

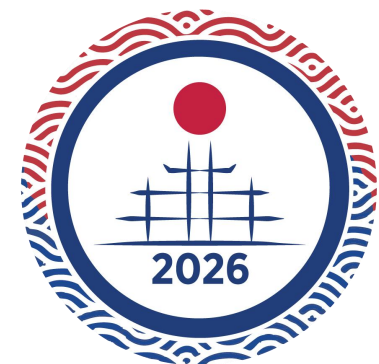


Less Is More: Multicenter Propensity-Weighted Comparison of 40-W vs 50-W Standardized CT-guided Lung Microwave Ablation

Jiachang Chi,Wangrui Liu, Haiping Lin,Yujie Fu, Xiaojing Zhao

Department of Thoracic Surgery, Renji Hospital, Shanghai Jiao Tong University School of Medicine

Correspondence: cowdliuwr@gmail.com



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INTRODUCTION

Why power matters

Generator wattage is decisive yet poorly standardized in lung microwave ablation (MWA).

Clinical tension

Higher peak intensity may amplify pleural/alveolar injury and central vaporization/char without improving peripheral margin coverage.

Isolating wattage

Held constant across arms: one 2.45-GHz platform, one 17-G cooled blunt-tip antenna, coaxial single-pass access, margin-oriented placement, central imaging review, and matched follow-up.

Exposure Fixed 40 W vs 50 W.

Study question

Can 40 W reduce injury and improve radiographic remodeling without sacrificing 12-month completeness?

METHODS

Cohort Retrospective harmonized 3-center study; Oct 2022-Oct 2024; 622 first CT-guided MWA sessions (40 W, n=409; 50 W, n=213).

Equipment & anesthesia

- MTC-3C 2.45-GHz generator; MTC-3CA-II3 17-G internally cooled blunt-tip antenna; Vison-China Medical Devices R&D Center, Nanjing.
- MWA1817C ,Canyon Medical Inc. Nanjing China

Standardized ablation access

- CBL-MWA (Coaxial-Blunt-tip-Low-power): coached end-expiration; trajectory optimized for needle-airway distance, vessel corridors, and a favorable pleural angle.
- Coaxial introducer crossed visceral pleura once; blunt-tip antenna depth/angle adjusted inside the protected tract.
- Margin target: ~10 mm for primary NSCLC and ≥3-5 mm for metastases when anatomically feasible.

Energy endpoint

•40 W default; dwell titrated until the evolving ground-glass halo encircled the lesion and planned margin. Immediate CT confirmed coverage and absence of air leak/bleeding.

Higher-power selection triggers

- Checklist considered 50-60 W for central/juxtavascular solid nodules >12-15 mm, poor antenna-parenchyma coupling, long trajectory/repositioning, prior radiotherapy or fibrotic stroma, or incomplete margin at standard dwell; this analysis compared fixed 40 W vs 50 W. Two attending radiologists co-signed.

Imaging & analysis

- Blinded central core at 48 h, 3, 6, and 12 months; CTCAE v5.0 safety; site-stratified stabilized IPW with site-clustered robust models; post-weighting absolute SMDs <0.10; 12-month imaging completion 92%.



1. The heating electrode is positioned at the extreme distal tip, creating an additional 5 mm zone.
2. The **blunt tip** prevents puncture of blood vessels, bronchi, or the pleura, making it better suited for deep-seated hilar lesions .

DISCUSSION AND CONCLUSION

RENJI / CHINA EXPERIENCE

From technique innovation to a standardized lung-MWA pathway · published evidence, 2021–2026

2021 DIAGNOSE	20-W pre-coagulation followed by same-tract core biopsy; post-coagulation pathologic diagnosis 100% vs 75% before coagulation (31 patients; 32 GGOs). <i>Chi et al. Cardiovasc Intervent Radiol. PMID 33825064 · within-patient feasibility study</i>
2021 ACCESS	Blunt-tip GGO ablation maintained 100% 24-h technical efficacy; grade-I complications were 42.3% vs 75.0% with the earlier sharp-tip pathway (n=42). <i>Chi et al. Eur Radiol. PMID 33797595 · retrospective before–after study</i>
2022 TOLERANCE	Thermal-field, multisite subpleural anesthesia reduced moderate/severe pain to 16.8% vs 67.7% and IV analgesic use to 7.6% vs 45.2% (n=243). <i>Hu et al. Int J Hyperthermia. PMID 35786169 · retrospective before–after study</i>
2024 COVERAGE	In 231 early-stage NSCLCs, bronchovascular-bundle proximity and an ablation margin <5 mm independently predicted local progression—anatomy and margin remain decisive. <i>Wang et al. Eur Radiol. PMID 37505251 · retrospective cohort</i>
2026 POWER	Three-center, propensity-weighted comparison (n=622): 40 W was associated with fewer major adverse events, faster involution, fewer cavities, and 95.6% 12-month completeness. <i>Liu et al. Acad Radiol. PMID 41219035 · retrospective multicenter cohort</i>

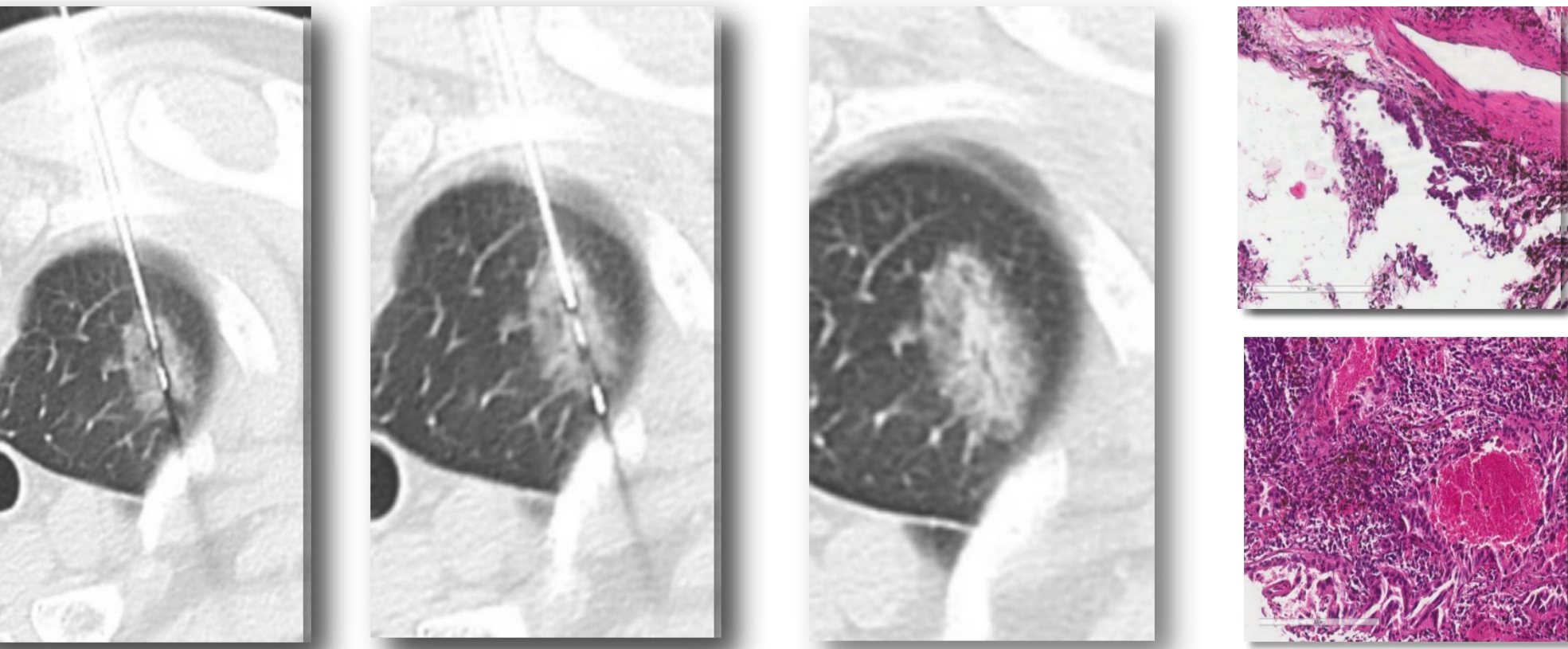
What travels Indication discipline → single-tract coaxial access → blunt-tip control → CT-verified margin → surveillance + salvage
Center-derived Chinese experience—not a national guideline. Retrospective evidence predominates; surgery remains essential when pathology, nodal staging, or oncologic margins require it.

LESS ENERGY, MORE CONTROL Start at 40 W; escalate only for coupling, anatomy, or incomplete image-defined coverage.

REFERENCES & ACKNOWLEDGEMENTS

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[6] Hu H, et al. Cardiovasc Intervent Radiol. 2021;44:237-246. PMID 32909064. CC BY.
Ethics / equipment Renji IRB KY2021-263-B; MTC-3C/MTC-3CA-II3; uCT 530.
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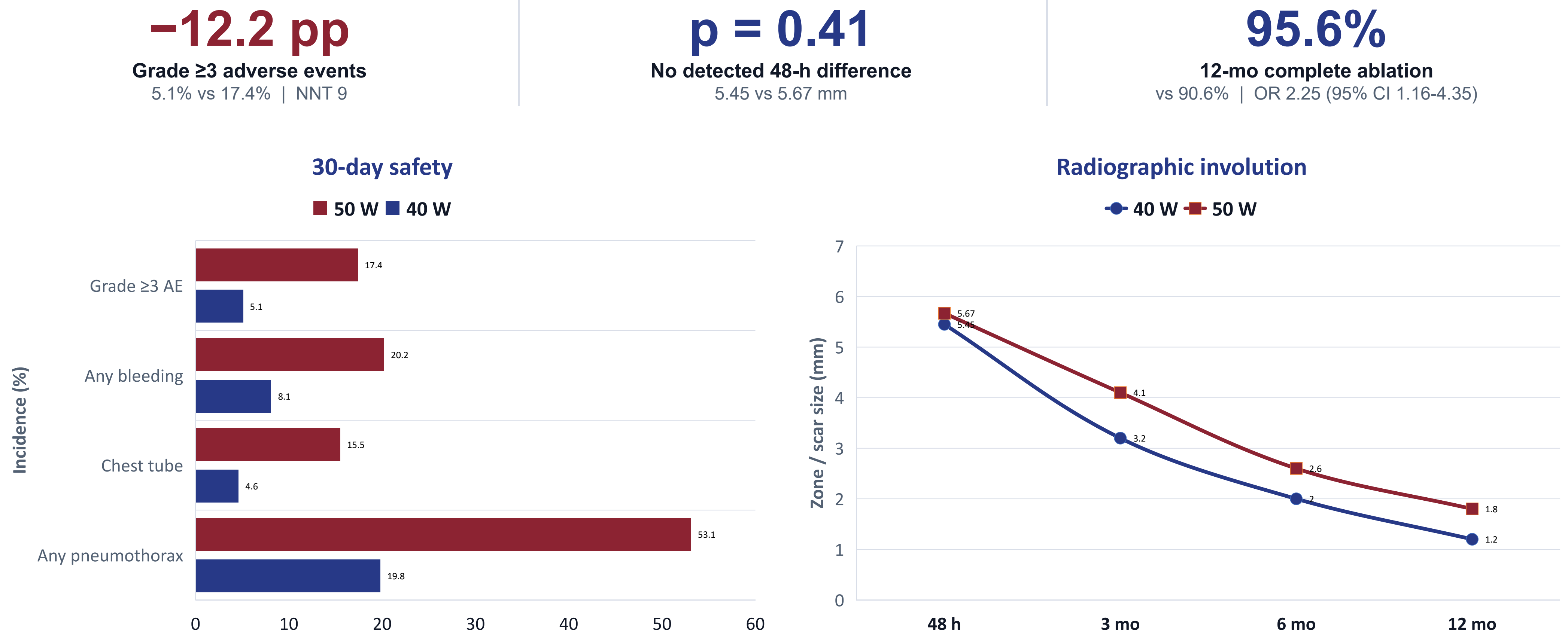
Allowing the sample to clot before processing simultaneously increases the positive rate and reduces bleeding.

Closed-loop workflow: Pre-coagulation → Coaxial biopsy (H&E, IHC, molecular analysis) → Precision inactivation.

RESULTS

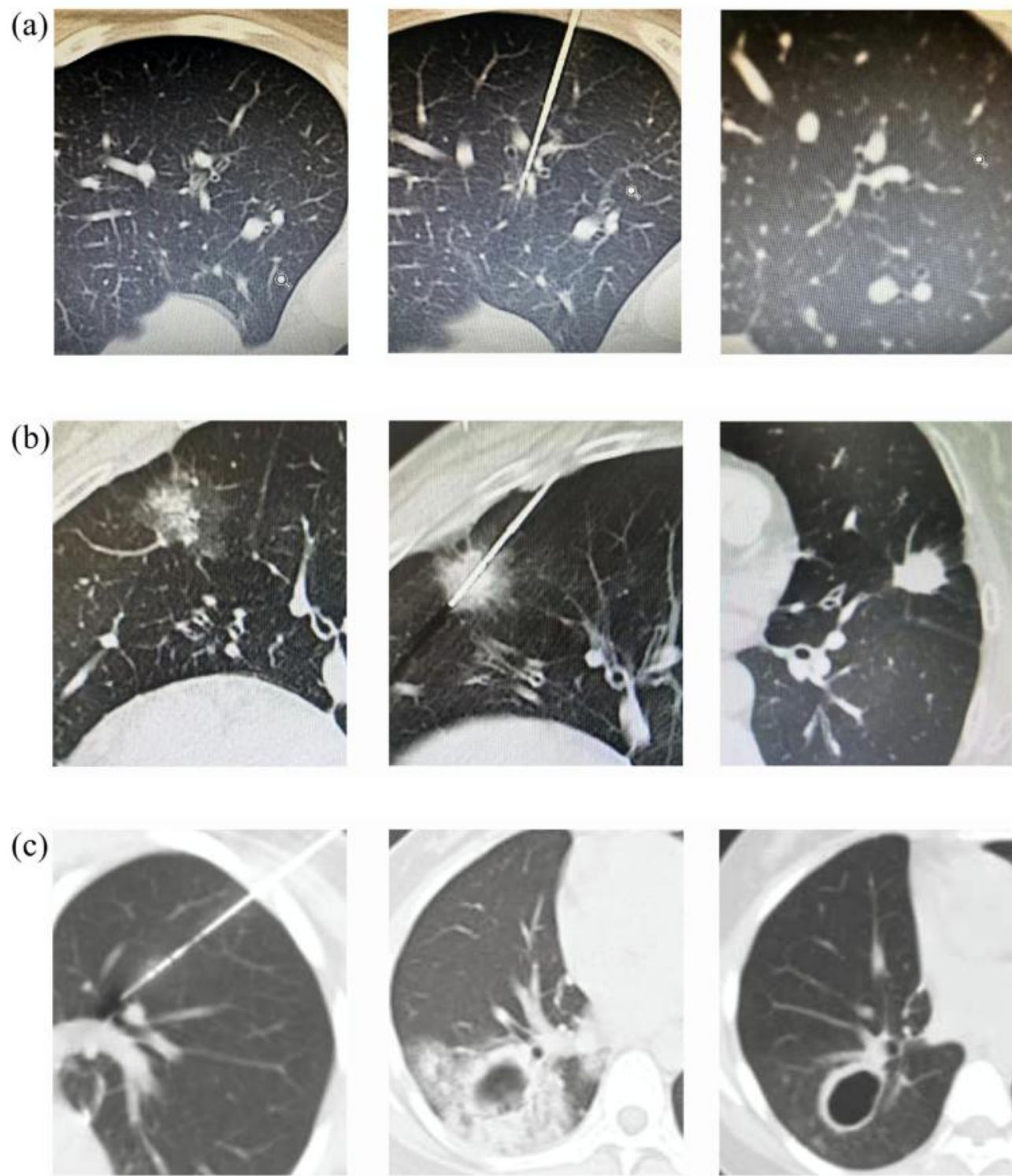
40 W was associated with safer healing and similar early coverage

n=622 | 40 W n=409 | 50 W n=213 | site-stratified stabilized IPW



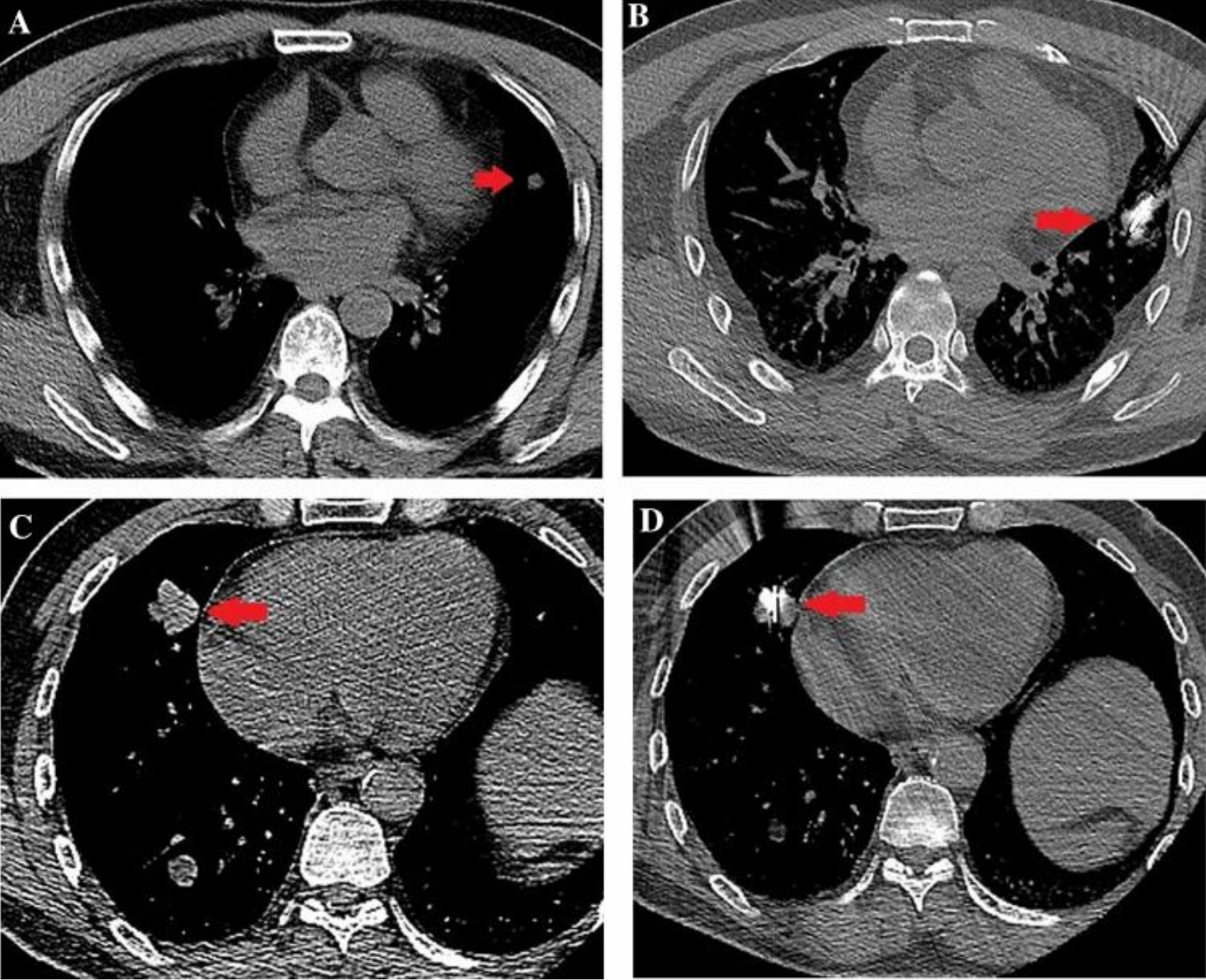
CAVITY-FORMING INJURY 3 / 6 / 12 mo: 40 W 4.2 / 2.4 / 1.7% vs 50 W 9.9 / 7.0 / 4.7% · all p≤0.005

CASE ATLAS — FIVE PUBLISHED, DE-IDENTIFIED EXAMPLES



CASES 1–3 | POWER-DEPENDENT HEALING

- 1 40 W → compact scar.
- 2 50 W → larger mature scar.
- 3 50 W → persistent cavity despite similar early coverage.

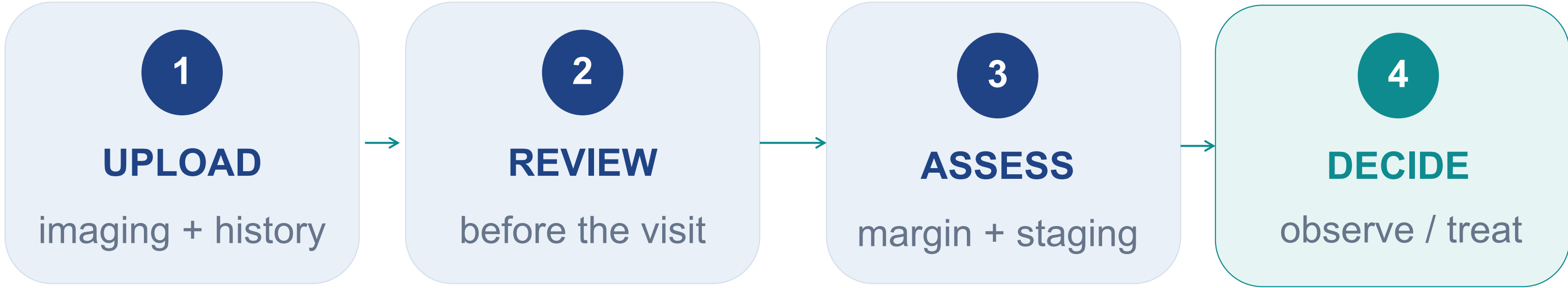


CASES 4–5 | ANATOMY SETS THE BOUNDARY

A–B: 1.2-cm lesion near but not contiguous with the pericardium.
C–D: 2.8-cm lesion contiguous with the pericardium.

This propensity-matched report found better long-term control and OS with wedge resection as first-line therapy; MWA was positioned as an alternative for high-risk/inoperable patients.

Renji PRECISION APPOINTMENT



CASE 6



CBL-MWA
(Coaxial-Blunt-tip-Low-power)