Atrial fibrillation (AF) after cardiac surgery is a major cause of morbidity and mortality, and it has been reported that the rate of occurrence is 18–40%. Various causes have been studied, including advanced age, body mass index, obesity, left atrial dimensions, cardiac dysfunction, chronic respiratory failure, renal dysfunction, fluid balance, preoperative medications, inflammation, and fibrosis, but no definitive consensus has yet been reached and various factors are involved in its occurrence (Figure). In this issue of the Journal, Chua et al. describe how they divided 265 patients undergoing cardiac surgery into 3 groups based on the results of preoperative glomerular filtration rate (GFR (ml · min⁻¹ · 1.73 m⁻²): Group 1, ≥90; Group 2, 60–90; Group 3, <60), and they report that the incidence of postoperative AF (POAF) is higher in patients with lower renal function. Furthermore, they demonstrated a correlation between GFR and the risk of postoperative AF.
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and E/e’, which is an index of left ventricular (LV) diastolic dysfunction. In the cardiovascular internal medicine area, LV diastolic dysfunction is attracting attention as a primary cause of cardiac failure. It has been reported that LV diastolic dysfunction causes atrial and ventricular pressure loads, leads to atrial remodeling, and is closely involved in the occurrence of AF. However, there have been almost no studies on the relationship between post-surgical POAF and LV diastolic dysfunction. The first report was made by Meldumi et al of the Mayo Clinic who concluded that LV diastolic dysfunction is a powerful predisposing substrate for the occurrence of POAF after cardiac surgery, based on the detailed data obtained from the echocardiography and angiography. They considered that progression of fibrosis related to advanced age causes remodeling and increased stiffness of the atrial and ventricular myocardium.

In their study, Chua et al also investigated the relationship with renal dysfunction, and report that advanced age, renal dysfunction, anemia, LV hypertrophy, and LV diastolic dysfunction are closely involved in the occurrence of POAF after cardiac surgery. In a previous study, they focused on the relationship between LV diastolic dysfunction and renal dysfunction, because the magnitude of left atrial pressure and the severity/chronicity of diastolic dysfunction is a marker of left atrial enlargement, and left atrial voltage/longer activation time influences renal function. They discuss the association in patients with renal dysfunction with anemia, left ventricular hypertrophy, LV diastolic dysfunction, and left atrial enlargement, according to the literature, and their conclusion that renal dysfunction and LV diastolic dysfunction are important issues for patients undergoing cardiac surgery makes their study’s results significant in clinical practice.

Regarding the prevention of POAF, administration of amiodarone and oral administration of beta-blockers are recommended in the ACC/AHA/ESC guidelines. We previously demonstrated that landiolol hydrochloride, an ultra-short-acting intravenous β-blocker, and the oral β-blocker bisoprolol prevented POAF in a randomized controlled trial of patients undergoing CABG with cardiopulmonary bypass, and we concluded that an antiinflammatory effect, antiischemic action, and sympathetic effect were involved. We have also reported that carperitide has an antiarrhythmic effect and a preventive effect on the occurrence of AF. In that study, although we concluded that the antiischemic action and inhibitory effect on the renin-angiotensin-aldosterone system by carperitide were involved in the prevention of POAF, the findings of Chua et al make us want to investigate further because it is possible that POAF was prevented by improvement in either LV diastolic dysfunction or renal dysfunction by the effect of beta-blockade or carperitide.

In the study by Chua et al the rate of preoperative and postoperative β-blocker use was approximately 70%, so we can expect further developments from their study because future investigations of LV diastolic dysfunction and renal dysfunction in relation to drug use may be more helpful for clinical practice.

References