



P2.067: The Airbag Sign: A Novel CT Finding Predicting Nodal Status in Surgically Resected Non-Small Cell Lung Cancer

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INTRODUCTION

Accurate preoperative assessment of nodal status remains a cornerstone of surgical planning in non-small cell lung cancer (NSCLC). Despite advances in PET-CT and endobronchial ultrasound, reliable CT-based morphological predictors of lymph node involvement are limited. Peritumoral emphysematous or cystic airspaces are commonly observed adjacent to lung tumors, yet their prognostic significance has not been systematically evaluated. We hypothesized that these peritumoral air-containing spaces may act as a physical barrier to tumor spread and serve as a novel radiological sign predictive of nodal status.

METHODS

We retrospectively analyzed preoperative CT scans of 129 patients with surgically resected NSCLC at a single tertiary center. The Airbag Sign was defined as a crescent-shaped or circumferential peritumoral air-containing space (emphysematous area or air cyst) interposed between the tumor margin and the adjacent lung parenchyma. Figure 1. A thoracic radiologist and a thoracic surgeon independently evaluated all CT scans blinded to pathological outcomes. Associations between the Airbag Sign and nodal status (N0 vs N+), spread through air spaces (STAS), tumor contour, visceral pleural distance, and clinicopathological variables were analyzed using chi-square, Fisher exact, and Mann-Whitney U tests. Multivariate logistic regression was performed to identify independent predictors.

DISCUSSION AND CONCLUSION

Conclusions: The Airbag Sign is a novel, easily assessable CT finding that strongly predicts nodal negativity in resected NSCLC (NPV 92.7%). The paradoxical association with STAS in N0 patients suggests a dual biological role: peritumoral air spaces may confine local tumor aggressiveness while acting as a physical barrier against systemic lymphatic dissemination. If validated prospectively, the Airbag Sign could complement existing mediastinal staging strategies and influence the extent of surgical resection planning.

REFERENCES & ACKNOWLEDGEMENTS

Artificial Intelligence (AI) Use Disclaimer

Artificial intelligence (ChatGPT, OpenAI) was used for language editing. All scientific content, analyses, interpretations, and final presentation were reviewed and approved by the author.

RESULTS

The Airbag Sign was present in 55 patients (42.6%) and absent in 74 (57.4%). Median age 63 years; 75.2% male; adenocarcinoma 63.6%, SCC 29.5%. The Airbag Sign demonstrated a striking inverse association with nodal involvement. Among Airbag(+) patients, only 7.3% had nodal metastasis (N1/N2), compared to 55.4% in Airbag(–) patients (OR=0.063, 95% CI 0.02-0.19, p<0.001). The negative predictive value for nodal positivity was 92.7%. In the N0 subgroup (n=84), a paradoxical positive association was observed between the Airbag Sign and STAS (52.9% vs 27.3%, OR=3.0, p=0.025), suggesting that the peritumoral air barrier may confine tumor aggressiveness locally while preventing systemic nodal dissemination. Additionally, peritumoral emphysema was associated with complete absence of STAS (0/18, p=0.010). The Airbag Sign was significantly associated with surrounding ground-glass opacity (p=0.003). Results are summarized in Table 1. Table 1. Airbag Sign and Nodal Status

Table 1. Airbag Sign and Nodal Status

	Airbag (+)	Airbag (–)	p
N+ rate	4/55 (7.3%)	41/74 (55.4%)	<0.001
NPV for N0	92.7%	—	—
STAS+ in N0 subgroup	27/51 (52.9%)	9/33 (27.3%)	0.025



Figure 1: Representative CT images of the Airbag Sign (red arrows) in two N0 NSCLC patients. Peritumoral crescent-shaped air-containing spaces interposed between tumor margin and adjacent parenchyma. Both patients confirmed nodal-negative (N0) on final pathology.