Focus on cardiac arrhythmias and conduction disorders

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The sudden appearance of cardiac arrhythmias or the development of new conduction disorders always should trigger to look for underlying changes in myocardial perfusion and/or pump function, electrolyte or metabolic disturbances and electrophysiological side-effect of medications.

Cardiac surgery is frequently complicated by the development of postoperative atrial fibrillation (AF) (in about 30 % of the patients after coronary artery bypass grafting and 50 % after valve surgery) which is associated with an increased postoperative morbidity and mortality due to acute heart failure, stroke and other thrombo-embolic complications, ventricular arrhythmias. The current European Society of Cardiology (ESC) guidelines recommend beta-blocker therapy in all patients and prophylactic amiodarone therapy in high risk patients to prevent postoperative AF. Precise tools for assessing the risk for postoperative AF are however missing. In a prospective study of cardiac surgery patients in whom clinical, biological, ECG and transthoracic echocardiography data were preoperatively collected, history of AF and an indexed left atrial volume >32 ml/m² were the strongest predictors of postoperative AF. In absence of previous AF indexed LV mass >110g/m² was also an independent predictor. These findings suggest that preoperative echocardiography may allow a more accurate identification of high-risk patients who potentially may benefit from an improved prevention of postoperative AF by prophylactic amiodarone treatment. Moreover, as diastolic dysfunction with elevated left ventricular filling pressure is most probably the most frequent underlying cause responsible for the left atrial remodeling, the postoperative fluid balance should be more cautiously monitored in AF patients with dilated left atria and eventually preload reducing agents such as diuretics, nitrates or ACE-inhibitors administered in order to prevent too excessive swings in left atrial pressure that may trigger AF. Higher preoperative NT-pro brain natriuretic peptide levels were indeed strongly associated with the development of postoperative AF.

Known permanent or new-onset AF is a relatively common comorbid condition or complication in patients with an acute coronary syndrome (ACS). A post-hoc analysis from the long-term follow-up of antithrombotic management patterns in acute CORonary syndrome patients (EPICOR) registry (NCT01171404), a prospective, observational study conducted in Europe and Latin America, shows that in real life clinical practice patients with ACS and AF are less frequently treated with revascularization therapies, and that more than half do not receive oral anticoagulation at discharge, with a decline in use over time. They experienced a high event rate during long-term follow-up, with increased mortality, and cardiovascular and bleeding events compared with ACS patients without AF. Known permanent AF was a strong independent predictor of both mortality and the composite endpoint of death, non-fatal myocardial infarction or non-fatal stroke during the first 2 years after discharge, whereas new-onset AF was not. These findings indicate that the implementation of guideline-recommended therapies needs to be markedly improved in these high-risk ACS patients both during the initial hospitalization and follow-up.

A literature review shows that the incidence of AF varies widely (1 to 44%) in patients hospitalized with an acute medical illness and is heavily dependent on the intensity of continuous ECG-monitoring. Recurrence rates after discharge are high (42 to 68%) and possibly also underestimated. Further prospective studies using systematic and sensitive AF detection strategies are needed to assess the incidence, recurrence rate and long-term clinical outcome of AF during an acute medical illness.

Patients with recent-onset AF (>48 hours) are frequent visitors at the emergency department (ED). Early conversion without any delay may reduce the risk of thromboembolic complications and prevent electrical and mechanical left atrial remodeling. Pharmacological conversion of recent-onset AF is a valuable alternative for electric cardioversion without any need for anesthesia or fasting what may improve the patient flow at the ED. In a non-randomized retrospective study intravenous verapamil was safe, almost two times more effective and
faster than flecainide in the pharmacological cardioversion of recent-onset atrial fibrillation.\(^5\)

In spite of early reperfusion up to one third of the patients with a ST elevation myocardial infarction (STEMI) do not show a significant resolution of the ST segment elevation upon recanalization of the infarct related coronary artery,\(^6\) a hallmark of the development of a marked reperfusion injury,\(^7\) that frequently also is associated with the appearance of **ventricular reperfusion arrhythmias**. Although these arrhythmias were in the thrombolytic era interpreted as a beneficial sign indicating that reperfusion is taking place, it has now become clear that they share a common pathophysiological basis with that causing fatal reperfusion injury. Reperfusion arrhythmias should therefore rather be seen as a marker for fatal reperfusion injury. In a review paper the pathophysiological mechanisms of lethal reperfusion injury at the cellular level and reperfusion arrhythmias are discussed in detail.\(^8\)

The development of **ventricular arrhythmias leading to cardiac arrest** is major complication of **acute myocardial infarction** (MI) responsible for an important prehospital mortality. Analysis of the data of a large clinical acute MI registry at the Vienna general hospital shows that the highest incidence of cardiac arrest is observed in the youngest patients (<45 years) and decreases significantly with increasing age.\(^9\) Although cardiac arrest is overall a strong and independent predictor for mortality there was no significant association with mortality in very young patients. The risk for the development of ventricular arrhythmias leading to cardiac arrest appears therefore age dependent with a much higher susceptibility in young MI patients without any effect on long term mortality.

The latest ESC guideline for STEMI recommends that left and right bundle branch block (RBBB) should be considered equal for recommending urgent angiography in patients with suspected MI.\(^10\) Analysis of large group of patients with suspected MI included in two large recent prospective studies supports RBBB as a high-risk feature in patients with suspected MI.\(^11\) However, the concept of **RBBB as a trigger for acute coronary angiography is challenged** because the likelihood of identifying a culprit lesion is rare and equally frequent in patients without RBBB.

Sedation is commonly needed in the intensive cardiac care unit. In an educational review on **sedation in cardiovascular critical care medicine** a general sedation algorithm specific for the hemodynamically unstable cardiac patient is provided.\(^12\)

Optimal antithrombotic therapy in patients with atrial fibrillation and coronary artery disease (CAD) is challenging as these patients need to be protected both from cerebrovascular complications and acute myocardial ischemic events. In a post-hoc analysis of the ENGAGE AF−TIMI 48 trial the efficacy and safety profile of the oral Factor Xa inhibitor edoxaban was compared with warfarin in patients with atrial fibrillation with and without established CAD.\(^13\) Treatment with the higher-dose edoxaban regimen (60 mg once daily) in patients with known CAD was associated with a significant reduction of acute MI with a similar reduction in the risk of major bleeding compared with warfarin regardless of CAD status. Presence or absence of CAD did not modify the efficacy or safety profile of the lower-dose edoxaban (30mg once daily) regimen. It appears therefore that in patients with stable CAD who require an oral anticoagulant for atrial fibrillation, a higher-dose edoxaban regimen may be the preferred antithrombotic therapy.

Despite dual antiplatelet therapy, continuing thrombin generation and thrombin-mediated platelet activation account in part for the residual risk of atherothrombotic complications among patients with prior ACS. **Addition of a low dose antithrombotic regimen with an oral factor Xa inhibitor** may possibly improve outcome of high-risk post ACS patients by preventing ongoing thrombus formation. In a post-hoc analysis of the ATLAS ACS 2-TIMI 51 trial rivaroxaban 2.5 mg twice daily was associated with a significant reduction in the composite endpoint of cardiovascular death, myocardial infarction, or stroke with no increase in fatal bleeding.\(^14\) In **high-risk ACS patients** without a history of prior stroke or transient ischemic attack, adding rivaroxaban 2.5 mg twice daily to DAPT with aspirin and clopidogrel may therefore be considered to improve clinical outcome.

**References**