

Competing-Risk Validation of AJCC 9th TNM Versus Masaoka-Koga Staging in Thymoma



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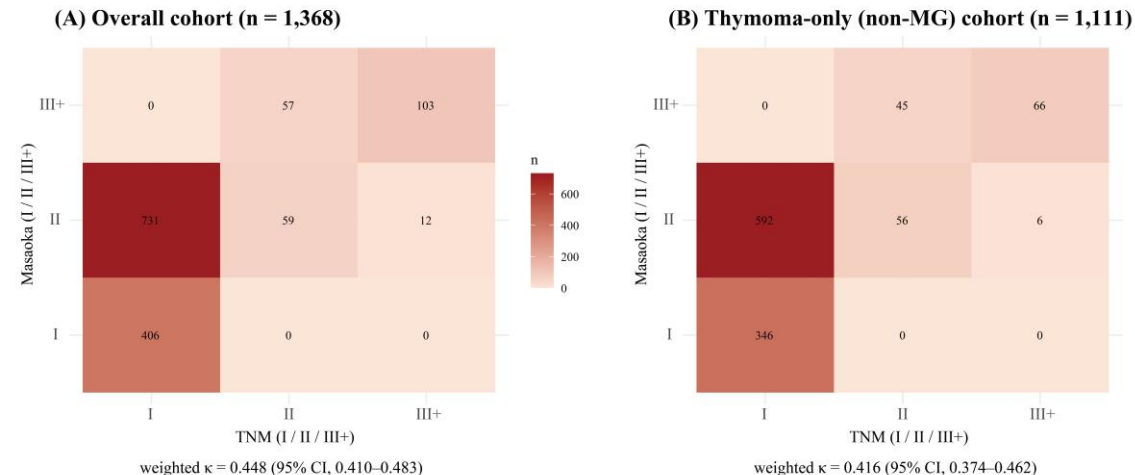
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Introduction

Masaoka-Koga remains widely used for thymoma, but its stage II is heterogeneous and may weaken reproducibility and intermediate-risk stratification. We compared AJCC 9th TNM with Masaoka-Koga for survival and postresection tumor recurrence/metastasis.

Methods

We retrospectively studied patients undergoing curative-intent thymoma resection at three thoracic centers from January 1, 2009, through November 30, 2025. Tumors were restaged per AJCC 9th TNM and Masaoka-Koga stages were re-reviewed. Stage groups were harmonized as I/II/III+. Parallel multivariable Cox and Fine-Gray models held covariates constant while alternately entering each staging system. Time-dependent AUC, Brier score, calibration, and leave-one-center-out validation assessed performance.



0.448

Weighted inter-system
agreement

91.1%

Masaoka II reassigned to
TNM I

0.918 / 0.872

TNM AUC at 3 / 5 years

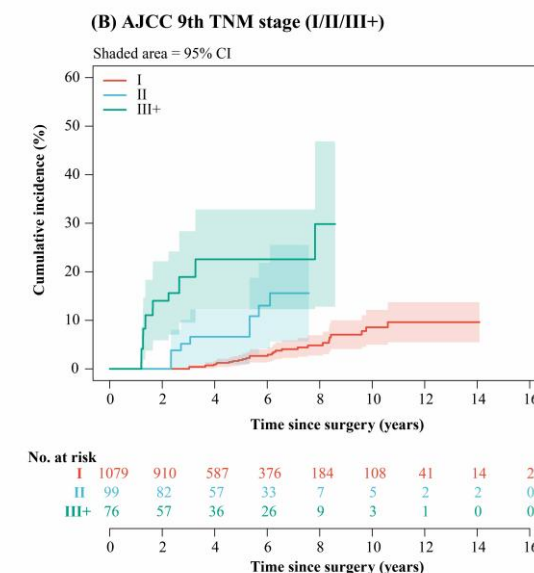
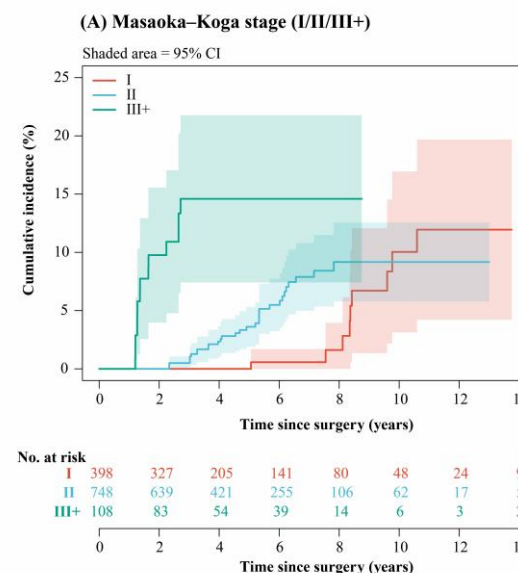
Primary Findings

Among 1,368 patients, median follow-up was 4.67 years; 1,254 (91.7%) had R0 resection and 78 deaths occurred. Agreement was moderate (weighted kappa=0.448; 95% CI, 0.410-0.483). Most Masaoka II tumors were reclassified as TNM I (731/802; 91.1%). For OS, TNM showed steeper gradients than Masaoka (stage II vs I: HR 2.45 vs 1.99; stage III+ vs I: HR 4.33 vs 3.56) and higher 3-/5-year AUCs (0.918/0.872 vs 0.887/0.839).

Additional Findings

- After R0 resection, TNM better separated recurrence/metastasis risk: stage II vs I HR 3.55 (95% CI, 1.60-7.88) versus 1.87 (95% CI, 0.88-3.99) for Masaoka-Koga.
- Gray P=4.51 x 10⁻¹⁴ for TNM versus 6.91 x 10⁻⁶ for Masaoka-Koga.
- Leave-one-center-out OS mean AUC at 3/5 years: 0.915/0.851 versus 0.875/0.814.

Event: recurrence/metastasis





Conclusion

AJCC 9th TNM more clearly resolved intermediate-stage migration and better stratified survival and postresection recurrence/metastasis risk than Masaoka-Koga, supporting TNM as the preferred framework for thymoma surveillance and multicenter research.

Funding

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Ethics

Institutional review boards of the participating centers (April 16, 2025; No. 2025KY123); informed consent was waived.

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