


Strain Before the Storm: Peak Atrial Longitudinal Strain as a Predictor of Postoperative Atrial Fibrillation in Valve Surgery

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Background: Postoperative atrial fibrillation (POAF) remains a frequent complication following valve surgery, contributing to increased morbidity and prolonged hospitalization.^{1,2} Existing risk stratification models demonstrate limited predictive value. Peak atrial longitudinal strain (PALS), a marker of left atrial functional remodeling, may improve preoperative risk assessment.³

Methods: A PRISMA-compliant systematic review was conducted. From a validated base of 31 observational studies on echocardiographic predictors of POAF, we identified 3 studies exclusively involving isolated valve surgery patients. These studies underwent ROBINS-I risk of bias assessment and GRADE evidence quality evaluation. Standardized mean differences (Hedges' g), 95% confidence intervals (CI), and standard errors (SE) were calculated. A random-effects meta-analysis was performed; heterogeneity was assessed using the I^2 statistic.

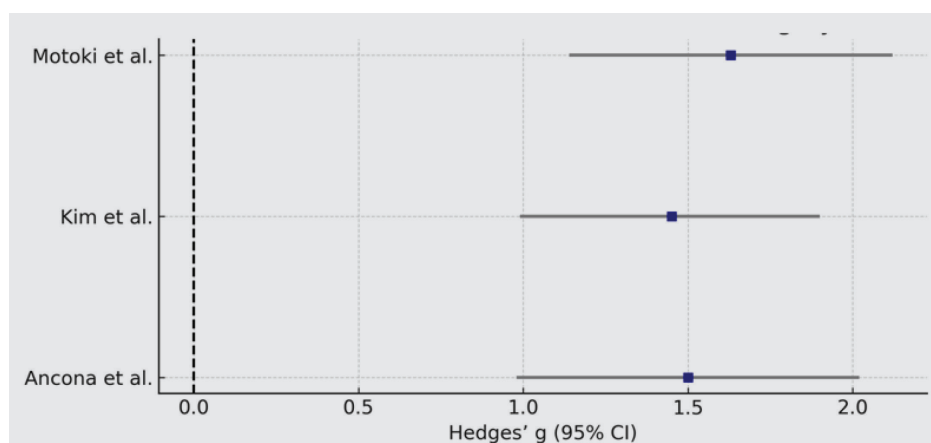


FIGURE 1. Forest plot showing peak atrial longitudinal strain and postoperative atrial fibrillation in valve surgery.

Results: All three studies demonstrated significantly lower preoperative PALS values in patients who developed POAF. Pooled effect sizes were large and consistent (**Figure 1**): Motoki *et al.* ($g=1.63$, 95% CI 1.14–2.12), Kim *et al.* ($g=1.45$, 95% CI 0.99–1.90), Ancona *et al.* ($g=1.50$, 95% CI 0.98–2.02). No heterogeneity was observed ($I^2=0\%$). Reported PALS cut-off values across the studies ranged from 23% to 26%, with corresponding AUC values between 0.90 and 0.93, indicating excellent discriminative performance.

Conclusion: Preoperative reduction in PALS is strongly associated with POAF in valve surgery. This focused meta-analysis is the first to evaluate PALS exclusively in isolated valve surgery patients. It demonstrates that the predictive power of PALS re-

mains robust in this clinically distinct subgroup, with large effect sizes and no heterogeneity across studies. These findings support the integration of PALS into preoperative risk assessment protocols for valve surgery patients, where atrial structural and functional remodeling is particularly relevant. This work adds novel evidence that may inform tailored prophylactic strategies and future guideline development.

LITERATURE

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