



Decoding postoperative atrial fibrillation risk: a systematic review of preoperative echocardiographic predictors in cardiac surgery

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Introduction: Postoperative atrial fibrillation (POAF) is a frequent complication following cardiac surgery, increasing morbidity, length of hospital stay, and healthcare costs.¹ Although multiple clinical factors contribute to POAF risk, echocardiographic parameters reflecting left atrial and ventricular function may improve preoperative risk stratification. Identifying reliable predictors could enhance patient selection, optimize perioperative management, and reduce complications.² This systematic review evaluates the role of preoperative echocardiography in predicting POAF in patients undergoing cardiac surgery.

Patients and Methods: A systematic search, conducted according to PRISMA guidelines, explored PubMed, CrossRef, and Google Scholar for studies evaluating preoperative echocardiographic predictors of POAF in adult cardiac surgery patients. After screening 363 studies, 317 proceeded to title and abstract screening. A full-text review of 112 studies led to the final inclusion of 31 studies. Data extraction included echocardiographic parameters, study design, and POAF incidence. The risk of bias was assessed using the ROBINS-I tool, while the GRADE methodology evaluated the evidence quality.

Results: 4,512 patients were included, with a POAF incidence of 24.0%. Key echocardiographic predictors of POAF included increased left atrial volume index (LAVI), reduced left atrial strain (PALS, PACS), impaired LV diastolic function (elevated E/e' ratio), prolonged PA-TDI duration, diminished left atrial function (LAEF, LAFAC), and reduced LV global longitudinal strain (GLS). POAF patients had significantly higher LAVI, E/e', and PA-TDI duration, while LA strain, LA function, and LV GLS were lower ($p < 0.05$). The ROBINS-I assessment classified 13 studies as low risk of bias, while 18 studies had moderate risk primarily due to selection bias, uncontrolled confounding, and variability in echocardiographic measurements. According to the GRADE assessment, 16 studies were rated as moderate-quality evidence and 15 as low-quality evidence, primarily due to the observational design and inconsistencies in echocardiographic measurement protocols.

Conclusion: LAVI, LA strain, and LV diastolic dysfunction emerged as the strongest echocardiographic POAF predictors, underscoring their critical role in preoperative risk stratification. Despite moderate-quality evidence, these findings advocate for echocardiographic markers integration into POAF risk models to refine patient selection and optimize outcomes. Future research must focus on standardizing measurements, validating thresholds, and embedding these parameters into clinical decision-making to enable precise, individualized risk assessment.

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LITERATURE

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