



EP05.07: Re-examining the Prognostic Role of Pleural Fluid Cytology in Lung Cancer in the Era of Modern Systemic Therapies

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INTRODUCTION

Background:

Staging is a key determinant of prognosis and treatment in lung cancer. However, advances in systemic therapies have improved survival, raising questions about the prognostic relevance of certain staging components.

Aim:

This study aimed to evaluate the prognostic impact of pleural fluid cytology status and other survival-related factors in lung cancer patients with pleural effusion.

METHODS

Design:

Patients with lung cancer diagnosed between January 1, 2023, and March 31, 2025, with pleural effusion at diagnosis were included in the study.

Demographic, clinical characteristics and survival data of the 95 patients analyzed in the study were prospectively recorded and obtained from the Lung and Pleural Cancers Research and Clinical Center database, and retrospectively analyzed.

At least two pleural fluid cytological examinations were required.

Statistical analyses:

Factors associated with survival were evaluated using univariate and multivariate analyses.

Survival was visualized by Kaplan–Meier curves and survival time was expressed as median, standard error, and 95% confidence interval (CI). Log-rank analysis was used to compare survival time between groups. All analyses were performed using SPSS (version 25.0) with statistical significance set at two-sided $p < 0.05$.

DISCUSSION AND CONCLUSION

The IASLC Staging Committee reclassified MPE from T4 to metastatic (M1) disease in the 7th edition of the TNM staging system. However, pleural effusions may not be extensively investigated in clinical practice, particularly in patients with poor performance status, unfavorable clinical or laboratory parameters, or metastases to other organs. Moreover, with advances in modern systemic therapies, survival has improved, particularly in patients with advanced-stage disease. Evidence regarding the clinical and prognostic significance of pleural fluid cytology in this setting remains limited.

Our findings showed that positive pleural fluid cytology was not associated with survival, whereas KRAS positivity was associated with poorer prognosis and modern systemic treatment with better prognosis. These findings may have implications for the diagnostic management of pleural effusion in patients with advanced lung cancer. After initial thoracentesis and clinical evaluation, once alternative causes of pleural effusion, such as infection, have been excluded, prompt initiation of systemic treatment rather than further invasive pleural biopsy may be a reasonable approach in patients who do not require pleural intervention for symptom palliation. However, these findings should be confirmed in prospective studies.

ACKNOWLEDGEMENTS

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RESULTS

Table 1. Characteristics of patients.

Variables	n=95
Age, years (mean±SD) (min-max)	68.06±9.21 (40-88)
Sex, n (%)	
Male	77 (81.1)
Female	18 (18.9)
Smoking status, n (%)	
Current	55 (58.5)
Ex-smoker	28 (29.8)
Never	12 (11.7)
Pleural fluid amount, n (%)	
Mild	27 (28.4)
Moderate	32 (33.7)
Massive	36 (37.9)
Hemorrhagic effusion, n (%)	
No	70 (73.7)
Yes	25 (26.3)
Pleural fluid characteristics, n (%)	
Trasudate	5 (5.4)
Exudate	90 (94.6)
pH (n=91), n (%)	
≤7.30	20 (21.1)
>7.30	71 (74.7)
Histopathology, n (%)	
Adenocarcinoma	48 (50.5)
Squamous cell carcinoma	19 (20.0)
Small cell carcinoma	24 (25.3)
Others	4 (4.2)
T, n (%)	
1	2 (2.1)
2	6 (6.3)
3	6 (6.3)
4	81 (85.3)
N, n (%)	
0	4 (4.2)
1	7 (7.4)
2a	11 (11.6)
2b	20 (21.1)
3	53 (55.8)
M, n (%)	
No	13 (13.8)
Yes	82 (86.2)
Metastasis, n (%)	
Brain	15 (16.1)
Bone	32 (35.2)
Liver	11 (12.1)
Adrenal gland	19 (20.9)
Others	26 (27.4)
ECOG, n (%)	
0-1	49 (51.6)
2	23 (24.2)
3-4	23 (24.2)
Molecular alterations, n (%)	
EGFR (n=56)	7 (12.5)
ALK (n=49)	3 (6.1)
ROS1 (n=49)	2 (4.1)
KRAS (n=38)	9 (23.7)
PDL1 (n=60), n (%)	
<1%	37 (61.7)
1%-50%	10 (16.6)
>50%	13 (21.7)
Treatment, n (%)	
Best supportive care	35 (36.8)
Chemotherapy	29 (30.6)
Modern systemic treatments	31 (32.6)

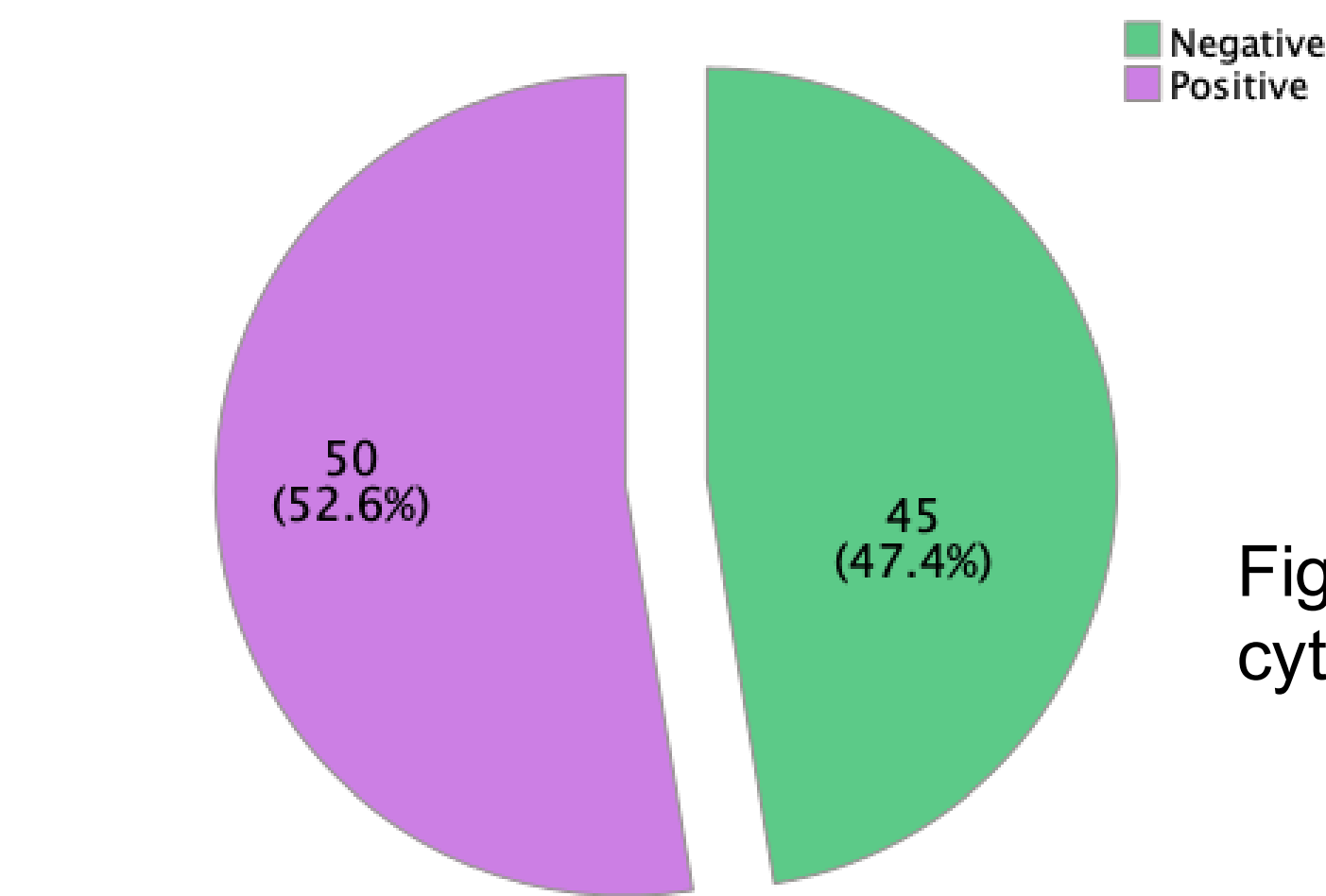


Figure 1. Pleural effusion cytology results.

- The median survival was 4.0±0.79 months (95% CI: 2.45–5.55).
- Fourteen patients (14.7%) were alive, with a median follow-up of 20.5 (13–34) months.
- In univariate analysis, pleural fluid cytology status was not associated with survival, whereas pleural effusion volume, ECOG performance status, tumor histology, KRAS mutation status, presence of metastasis, adrenal metastasis, and receipt of treatment were significantly associated with survival.
- In multivariable analysis, KRAS positivity was identified as an independent predictor of worse survival (HR: 3.40, 95% CI: 1.12–10.27; $p=0.030$), whereas receipt of modern systemic therapy was associated with improved survival (HR: 0.15, 95% CI: 0.04–0.67; $p=0.013$). Pleural fluid cytology status was not significantly associated with survival (HR: 2.33, 95% CI: 0.72–7.62; $p=0.160$).

Table 2. Multivariable analysis results.

	HR	CI	p
Pleural fluid cytology	2.33	0.72-7.62	0.160
Pleural fluid volume	1.38	0.54-3.56	0.504
ECOG performance status	0.88	0.38-2.04	0.759
Tumor histology	1.49	0.86-2.58	0.156
KRAS mutation status	3.40	1.12-10.27	0.030
Adrenal gland metastasis	0.84	0.23-3.03	0.785
Modern treatment	0.15	0.04-0.67	0.013

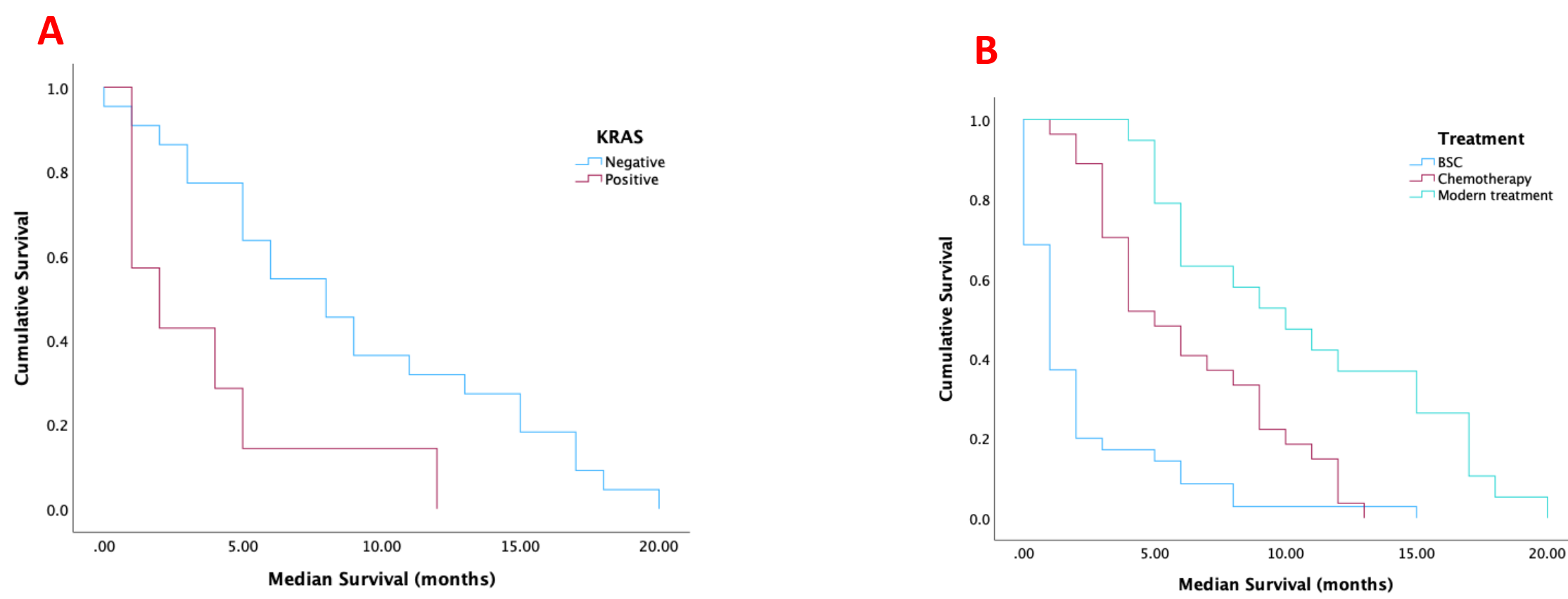


Figure 2. Kaplan–Meier survival curves according to KRAS status (A) and treatment (B).