

What we have learned from the ESC position paper on arrhythmias in acute coronary syndromes

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Arrhythmias frequently accompany acute coronary syndromes (ACSs). Management of such patients might be a challenging issue for emergency physicians and cardiologists, and because knowledge and evidence on the topic are emerging and evolving (1).

The recently published position paper by the European Heart Rhythm Association, Acute Cardiovascular Care Association, and European Association for Percutaneous Cardiovascular Interventions joint task force addresses this issue, providing an expert opinion on the topic, explaining and justifying comprehensive management approaches, and suggesting decision making and actions for cardiologists and specialists in relevant disciplines on how to manage and treat challenging cases of arrhythmias in patients with ACS (2-4).

The document covers the following topics: how to determine patients at risk for arrhythmias, pharmacological (antiarrhythmic drug therapy), and nonpharmacological approaches (overdrive pacing, direct current cardioversion (DCC), and catheter ablation), which have become the preferred way of treating arrhythmia, how to treat tachy- and bradyarrhythmias and atrial fibrillation (AF), and how to manage arrhythmias in special conditions: occurring during PCI, accompanying cardiogenic shock, and in patients with implanted ICD.

The following distinctive message of the paper must be acknowledged; that is, management approaches of patients with ACS and patients with arrhythmias have shifted towards invasive management. The mainstay of treatment of all types of cardiac arrhythmias in patients with ACS is the achievement of complete revascularization and restoration of coronary flow and perfusion-measures to treat underlying ischemia and infarction-which should be the first-line treatment in management of arrhythmias.

Patients with ACS might present with a wide variety of cardiac arrhythmias, including sustained ventricular arrhythmias (VAs), AF, and bradyarrhythmias. It is outlined that patients with

ACS presenting late from onset of symptoms or in whom complete revascularization was not achieved or having substrate for arrhythmia prior to ACS and those with complications should be considered at a high risk for cardiac arrhythmia development.

How to treat VAs in patients with ACS?

In patients with ST-elevation myocardial infarction (MI), sustained VA [ventricular tachycardia/ventricular fibrillation (VT/VF)] occurrence varies between 4.4 and 10.2% in patients undergoing primary PCI and thrombolytic therapy, respectively (5-7). These arrhythmias might develop due to reperfusion or occlusion of coronary artery. Reperfusion arrhythmias do not usually require treatment, and prompt revascularization must precede all further measures in treatment of arrhythmias.

The main trend in management of VA presented in the current position paper is that first choice of therapy includes use of nonpharmacological approaches, followed by use of pharmacological therapy, if necessary. Treatment of VA that occurs and sustains despite optimal revascularization treatment must include general measures, such as early treatment with beta-blockers in absence of contraindications, correction of electrolyte imbalance, and adequate sedation to reduce sympathetic drive and nonpharmacological methods as overdrive stimulation and/ or repetitive DCC, which must be first attempted to terminate arrhythmia. Antiarrhythmic drugs can be used only if nonpharmacological methods fail, with amiodarone as the first choice, followed by lidocaine, if necessary. When all above measures fail, catheter ablation as described below can be considered.

In patients with ACS and VA who have implanted ICDs and pacemakers, the following DCC technique must be used: the anterior-posterior paddle/pad position on the chest, ideally at



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least 8 cm away from the generator position, and use of biphasic shock. It is necessary to check pacing and sensing parameters after DCC.

Catheter ablation can be considered as a bailout measure when a patient with ACS presents with an electrical storm, defined as three or more episodes of VT/VF in 24 hours, that is refractory and resistant to nonpharmacological and pharmacological treatment. The procedure must be performed by experienced in catheter ablation of VT/VF electrophysiologists in a high-volume VT ablation center; if these are unmet, the patient should be transferred to the high-volume ablation center.

If a patient with ACS and implanted ICD develops conditions such as electrical storm or inappropriate ICD shocks, the following management strategies should be considered: treat ischemia and perform revascularization; correct electrolytes in patients with QT interval prolongation or hypokalemia, use beta-blockers combined with sedatives to reduce sympathetic overactivity, and consider amiodarone as a preferred antiarrhythmic agent for treatment of electrical storm. In a patient with ICD, if the device fails to terminate VT/VF, external DCC as described above, can be used for arrhythmia termination. Patients with ICD may require device reprogramming. In intractable cases of electrical storm, catheter ablation as described above should be considered. If persistent arrhythmia is accompanied by hemodynamic instability, placement of the percutaneous left ventricular assist device should be considered.

How to treat AF in patients with ACS

Patients with ACS might present with pre-existing or newly developed AF, which is associated with increased in-hospital, short-, and long-term morbidity and mortality (8-10). Whenever AF is accompanied by hemodynamic instability, urgent DCC is required. Rate control should be achieved irrespective of the type of AF, pre-existing or newly developed. For rate control, beta-blockers or, possibly, calcium antagonists can be used; amiodarone and/or digitalis are indicated in patients with severe left ventricular dysfunction. Amiodarone can also be used for restoration of sinus rhythm in addition to electrical cardioversion; other antiarrhythmic agents might be harmful to patients with MI. Adequate anticoagulation therapy is required for prevention of thromboembolic events. Selection of antithrombotic therapy should be based on individualized risk assessment of thromboembolic events and bleeding (using the CHA₂DS₂-VASc and HASBLED scores, respectively), as well as measures to minimize bleeding complications (11). The recommendations have been recently updated in the new published European Society of Cardiology Working Group on Thrombosis, European Heart Rhythm Association, European Association of Percutaneous Cardiovascular Interventions and European Association of Acute Cardiac Care position paper (12).

How to treat bradyarrhythmias in the setting of ACS

Persistent bundle branch block and high-degree atrioventricular (AV) block in patients with acute MI that develop soon

after admission are associated with high mortality (13, 14). Successful and prompt revascularization is sufficient to reverse newly developed conduction disturbances, particularly in the setting of inferior MI. Temporary transvenous pacing is required for conduction disturbances that do not resolve after revascularization and medical treatment with positive chronotropic agents (isoproterenol, atropine, etc), such as high-degree AV block and ventricular conduction defects, high-degree AV block without adequate escape rhythms, and life-threatening bradyarrhythmias occurring during interventional procedures. Permanent pacing should be considered when conduction disturbances persist beyond the acute phase of MI and as soon as possible, if the indication for permanent pacing is established.

How to manage a patient with arrhythmia that developed during primary PCI?

About 6% of patients with ST-elevation MI might develop sustained VT/VF, with 2/3 of events occurring before the end of primary PCI, and irrespective of the timing of their occurrence, these arrhythmias are associated with an increased risk of mortality. Task force members recommend the following management strategy for sustained VA in patients with STEMI that developed during primary PCI: VT/VF should be treated by DCC, overdrive pacing, beta-blockers, and amiodarone; for polymorphic VT, use of electrolyte imbalance correction, beta-blockers, and amiodarone are recommended; for refractory VT/VF cases, implantation of the percutaneous left ventricular assist device should be considered. Atrial fibrillation does not usually require treatment during intervention, except cases when it is accompanied by a high ventricular rate. This arrhythmia with a high ventricular rate occurring during PCI should be treated by urgent DCC, with further treatment as described above.

How to treat arrhythmias in a patient with ACS and cardiogenic shock?

Cardiac arrhythmias, sustained VT/VF, AF, and bradyarrhythmias in patients with ACS and cardiogenic shock worsen hemodynamic instability and are associated with a high mortality rate (15, 16). Regardless of the type of cardiac arrhythmia, treatment of underlying cardiogenic shock and prompt revascularization should be performed as primary procedures and should not be delayed by arrhythmia management. Acute management of VT/VF includes immediate DCC, amiodarone, and lidocaine, if necessary. In refractory VT/VF cases, placement of the percutaneous left ventricular assist device or extracorporeal membrane oxygenation-assisted PCI can be used. Use of intra-aortic balloon counterpulsation has not been shown to be effective in patients with cardiogenic shock undergoing primary PCI and is not recommended. If intractable arrhythmia persists, catheter ablation may be considered as a salvage procedure, as described above.

AF should be managed by immediate DCC if accompanied by a high ventricular rate and it compromises further cardiac output; amiodarone is the agent of choice for rate control, and it

might assist cardioversion. If the high ventricular rate cannot be taken under control by above measures, atrioventricular node ablation with biventricular or left ventricular stimulation can be considered. Severe and symptomatic bradyarrhythmias accompanied by hemodynamic instability require placement of temporary pacemaker if they do not resolve within few minutes after reperfusion.

Although in real-time practice, each challenging case might not fit the set of rules represented in any guidelines or position papers, we believe that above-mentioned different clinical scenarios and expert recommendations showing how to manage these cases will help practicing cardiologists and emergency physicians to choose and apply the correct and most effective management strategy to their patients.

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