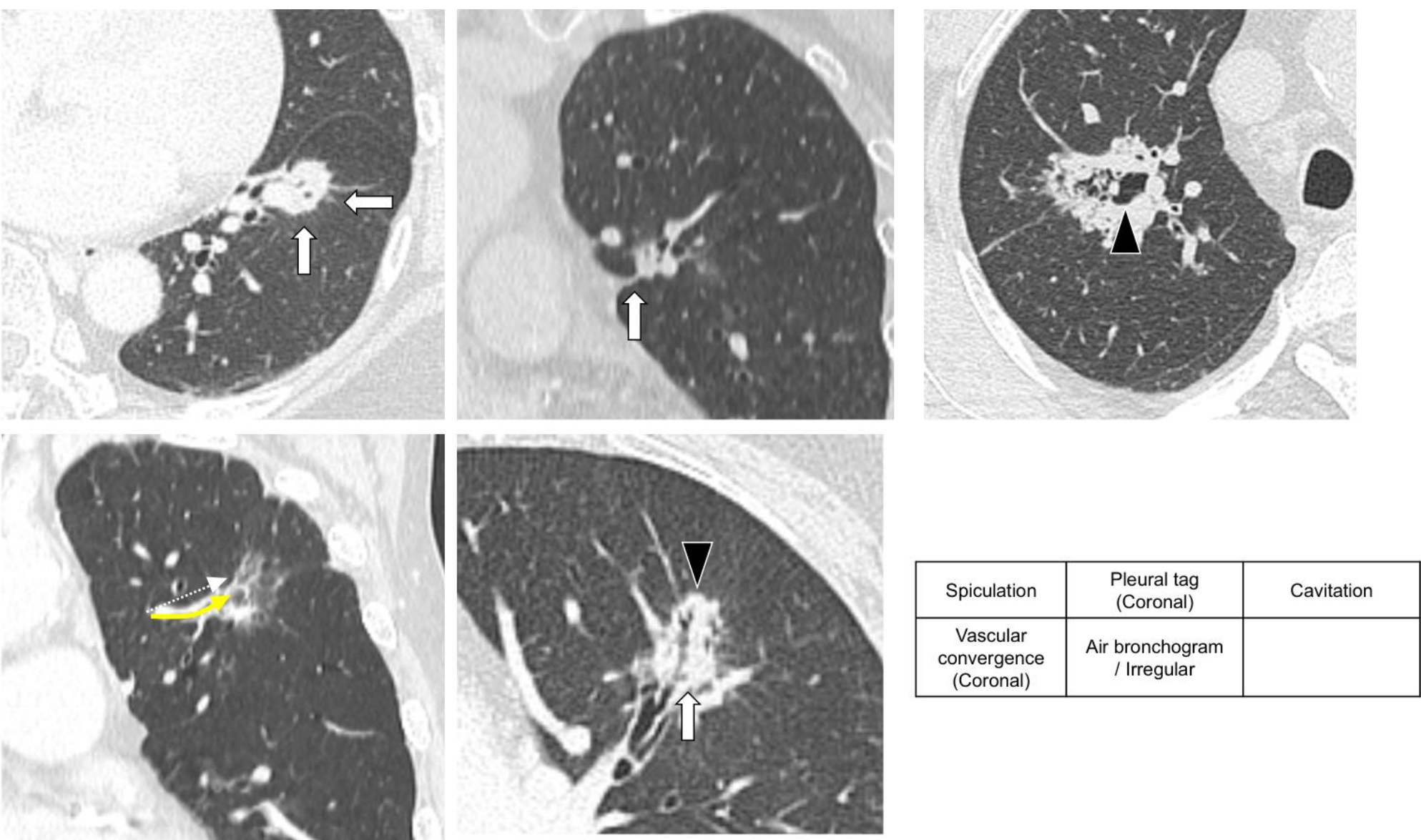


Figure 1: The definitions of CT findings

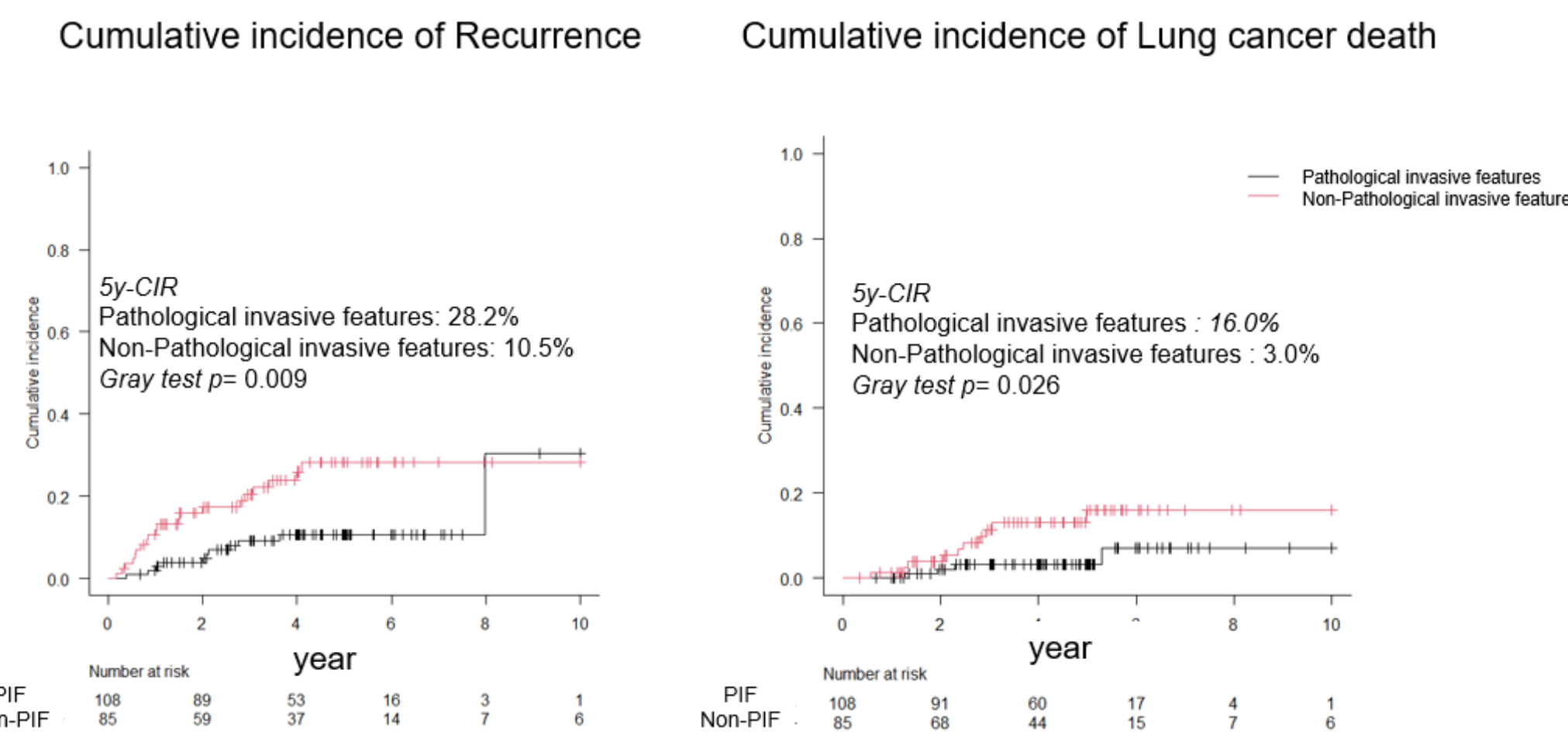


Figure 2: Cumulative incidence of recurrence and cumulative incidence of lung cancer death

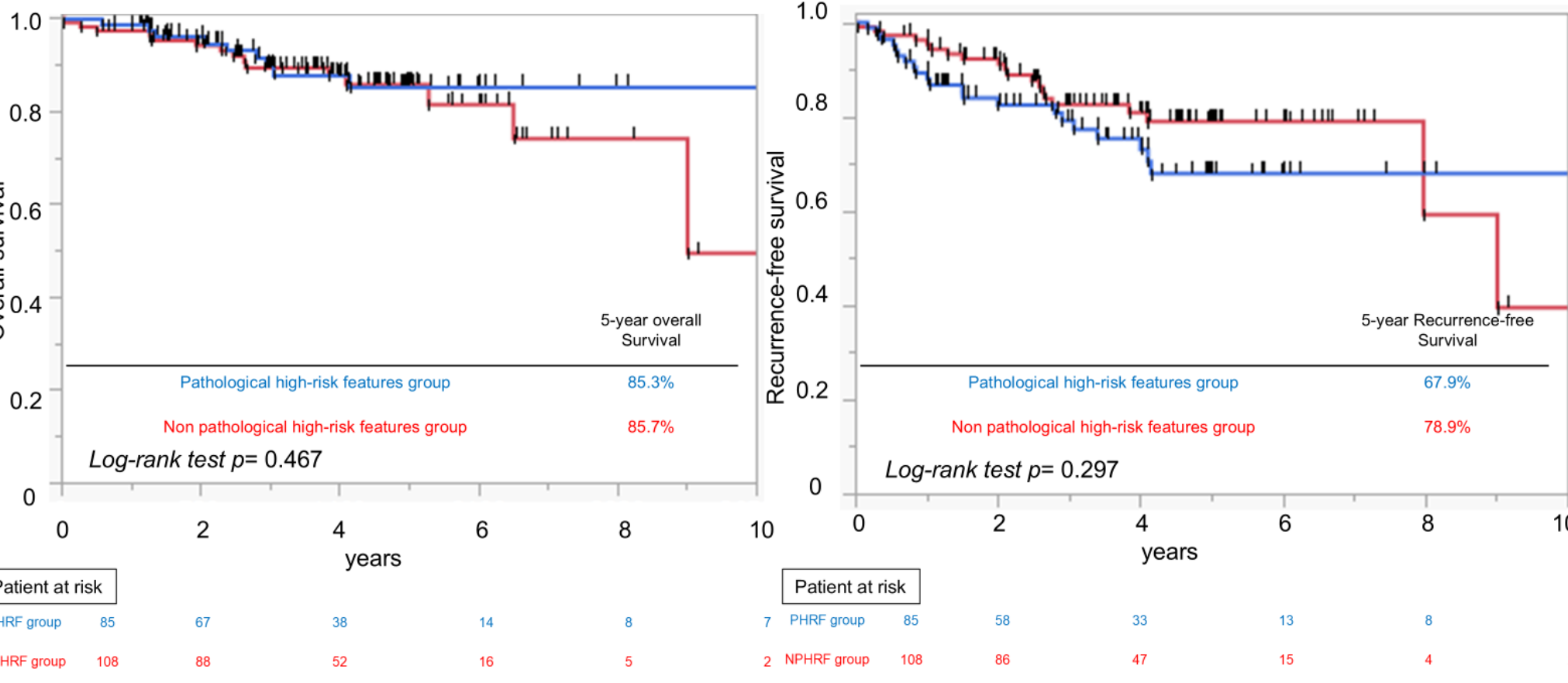


Figure 3: Five-year overall survival and recurrence free survival

variable	Univariable		Multivariable	
	HR(95% CI)	P value	HR(95% CI)	P value
Serum CEA level ≥ 5	1.784(0.848-3.815)	0.126		
Adenocarcinoma	1.063(0.534-2.142)	0.861		
SUVmax ≥ 3	5.626(2.993-10.978)	<0.001	3.880(1.812-8.572)	<0.001
Tumor size on CT	1.763(1.240-2.549)	0.001	1.554(1.039-2.346)	0.031
Tumor without GGO	2.602(1.458-4.709)	0.001	0.588(0.253-1.361)	0.214
Pleural tag	1.110(0.622-1.980)	0.721		
Spicula	1.327(0.737-2.409)	0.345		
Vascular convergence	2.866(1.458-5.899)	0.002	2.267(1.065-5.010)	0.033
Cavity	2.140(0.687-7.320)	0.189		
Air bronchogram	0.444(0.246-0.794)	0.006	1.069(0.473-2.468)	0.873
Irregular	0.667(0.224-1.935)	0.452		

Table 3: Univariable and multivariable analyses for predictive factors of PIF

Baseline characteristics (N=193)	PIF (N=85)	Non-PIF (N=108)	P-value
n(%) or median (IQR)			
Sex female	31(36.5)	56(51.9)	0.041
Age -years	72(64-78)	74(68-79)	0.063
BMI -kg/m ²	23(20-25)	23(21-25)	0.646
Non-Smoker	21(24.7)	44(40.7)	0.021
Charlson comorbidity index	1(0-2)	1(0-2)	0.949
Serum CEA level -ng/ml	3.0(2.0-4.4)	2.7(1.9-3.8)	0.203
%FVC %	105.4(94.7-115.0)	108.6(96.1-116.4)	0.232
FEV1.0% %	73.3(65.0-77.1)	71.8(66.0-77.5)	0.932
Lobectomy	76(89.4)	74(68.5)	<0.001
Adjuvant chemotherapy +/- /unknown	23(27.1)/58(68.2)/4(4.7)	6(5.6)/99(91.7)/3(2.8)	<0.001

Table 1: Patient characteristics

Baseline characteristics (N=193)	PIF (N=85)	Non-PIF(N=108)	P-value
n(%) or median (IQR)			
Size of tumor on CT -cm	2.6(1.8-3.2)	2.1(1.5-2.5)	0.001
Spiculation	56(65.9)	64(59.3)	0.372
Pleural tag	36(42.4)	43(39.8)	0.769
Tumor without GGO	53(62.4)	42(38.9)	0.001
Vascular convergence	71(83.5)	69(63.9)	0.003
Air bronchogram	40(47.1)	72(66.7)	0.008
Irregular margin	77(90.6)	101(93.5)	0.589
Cavitation	8(9.4)	5(4.6)	0.249
cStage IA1/IA2/IA3/IB	3(3.5)/33(38.8)/28(32.9)/21(24.7)	32(29.6)/43(39.8)/27(25.0)/6(5.6)	<0.001
SUVmax	6.2(3.3-10.8)	2.2(1.3-4.8)	<0.001

Table 2: Radiological findings