

The oncological role of pre-operative cardiac function in post-operative stage I lung adenocarcinoma metastasis

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Introduction: Postoperative metastasis (POM) for resectable stage I lung adenocarcinoma is clinically infrequent and associated risk factor is not easily predictable before the operation. According to the animal models for cancer metastasis, cardiac function probably plays important role for the results. Aims of this study is to identify predictable factors for POM that is associated with cardiac function and parameters for surgical type precision, adjuvant therapy and neoadjuvant therapy.

Materials and Methods: From January 2014 to December 2021, four hundred fifty-one consecutive patients, who underwent resection for stage I lung adenocarcinoma without any adjuvant therapy or induction therapy in Kaohsiung Medical University Hospital, were included. Patients' clinical and pathological characteristics, including age, gender, surgical types, preoperative echocardiogram, pathologic tumor stage, size, location, and subtype of adenocarcinoma, were analyzed (Fig. 1).

Results: A total of 27 cases had metastasis during follow-up (6.6%)(Fig. 1). Preoperatively, Tumor size adjust by mitral valve peak A velocity (MVpeakA), one of parameters for left ventricular diastolic function (≤ 1.23 , sensitivity: 100%, specificity: 58.4%) can validly predict POM (area under receiver operating characteristic curve (AUC ROC): 0.824)(Fig. 2). Regarding surgical/pathological characteristics, those with solid component ($>20\%$), T1c, and T2a were increased risk to have POM (odds ratio ((OR)): 1.05, 3.36, and 2.93, respectively, $p < 0.05$)(Table 1). Based on the multivariate regression analysis, POM is associated with choosing sublobar excision for those with left side lesion, and MVpeakA > 0.74 (OR: 5.115, $p < 0.05$)(Table 2).

Conclusion: For surgical plan, sublobar excision might increase the chance of POM when the patients' stage I lung adenocarcinoma was left-sided with MVpeakA is up to 0.74. We recommend the adjuvant therapy should be provided for those with high solid component, T1c, and T2a lesion. Moreover, preoperative tumor size adjusts by MVpeakA up to 1.23 might be a potential predictive factor of POM and more data is warranted to draw a firm conclusion.

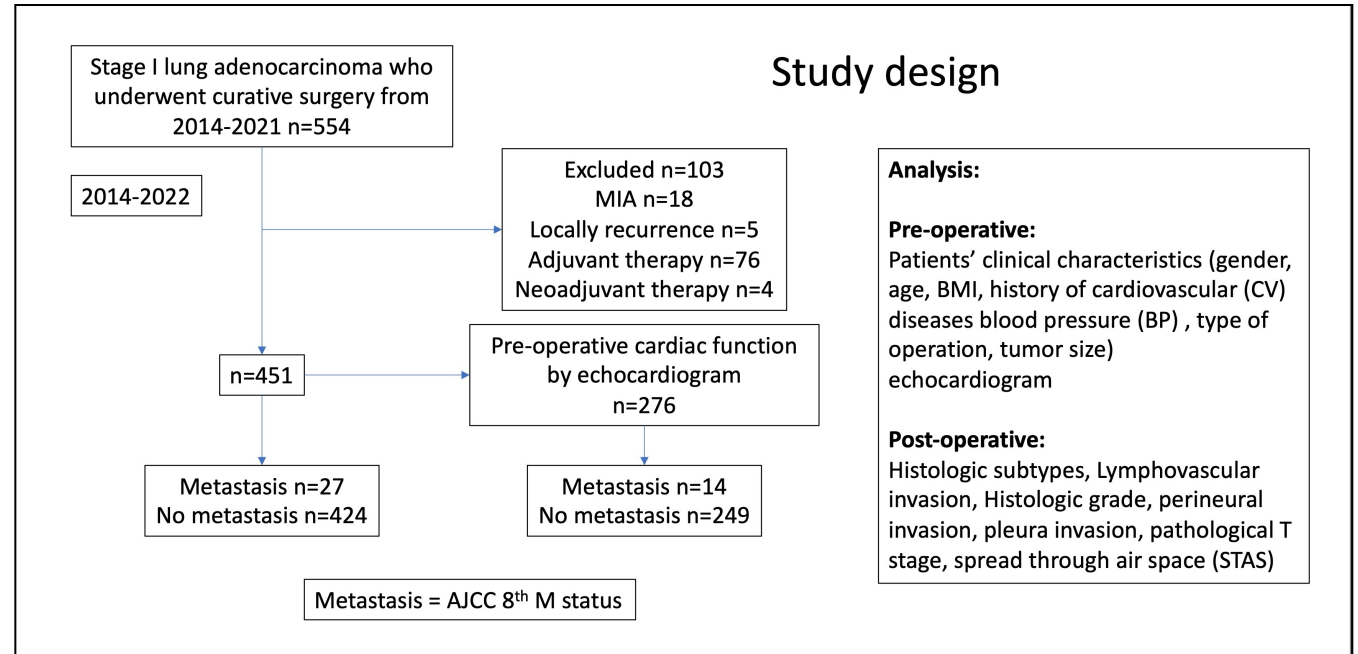


Figure 1: study design

Table 1. Patient Characteristics and Outcome Variables

	Total (n=451)	No (n=424)	Metastasis (n=27)	P
Age		61.8±10.6	62.4±8.8	0.753
Gender, n (% male)	451 (37.7 %)	424 (37%)	27 (48.1%)	0.306
Pre-operative cardiac function (MV Peak A Vel)		0.8±0.2	0.91±0.18	0.044
Site, n (% left)		424 (39%)	27 (59.2%)	0.043
Surgical type (n)	Lobectomy (242) Sublobar (209)	(225) (199)	(17) (10)	0.427
Tumor size (cm)		1.45±0.67	2.00±0.54	0.001
Adenocarcinoma Subtype (n)	Lepidic (79) Acinar (292) Papillary (55) Micropapillary (4) Solid (16)	(77) (281) (47) (3) (16)	(2) (11) (278) (1) (5)	0.196 0.011 0.010 0.219 0.006
T Status (n)	T1a (130) T1b (129) T1c (47) T2a (128)	128 125 40 114	2 4 7 14	0.011 0.102 0.007 0.005

MV Peak A vel: Mitral valve Peak A Velocity

Table 2: Association between Patient Characteristics and post operative metastasis among The Study Population

	Univariate Regression Analysis			Multiple Regression Analysis		
	OR	95%CI	P	OR	95%CI	P
MV PEAK A	15.34	1.07 220.42	0.045	28.65	1.58 519.402	0.023
TYPE OF EXCISION						
LOBAR		Ref.			Ref.	
SUBLOBAR	1.504	0.67 3.36	0.32	5.115	1.245 21.02	0.024
SITE						
LEFT		Ref.			Ref.	
RIGHT	0.438	0.2 0.97	0.041	0.077	0.16 0.374	0.001

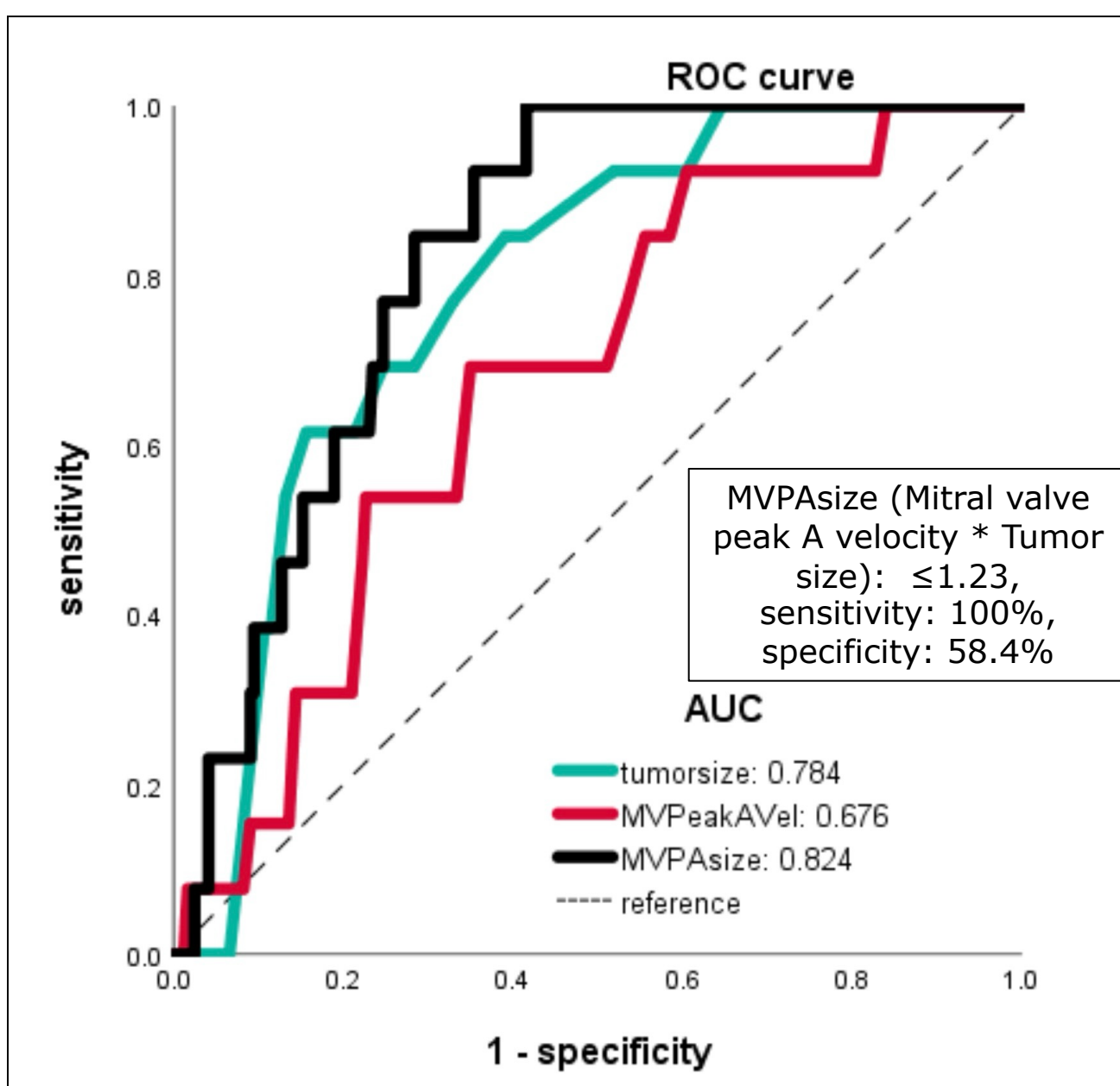


Figure 2: AUC and ROC curve



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